Revisiting the 26 Years of the Japan-India Science Council

Japan Society for the Promotion of Science
日本学術振興会

Preface: Purpose of the commemorative publication

The Japan-India Science Council was established in 1992 by way of an agreement between the Japan Society for the Promotion of Science (JSPS) and the Indian government's Department of Science and Technology (DST). The Council held its first meeting in 1993. Over the period of 26 years that has elapsed since then, successive generations of Council members, with great ardour and strong will, have worked to invigorate scientific exchange between Japan and India while building robust foundations to support and advance it.

With changes in the global scientific milieu over time and toward creating an enhanced platform upon which JSPS and DST can more smoothly and rationally carry out bilateral programs, the role of the Japan-India Science Council has ended; however, joint research projects and seminars will continue to be supported under the Japan-India Cooperative Science Programme as in the past. This Commemorative Booklet is published at this juncture for the purpose of retracing the Council's footsteps and landmarks over course of its rich and esteemed history—a history that has set the cornerstones for even more vibrant scientific collaboration between Japan and India. As we set about treading this new path, we ask for your greatly appreciated guidance and support.

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Milestones of the Japan-India Science Council

1992	June	An Indian delegation in the natural science visited Japan. An agreement was made to establish the Japan-India Science Council.
1993	August	The Japan-India Science Council was established, and its first meeting was held in New Delhi. The council agreed on the 5 priority areas of cooperation. i) Molecular Structure, Spectroscopy, and Dynamics, ii) New Materials, including Polymers, iii) Modern Biology and Biotechnology, iv) Manufacturing Science, v) Astronomy and Astrophysics A 3-year (1993-1995) exchange programme was carried in the fields of spectroscopic chemistry, manufacturing science, and space science.
1994	October	The second meeting of the Council was held in Tokyo. An exchange was started in the areas of New Materials and Modern Biology and Biotechnology.
	November	The first Asian Academic Seminar was held in Bangalore.
1996	January	The third Council meeting was held in New Delhi.
1997	February	The fourth Council meeting was held in Tokyo. A 4-year (1997-2000) exchange scheme was decided upon. Prof. Nagakura proposed to explore the possibility of organising the Japan-India Science Lecture programme. The final decision was made after the Japanese side decides on the modality. The 1st lecture was delivered in Bangalore in November 1997.
1999	October	The fifth Council meeting was held in New Delhi. The new priority area of "Surface and Interface Science" was added to the programme. The Japanese side proposed to name the new lecture series as "Mizushima-Raman Lecture Series", which was approved by the Council.
2000	December	The sixth Council meeting was held in Kyoto. A 4-year (2001-2004) exchange scheme was decided upon.
2003	September	The seventh Council meeting was held in New Delhi.
2005	January	The eighth Council meeting was held in Tokyo. It was agreed to issue an open call for joint research project and seminar proposals.
	September	Call was issued for joint research project and seminar proposals (to be selected in FY2006).
2006	March	The ninth Council meeting was held in Bangalore.
	April	The Exploratory Exchange Programme started.
2007	March	The tenth Council meeting was held in Tokyo. The name of two priority areas were modified i) Molecular Science and Molecular Materials including Dynamics and Supramolecular Science and v) Astronomical & Space Science.
	June	Pilot projects were carried out in the area of Earthquakes and Tsunami (ending in FY 2008).
2008	January	The eleventh Council meeting was held in Delhi. An agreement was made to rotate the Asian Academic Seminars between Japan and India every year (starting from FY 2008).
2009	January	The twelfth Council meeting was held in Yokohama. Prof. Nagakura attended the meeting as a Special Advisor.
2010	March	The thirteenth Council meeting was held in Hyderabad.

2011	February	The fourteenth Council meeting was held in Tokyo. The Council agreed to bring some ideas for restructuring of priority areas, which will be established in the next meeting.
2012	March	The fifteenth Council meeting was held in Kolkata. The Council agreed that the six priority areas were restructured to five (starting from FY2013 call). [A] Fundamental Sciences: Physical and Chemical Systems, [B] Materials and System Engineering: Man-made Systems, [C] Natural Systems: Life Sciences and Bioengineering, [D] Sciences for Earth-Space, Marine, and Environment: Global Systems, [E] Mathematics and Computational Science
2013	March	The sixteenth Council meeting was held in Tokyo.
2014	March	The seventeenth Council meeting was held in Hyderabad. It was agreed to shift the Exploratory Exchange Programme to the Special Lecture Programme.
	April	The Special Lecture Tour Programme started.
2015	March	The eighteenth Council meeting was held in Tokyo.
2016	April	The nineteenth Council meeting was held in Bangalore.
2017	May	The discussions about the review of each programme and other agenda were held between the Japanese and Indian council members over emails. It was agreed to include the discussion results into the Agreed Minutes, have a face-to face meeting every two years in the future and change the title of “Asian Academic Seminar” to “Japan-India Forum for Advanced Study”.
2018	April	The twentieth Council meeting was cancelled. It was agreed to hold the meeting on March 2019 in Japan.
2019	March	The twentieth Council meeting was held in Tokyo.

Message from Co-Chairs

Prof. SUZUKI Atsuto
(President, Iwate Prefectural University)

The Japan-India Science Council which had been established in 1993 under the co-organization of the Department of Science and Technology, Government of India (DST) and the Japan Society for the Promotion of Science (JSPS), completed its mission in March, 2019. On this occasion, I express my gratitude for dedicated contributions to successive Council-members.

This Council piloted major accomplishments of collaborations in Molecular Science, Advanced Material Science, Modern Biology/Biotechnology, Manufacturing Science, Astronomy/Astrophysics, and Surface/Interface Science. These collaborations were mutually beneficial in the way they enhanced the proposed activities, involved students and younger researchers from both countries, and allowed both countries to share in the programme's successes and accomplishments. In this process, the Council played a significant role in crossing scientific bridges and forging close investigative relationships.

The Council took an active step forward towards deepening the programme's content in 2012. The research areas were renewed with focus concentrated on Fundamental Sciences of Physical/Chemical Systems, Materials/System Engineering, Natural Systems of Life Sciences/Bioengineering, Astronomy/Space/Earth Systems, and Mathematics/Computational Science.

On top of scientific programmes, this Council used unique processes for stimulating collaborations. It held a face-to-face meeting every one or two year, rotating its venue between Japan and India. In these meetings, vigorous discussions were advanced among the Indian and Japanese members, spawning robust scientific exchange and network building between Japanese and Indian researchers, while fostering a strong relationship of trust between the two nations.

Even after ending the Council, support has continued for joint research projects and seminars under the Japan-India Cooperative Scientific Programme. Looking to the future, the two countries are expected to organise research in each area systematically while facilitating the acceleration of research collaborations and to more fully actuate the research infrastructures on both sides. Given these expectations, there exists a viable option for the programme to evolve into what might be called an "Indo-Japanese Virtual Science Laboratory".

I reiterate my appreciation to all who have participated in this programme of the Japan-India Science Council and made it so successful.

(Prof. SUZUKI Atsuto)

Co-Chair, Japan-India Science Council

Prof. Milan K. Sanyal
(Emeritus Professor and Former Director, Saha Institute of Nuclear Physics)

India Japan Science Council (IJSC) was initiated in 1993 to promote Cooperative Science Programme involving scientists from Japan and India with support from Japan Society for Promotion of Sciences (JSPS) and Department of Science and Technology (DST), Government of India. I am extremely happy to learn that JSPS has taken an initiative to bring out a commemorative booklet that compiles the success achieved under the IJSC.

I am associated with IJSC over many years first as a member and then as Co-Chairperson with Professor Suzuki. IJSC is a success story primarily because it was steered by active researchers from both countries. The IJSC flourished with able and dynamic leadership of two world renowned scientists as Co-Chairman, namely Professor Saburo Nagakura and Professor C.N.R. Rao. IJSC has brought large number of Indian and Japanese researchers together for science collaboration through joint research projects, seminars, visits of scientists, RONPAKU Fellowships and Asian Academic Seminars. IJSC has contributed significantly to flourish relation between our two countries in science world and numbers of joint publications involving scientists from our two countries have improved considerably. I assume similar scheme will be adopted to continue this flourishing collaboration activities between Japan and India in the field of Science and Technology.

Recently with initiative of IJSC, an Indian Beamline has been set up at a Japanese synchrotron, Photon Factory, KEK, Tsukuba and that has enabled large number of Indian Scientists to have access to a very intense synchrotron source for carrying out material research. This project was mentioned in the Joint Statement of the Annual Summit meeting of the two Prime Ministers in September 2014 “Science and Technology Number 43.” and subsequently. Recognizing the success of this flagship cooperative activity, both countries have agreed to continue this collaboration.

(Prof. Milan K. Sanyal)
Co-Chair, India-Japan Science Council

Commemorative Message

SATOMI Susumu, M.D., Ph.D.
(President, JSPS)

Twenty-six years have passed since the establishment of the Japan-India Science Council. I wish to express my deepest appreciation to the members of the Council, the participants in the Japan-India Cooperative Science Programme, and the staffs the Department of Science and Technology (DST) who have devoted both time and effort to carrying out our bilateral programme over this long period.

The importance of cooperation between Japan and India in the realm of science and technology has been loudly extolled in recent years. I've heard, however, that back in 1993 when the Japan-India Council was established via an agreement between JSPS and DST there had been little scientific exchange between our two countries. After that, thanks to all of your support, scientific collaboration between Japan and India expanded greatly. Looking back now, I must pay my heartiest respect to programme's pioneers for their groundbreaking efforts that abounded in farsightedness.

Our cooperative programme established five priority areas and assigned coordinators to each of them. These coordinators, who were themselves members of the Council, had excellent records of scientific achievements and keen discernment as to what's importance in conducting international exchange. What had been little progress in scientific exchange between Japan and India when the coordinator system was launched, accelerated quickly afterwards and now sees more than 100 applications for joint research received under the programme's open recruitments.

As one generation of researchers moves to the next, young researchers who had participated in the Japan-India Cooperative Science Programme later became members of the Council themselves and many can now be seen playing active roles as leaders of joint research projects and seminars. This makes me very happy.

Beyond a shadow of a doubt, what undergirds the vigorous exchange currently enjoyed between Japan and India is the legacy of enthusiasm and strong determination passed on by successive members of the Council and the fruits born of close cooperation between the Japanese and Indian coordinators. It's owing to your efforts that basic research has been so superbly advanced and that so many good scientific results have been achieved. Needless to say, your contributions have also been instrumental in cultivating many friendships among both researchers and programme administrators alike and in fostering the excellent young researchers who will go on to shoulder the future of scientific advancement. For these many accomplishments, I reiterate my admiration and thanks.

As the Japan-India Science Council comes to an end, we are pleased to ask you, the Council members, to compile your various experiences and activities for this commemorative booklet. With your 26-year history as a foundation stone to build upon, we at the Japan Society for the Promotion of Science will work to strengthen further our DST partnership as it plays a powerful role in advancing scientific exchange between Japan and India. To this end, I ask you all for your always appreciated guidance and encouragement.

I. History and Outline of Activities

1. History

Visiting India in April 1990, Japanese Prime Minister KAIFU Toshiki held a meeting with Indian Prime Minister V.P. SINGH, in which they decided to create a new and expanded framework of cooperation for promoting scientific exchange between the two countries. At that time, the Japan Society for the Promotion of Science (JSPS) was designated as the implementing organisation on the Japanese side. As its Indian counterpart organisation for JSPS, an MoU was already signed with the Indian National Science Academy to carry out a researcher exchange programme. At the same time, discussions were held in JSPS on strengthening Japan-India cooperation beyond researcher exchange.

In June 1992, JSPS invited an Indian Science Delegation[i] to Japan to discuss ways to implement the exchange toward more programmatically advancing bilateral scientific collaboration. As a result, the Japan-India Science Council was established to advance and facilitate cooperative scientific programmes between the two countries. JSPS and the Department of Science and Technology, Government of India (DST), were chosen as the programme's secretariats. Comprising 4-5 distinguished researchers on both sides, the Council members agreed to meet once a year, rotating between Japan and India. As areas of potential exchange, they proposed six research fields[ii].

Based on this discussion, the following researchers were appointed as members of the Council. On the Japan side: Prof. NAGAKURA Saburo, President, The Graduate University for Advanced Studies (SOKENDAI), Dr. ODA Minoru, Professor Emeritus, The University of Tokyo, Dr. OKADA Tokindo, Director General, JT Biohistory Research Hall, and Prof. YOSHIKAWA Hiroyuki, President, The University of Tokyo. On the India side: Prof. C.N.R. Rao, President, Jawaharlal Nehru Centre for Advanced Scientific Research, Prof. D. Balasubramanian, Prof. S.S. Kapoor, Prof. R.A. Mashelkar, Prof. S.S. Bhartia, and Prof. R.A. Rama.

Before holding the first Council meeting, in March 1993, a Japanese Science Delegation[iii] went to India to survey the state of research institutions in the country and to consider the types of joint research that would be possible. They also ascertained and compiled what the Indian side desired from its collaboration with Japan.

In August 1993, the first meeting of the Japan-India Science Council was held in New Delhi. Under the leadership of the two countries' co-chairs, a discussion was held on a framework for carrying out bilateral exchange in fields of the natural sciences. Agreed Minutes were written up on points of agreement and signed by the co-chairs. Respecting the agreement reached by the Council, the JSPS President and DST Secretary prepared and signed a "confirmation" document for carrying out the Japan-India Cooperative Science Programme. Included in the Agreed Minutes were the establishment of five priority areas of cooperation (i.e. Molecular Structure, Spectroscopy and Dynamics; New Materials, including Polymers; Modern Biology and Biotechnology; Manufacturing Science; and Astronomy and Astrophysics), a Postdoctoral Fellowship Program for Young Researchers, and a RONPAKU (dissertation PhD) Program.

After that, the Science Council held its meetings each year, rotating between Japan and India. Activities under the Japan-India Cooperative Science Programme were driven forward by vigorous discussions advanced among the

Council members. After each meeting, Agreed Minutes were prepared and signed by the co-chairs. Based on their contents, the format for carrying out the Cooperative Science Programme was set for the following year.

Twenty-six years elapsed from the time that the Japan-India Cooperative Science Programme was started to when the Science Council ended. Over that period, some 3,000 people had participated in the Cooperative Science Programme. Dr. C.N.R. Rao served at the Indian co-chair for 17 years starting from the time that the council was established. In recognition of his great contributions to promoting Japan-India research exchange and to fostering younger generations of researcher, he was awarded The Order of the Rising Sun, Gold and Silver Star by the Government of Japan in 2015.

2. Outline of Activities

(1) Joint Research Projects and Joint Workshops/Seminars (From 1993)

Support was provided for teams of Japanese and Indian researchers carrying out joint research projects, workshops and seminars.

Up to FY 2004, pairs of coordinators from the two countries designated by the Science Council planned and coordinated a variety of exchange activities. In the early period, Committee members served collaterally as coordinators. (In some fields, the principle investigators of joint research projects carried out planning under the umbrella of the coordinators.)

Coordinators from the two countries prepared concrete plans for each exchange activities, then, the Committee co-chairs coordinated in allocating the programme budget for implementing each activity. The coordinators in each field monitored and discussed the state of each activity's progress and reported its results to the Science Council. At the Council's eighth meeting, held in January 2005, it was decided to change the format for initiating joint research projects and seminars by issues open calls from the following fiscal year, with the Council members serving as application reviewers.

In FY1993, five priority areas were established: Molecular Structure, Spectroscopy and Dynamics; New Materials, including Polymers; Manufacturing Science; Modern Biology and Biotechnology; and Astronomy and Astrophysics. In 1999, a sixth area was added: Surface and Interface Science. Then in 2013, the field of Mathematics and Computational Science was added while the existing priority areas were refined and their content expanded. Concurrently, the number of fields was restructured back down to five. As a special case during the period from 2007-2008, joint research was conducted in the area of Earthquakes and Tsunami. (Please see Appendix-6 for the number of applications received and selected in each field from the time open calls were started.)

When the open calls were first issued, about 50 applications were received. From 2011, applications gradually increased to what's at present double the initial number per year.

(2) Asian Academic Seminars (1994-2016), Japan-India Forum for Advanced Study (2017-2019)

These seminars and fora were carried out in a short-term, intensive "school" format for young researchers from

Japan, India and other Asian countries. Providing them an opportunity to learn about the latest trends in scientific research, the seminars were aimed at contributing to the cultivation of excellent researchers while elevating the research standard of the participating countries in their various subject fields. The Science Council chose the themes of each seminar and their chairs. Up to 2007, one seminar was held every three years, after which the seminars were as a rule held once a year, with their venue rotating between Japan and India. By way of the Agreed Minutes signed on 9 March 2017, the format and title of the seminars was changed from "Asian Academic Seminar" to "Japan-India Forum for Advanced Study."

(3) Mizushima-Raman Lecture Series

The lectures in this series were held to commemorate the work of two eminent scientists: Dr. MIZUSHIMA San-ichiro, Professor Emeritus The University of Tokyo, who was Japan's pioneer in the field of Molecular Spectroscopy, and Dr. C.V. Raman, Professor, Indian Association for Promotion of Science, who won the Nobel Prize for Physics in 1930 for his discovery of the Raman Effect. These commemorative lectures were delivered by scientists with highly outstanding records of research achievement in fields of Molecular Spectroscopy. This programme was started in 1997 by way of agreement between Dr. C.N.R. Rao and Dr. NAGAKURA Saburo, who were the Council's co-chairs at that time. Each year, the venue for the lecture rotated between Japan and India. When held in Japan, its venue was the Annual Meeting hosted by the Japan Society for Molecular Science and in India it was the CRSI National Symposium in Chemistry. At the March 2014 meeting of the Science Council, it was agreed to use the lecture participants' stay in the host country as an opportunity to visit research institutions as a valuable way to deepen exchange among them. Thereafter, not only were the commemorative lectures held but also university and research institute visits were carried out in conjunction with other lectures and research discussion as a means of strengthen collegial ties.

(4) Exploratory Exchanges (2006-2013), Special Lecture Tour Programme (2014-2016)

To lay the cornerstones for joint research projects and seminars, the coordinators in each priority area recommended researchers from the two countries to conduct "exploratory exchanges," that is, when in the counterpart country they would carry out research activities, give lectures, swap scientific information, and conduct other exchange activities. By way of a decision at the Council's 17th meeting in March 2014, the name of this programme was changed to the "Special Lecture Tour Programme," under which senior researchers visited at least three research institutions and gave lectures in the counterpart country.

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[i] C.N.R. Rao (IISc), S.K. Joshi (Indian Council of Scientific and Industrial Research), P. Rama Rao (Department of Science and Technology), R. Chidambaram (Bhabha Atomic Research Institute)

[ii] Spectroscopy molecular structure and chemical dynamics, New materials (including polymers), Beam line science using synchrotron radiation sources and other facilities, Modern biology and biotechnology, Solar energy related areas, and Manufacturing sciences

[iii] DOYAMA Masao (Nishi Tokyo Science University), YOSHIHARA Keitaro (Okazaki National Research Institutes), KIUCHI Manabu (The University of Tokyo), MATOGAWA Yasunori (Institute of Space and Astronautical Science), YASUDA Kunio (Kyoto University) They visited: Department of Science and Technology (DST), Bhabha Atomic Research Institute (BARC), Indian Institute of Astrophysics (IIIA), Indian Institute of Science (IIS), Raman Research Institute (RRI), Vainu Bappu Observatory of IIA (VBO), Indian Space Research Organization (ISRO), ISRO Sattelite Centre (ISAC), Inter-Univ. Centre for Astronomy and Astrophysics (IUCAA), and Giant Metrewave Radio Telescope of TIFR (GMRT)

II. Early days

Reminiscences of the Japan-India Cooperative Science Programme and Future Prospects

Dr. YOSHIHARA Keitaro

(Professor Emeritus, Institute for Molecular Science and Japan Advanced Institute of Science and Technology)

At this 20-year juncture of its history, I am very happy to have been involved in the creation of the Japan-India Cooperative Science Programme. I take this occasion to extend a sincere word of appreciation to all who have contributed over these years to this programme, starting with the farsighted co-chairs, Prof. Nagakura Saburo and Prof. C.N.R. Rao. Every year, the programme's research coordinators gather in a meeting of the Japan-India Science Council. The meetings give the Japanese and Indian members a periodic chance to exchange views, which strengthens mutual understanding between them while promoting the smooth and fruitful implementation of the programme's activities. At the same time, I am very thankful to the programme's secretariats for the joint effort they make each year in compiling the minutes of the discussions in the Council meetings.

In February of 1993, in the lead-up to launching the Japan-India Cooperative Science Programme, I was asked by the Japan Society for the Promotion of Science (JSPS) to participate in an academic study group comprising the coordinators of five priority areas in natural science. In March we made a fact-finding visit to a few eminent institutions. In November, we received a visit of an Indian delegation. Together, we established a joint committee and screened the programme's first proposals. As examples of those early joint proposals, during the 3-year period between 1994-1996 in the area of "Molecular Structure, Spectroscopy and Dynamics", 68 researchers applied to participate in exchange visits while 462 applications were received for joint research projects. In 1994, seminars were launched under the programme. Venued in Japan and India, they are held on scientific topics related to the programme's five priority areas. In this year, the first Asian Academic Seminar was held in Bangalore. I remember the large number of applications we received for these activities giving us a strong sense of expectation about the programme's potential.

When our initial study group went to India, some of us visited the Indian Institute of Science, Tata Institute of Fundamental Research, and the Bhabha Atomic Research Centre. Observing the Indian researchers in them, we were very impressed by their enthusiasm for advancing basic science and their pursuit of truth through theoretical research. Going way back, Indian thought in areas such as religion, philosophy and mathematics has been superlative. From around the 18th century, Indian expertise could have been expected to seed modern scientific education. British colonial policy, however, did not recognize the establishment of modern higher education and research institutions for Indians. Though reluctantly, the colonial government did establish universities for studying modern science in three locations in 1855. This, as it turned out, helped to accelerate the Indian independence movement.

In 1876, the Indian Association for the Cultivation of Science (IACS) was established with donations from many citizens and supporters. Though blessed with neither sufficient funding nor personnel, this organization provided the research platform for Prof. C.V. Raman to advance his work. Struggling alone against heavy odds, he developed the "Raman Effect," in 1930. This landmark achievement made Prof. Raman the first Asian recipient of the Nobel Prize in Physics. In 1911, Jamsetji N. Tata, India's industrial pioneer par excellence, established the Indian Institute of Science. This university is said to have boasted

an educational standard of the highest level. [*Note 1*]

India's perception of basic science also has historical roots, clearly distinguishing it from many developing countries that place lopsided emphasis on application. Over these two decades India's educational system has been improved dramatically. The Indian Institute of Technology (IIT) is very well known as a top-notch education and research institution. It has expanded its programme into 16 campuses and plans to increase the number of campuses. The Indian Institute of Science Education and Research (IISER) has been established as a new university in the basic science field. It currently has five campuses, and boasts an ambitious long-term education strategy. In 2010, I met with Prof. T. Ramasami (former Secretary of DST and my counter Programme co-chair), who briefed me on India's education programme INSPIRE (Innovation in Science Pursuit for Inspired Research) established by his initiative, under which a seamless system of selection and support is being administered for pupils of 10 years old up to postdocs. Through this programme, support is already being provided for all age levels. As Japan continues to advance joint research with India, I believe these collaborations will be of increasingly strong productivity and impact.

To be candid, twenty years ago India's experimental facilities were rather unsophisticated. However, young Indian researchers were avidly studying foreign scientific literature. In fact, I can recall them asking me very detailed questions about papers I had authored. In one seminar held at that time by Prof. IWATA Koichi of The University of Tokyo, several of the university's doctoral students were invited to join. They found themselves edified by the participating Indian students' communication skills and zest for doing research. Such vibrant exchange among young researchers works to spawn future research initiatives. Mid-career Indian researchers and experts who initially got to know their Japanese colleagues through participation in exchanges under the Japan-India Cooperative Science Programme have since made mid- to long-term stays in Japan to carry out joint research. These collaborations have given birth to many world-leading research results.

I recently attended a seminar held in Nara on spectroscopy organised by Prof. TOMINAGA Keisuke of Kobe University. At it, leading Japanese and Indian researchers presented their latest research results in this field. What impressed me most was the earnest and spirited way in which young researchers selected to attend the seminar engaged their seniors in discussions and presented their papers. In that season of radiant autumn colours, I was impressed with vigour that energized the seminar, confirming for me the increasingly bright future that lies ahead for the Japan-India Cooperative Science Programme.

<December, 2014>

10th Council Meeting in Tokyo (March, 2007)

Note 1

Reference: *Minami Ajia no Kyojin Indo: Kindai Kagaku Reimeiki to Genzai* (India, South Asia's Giant: From the Dawn of Modern Science to Present) written by me in the Science Council of Japan's "Central District Council News (No.118, pp.4-6, 2004)." In this article, I have compiled information on the modern history of Indian science that learnt from Prof. K. Bhattacharrya, former Director of IACS, and thank his contribution.

Japan-India Science Cooperation under the Joint Council

Dr. C.N.R. Rao
(Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore 560 064, India)

Being conscious of the fact that India and Japan are the two most important Asian democracies, it was my feeling for many years that we should work together on various aspects of science, education and development. Although we had significant relations between the two countries after the second world war, we did not have intense joint activities in science. They had become marginal by 1990. We in India felt that there were very few Japanese scientists visiting India. I was concerned about this matter and talked about initiating a programme between India and Japan involving scientific collaboration and cooperation. I had a detailed discussion about this matter with my very dear friend, Prof. Nagakura Saburo. He agreed to arrange a meeting under the JSPS wherein we would have discussion about possible India-Japan Science Cooperation, if I could bring a group of scientists from India for that meeting. This happened in 1993. I went with heads of some of the scientific agencies of India and we had a very wonderful meeting in Tokyo with our Japanese colleagues headed by Prof. Nagakura Saburo.

The Indo-Japan Science Cooperation under the auspices of JSPS and the Department of Science and Technology, Government of India, blossomed since 1993. The main activities that we had were joint symposia, short-term scientist exchange programme and also Asian Academic Seminars. The exchange programme became successful wherein a number of scientists from India went to Japan to work in various laboratories on short visits. More importantly, the joint seminars on physical and biological sciences became popular and had great impact. A number of scientists from Japan came to India for meetings and for collaboration. The Asian Academic Seminar was a particularly exciting venture. The first one we had in Bangalore in the Indian Institute of Science was outstanding with leading scientists as well as young scientists participating in the meeting.

I believe that the Indo-Japan Science Cooperation supported by JSPS and the Department of Science and Technology of India has been a model programme and is worthy of emulation. Whatever we may do together in the future, we should keep in mind the important elements of the cooperative programme of the Indo-Japan Science Council. I do hope that scientific and cooperative collaboration between India and Japan will continue and even improve further to greater heights.

I believe that the 21st century belongs to Asia and in this scenario, India and Japan have to work together and contribute to science and knowledge in a big way. I hope that will this happen.

I would like to acknowledge the support of the Japanese and Indian scientists and thank Prof. Nagakura Saburo for his help and support in the early days, and Prof. Yoshihara for his valuable contributions. JSPS has been a wonderful partner in this venture as also the DST of India.

With fond hope for a great future for Indo-Japan Science collaboration.

Manufacturing Science under the Japan-India Cooperative Science Programme

Dr. KIUCHI Manabu
(Professor Emeritus, The University of Tokyo, Former Coordinator of the Manufacturing Science Area)

The decision to launch the Japan-India Cooperative Science Programme was made by the both governments in 1993. From that time until the Programme's overseeing body, the Japan-India Science Council, ended its activities in 2019, the collaboration and the exchange were assiduously carried out concerning the selected priority areas of natural science. Having received a request to compile the Programmes' results to date, I as the Japan-side coordinator of one of the priority areas, namely Manufacturing Science, would like to introduce some episodes that occurred during the implementation in the concerned area.

Under the Cooperative Programme, five areas were chosen from a broad spectrum of the natural sciences. In each of them, the cautiously and intensively selected cooperation and exchange were executed. The decision to include Manufacturing Science among the priority areas was unprecedented as an international bilateral exchange programme carried out by the Japan Society for the Promotion of Science (JSPS), the Programmes' nucleus organization. Previously, JSPS had mainly supported bilateral activities in fields of the more purely natural sciences. Manufacturing Science, which is top-to-bottom engineering and technology, was thought to be outside the purview of JSPS's support. Under this situation it was the Indian side that proposed Manufacturing Science as a priority area. Prof. P. Rama Rao, who was then the President of IIS-Bangalore and a Indian leading member of Science Council, had I heard strongly desired collaboration with Japan in this area, having understood the importance of Manufacturing Science from the perspective of India's intent to develop its industry. Observing the state of India's development today, I am convinced of his farsightedness.

At the beginning, for seeking to create a concrete strategy for implementing the Cooperative Programme, the Japanese coordinators of the priority areas visited India and had meetings with many Indian professors and researchers of principal universities and research institutions, where they bounced ideas off Indian administrators and experts as to areas of possible collaboration and research themes in which good results could be anticipated. In this process, the Manufacturing Science area decided to adopt a novel collaboration scheme for carrying out its bilateral scientific exchange. Before that time, JSPS ordinally used the scheme to support joint research works in which researches advanced respectively by researchers in Japan and India were combined, supplemented or integrated in a synergistic manner that produces more-highly advanced results. Other priority areas included in this Programme except Manufacturing Science area employed this scheme. However, it soon became apparent, the Manufacturing Science area would have difficulty in implementing under this scheme due to the large gap existing between Japan and India across a range of factors including feasible research themes, research capabilities, and already-accumulated research results, irrespective of whether basic or applied research were to be conducted.

As the result of these situation and consideration, it was decided to start the area's cooperative activities under the group exchange scheme, namely, organizing a researcher group comprising the faculty of universities and research institutions connected to Manufacturing Science in India and another similar group in Japan, which would contribute to the development and

advancement of research activities on both sides through inter-group exchange and information sharing. In the process, individual linkages were fostered among researchers on the two sides and recommendations leading to joint research were promoted.

Within the domain of Manufacturing Science, the Indian side wanted to concentrate particularly on Manufacturing and/or Processing Science and Composite Material Science. In each of these fields, researcher groups comprising 7-10 university faculty members were formed in Japan and India. From 1995, the groups visited each other's countries in every alternate year. In each country, two kind of seminars on manufacturing processes and composite materials were held. At every seminar, 3-days sessions were conducted for exchanging knowledge and information, and 2-day visits were executed to see the pioneering research being advanced at universities and research institutions. Indian attendants could observe state-of-the-art manufacturing facilities in Japan.

The seminars held in each country allowed people besides the group members to attend the sessions. The purpose for doing this was to construct platforms for as many people in related fields as possible from the two country to meet and generate cooperative ties and collaborative relations.

In carrying out the scientific exchange activities, the participants from both countries visited many of the counterpart country's cities and communities, such as Tokyo, Osaka and Nagoya in Japan and New Delhi, Mumbai and Bangalore in India, and principle universities and research institutions. Over the course, they deepened their discussions on various scientific and/or technological issues while mutually advancing research initiatives. Through this process, the diversified connections and relationships were formed among researchers of the two countries. This had in a literal sense contributed to the building of the infrastructure for research collaboration among so many researchers in the both countries.

Taking this opportunity to revisit the evolution of the Programme's Manufacturing Science area, I would like to express my profound appreciation to the many people on both sides whose efforts over long years have contributed to creating a flourishing Japan-India Cooperative Science Programme. I would like to extend a special word of thanks to Prof. Amitabha Ghosh, then President of IIT-Kharagpur, and Prof. Sanjay G. Dhande, then President of IIT-Kanpur. That I could share in the successes achieved through this Programme with them is for me a great honour and happiness.

<January, 2020>

Japan India Manufacturing Science Group

Prof. S.G. Dhande
(Professor, IIT Kanpur)

Japan has a leading position in the world of manufacturing. India has a large manufacturing base. Both the countries have traditions of research in the field of manufacturing science and systems. It is, therefore, natural that the collaborative work in the field of manufacturing research was carried out by the two countries.

There are several academic groups working in the field of modern manufacturing. The collaborative research in the field of nano-manufacturing can be considered as a highlight. The field of micro-manufacturing was also explored extensively by both the countries. The field of materials also was considered extensively. In particular, the mushy material for forging was explored by the groups of both the countries. The field of tool geometries also saw considerable interest in this programme. Manufacturing system was an area of common interest. Many modern tools including computer applications to manufacturing were developed together.

Joint activities were pursued in the form of research publications and mutual visits. Joint workshops were conducted both in Japan as well as in India. India Japan collaboration in the field of manufacturing, novel academic initiatives in India such as IIITDM Jabalpur, IIT Hyderabad and Visionary Leaders for Manufacturing programme were established.

Mysteries of the Universe, Pursued by Japan and India

Dr. SHIBAI Hiroshi
(Professor, Osaka University)

In the early 2000's, I spent a day at the Tata Institute of Fundamental Research, located in a huge city, Mumbai, perched on a peninsula jutting out into Arabian Sea. My host Prof. Manchanda told me that "30 years ago Hayakawa would always sit at the table on the side of the bay smoking a cigar. At the time I was a graduate student and have since had that imagine etched in my mind." That person was HAYAKAWA Sachio, the former president of Nagoya University. In the 1970's, the X-ray Astronomy Group led by Profs. Hayakawa and ODA Minoru, former director of the Institute of Space and Astronautical Science (ISAS), carried out a joint project with Prof. B.V. Sreekantan and his group, in which they launched a scientific research balloon from Hyderabad. Using the phenomenon of the Crab Nebula hiding behind the moon, they succeeded in measuring the apparent size of this important x-ray source. At that time, this was a ground-breaking research achievement. Graduate students back then had set a pivotal course for the big advances in space science to be made later between Japan and India.

Joint research in space science having continued, when the Japan-India Cooperative Scientific Programme was launched, Dr. SUGIMOTO Daiichiro, emeritus professor, The University of Tokyo, and the abovementioned Prof. Sreekantan became the two coordinators in its Space Science area. They worked together to build the cooperative programme. In 1999, I succeeded Dr. Sugimoto as the coordinator, a position which I would hold for 13 years until 2011. During that time, the coordinator on the Indian side was Dr. Ramanath Cowsik of the Indian Institute of Astrophysics. His institute had just constructed a 2-m aperture astronomical telescope which stood on a 4200-meter high plateau on back side of the Himalaya Mountains. Using India's own communication satellite, they were able to remotely control the telescope from Bengaluru where their research center was located. Through the Japan-India Cooperative Scientific Programme, Japanese researchers provided technical advice when the telescope was being constructed. At the end of September 2000, the "3rd India-Japan Seminar on Cooperation in Astronomy and Astrophisics" was held near the telescope site. It was attended by four researchers from Japan including myself. Celebrating the completion of the telescope, we held an in-depth discussion on astronomical observation—while battling altitude sickness.

While I was serving as a coordinator of the programme's space science area, we established the following policies. Japan had the most advanced equipment in the area of space science and astronomy as well as cutting-edge research technology. It did not, however, have an ideal observatory site. On the other hand, India had ideal observatory sites as well as higher capacities for launching rockets and scientific observation balloons into the atmosphere. As seen in the above example of the Crab Nebula, Japan and India merged their strengths in joint research initiatives—creating a synergism that proved highly beneficial to both sides.

On another plane, many Japanese researchers felt that high hurdles had to be crossed for them to initiate joint research projects with India, when compared to researchers from Western countries. The Japan-India Cooperative Scientific Programme wanted to help clear these hurdles. While supporting existing joint research, I tried to match both countries for further col-

laboration based on these policies. As a result, not only was bilateral progress made in observational astronomy but also in solar physics, planetary science, and theoretical astrophysics. While some exchanges continue others, however, have ended in these areas. Though not enough, I believe the Programme spawned some progress in advancing collaboration between Japanese and Indian researchers.

In 2011, we invited Indian young researchers and graduate students to Japan to attend the 4th India-Japan Seminar, held on the Inland Sea island of Awajishima. Twenty-four of them participated in the event along with 39 counterparts from Japan and seven from other countries. With leading scientists from the US and Europe also invited as lecturers, a vigorous discussion was advanced on leading-edge research in the fields of space science and astronomy. An excursion was taken to the Super-Kamiokande neutrino observatory to see its state-of-the-art facilities. I believe we have planted many seeds which I hope will contribute to bearing splendid fruit in the future of Japan-India exchange.

Looking back, I have visited more than 20 Indian cities and sojourned in India for an aggregate of more than a half year. Through those experiences, I have witnessed the distinct difference between India with its multiplicity and Japan with its homogeneity. Perhaps it is I who was most edified.

Visit Super-Kamiokande beneath the Kamioka Observatory at the 4th India-Japan Seminar

Academic Significance and Impact of the Japan-India Cooperative Science Programme

Dr. IWASAWA Yasuhiro

(Director of Innovation Research Center for Fuel Cells, Graduate School of Informatics and Engineering, The University of Electro-Communications, Emeritus Professor of The University of Tokyo)

The Japan-India Cooperative Scientific Programme was launched in 1993 in the wake of the establishment of the Japan-India Science Council in 1992. From the start, it had a unique presence and special significance within JSPS's international scientific exchange programmes given the Council's initial co-chairs with Dr. NAGAKURA Saburo on the Japan side and Dr. C.N.R. Rao on the India side. Dr. Nagakura had an outstanding record of achievements in chemical kinetics, won Japan's "Order of Culture," was Special Advisor to the Ministry of Education and Science, and President of the Japan Academy and of IUPAC. Dr. Rao had made outstanding contributions in nano-materials chemistry, won great many honorary titles in both India and abroad, and chaired the Scientific Advisory Council to the Indian Prime Minister, among a succession of other significant posts. The two leaders gave the programme a strong persona, both scientifically and politically, along with strong leadership, communication and influence capabilities. Undergirded by this leadership thrust, the members and affiliates of JSPS and DST had a strong sense of mission and the will to act upon it in carrying out the Japan-India Cooperative Scientific Programme.

In 2002, a sixth area, Surface and Interface Science, including Catalysis, was added based on a proposal by Drs. Nagakura and Rao who saw the field as playing an integral role in the nano-sciences both in their countries and worldwide (Other areas and Japan-side Council members are 1) Molecular Structure, Dynamics, and Molecular Materials, including Supramolecular Science (K. Yoshihara), 2) Advanced Materials, including Polymers and Nanomaterials (M. Doyama), 3) Modern Biology and Biotechnology (A. Ishihama), 4) Manufacturing Sciences (M. Kiuchi), 5) Astronomy and Astrophysics (H. Shibai)). To become the Japan-side Council member in this area, I received a request by phone directly from Dr. Nagakura. (At the time, I was a professor at The University of Tokyo specializing in surface and catalysis sciences.) Dr. Rao, the India-side Council co-chair, requested Dr. Milan K. Sanyal of the Saha Institute of Nuclear Physics, Kolkata, to join the Area 6 project. He was known as a specialist in surface physics and nano-science.

Within the Science Council, I felt that Drs. Nagakura and Rao were a perfect match as the co-chairs, as they had a shared sense of scientific values and programme trajectory, records of highly substantial scientific achievements, and impressive presences within the scientific community. They created an atmosphere in which the Council members in diverse fields could engage in friendly yet candid discussions. I personally was thankful to them for allowing me to study sand learn about research trends in other fields and about those researchers' ways of thinking. Looking back, I'm reminded anew of how very significant were the selections of Council members from the two countries.

In 2010, I became a coordinator of the Asian Academic Seminar held in Kolkata. Venued at the Saha Institute of Nuclear Physics, it was attended on the Japan side by about 10 specially selected students and young researchers. Happily, none of them contracted bacterial infections while there, so they returned to Japan unaffected by diarrhea or other problems. On the first night, the female students were unable to sleep having been bitten unmercifully by mosquitoes. Learning of this, Dr. Sanyal immediately changed the hotel where the Japanese participants were staying. As a result of this kind of hospitality, everyone

enjoyed the seminar, the Indian cuisine and interaction among each other. Some of the students went on to acquiring university posts, while others can be seen playing important roles in industry. In a myriad of ways the Asian Academic Seminars were meaningful: They provided opportunities for the young participants to experience firsthand different cultures, environments, ways of thinking, and policies, while grappling with contemporary issues such as diversity, sustainable development goals, and higher education on the doctoral level.

In March 2007, when the Science Council met in Japan, members with various specializations engaged each other in a conversation during an after-meal break. In it, Dr. Sanyal, the Indian member of the Area 6 group, asked about whether synchrotron radiation, for which research was being advanced in India, could be added to a beamline project at either KEK's Photon Factory (KEK-PF) or SPring-8 in Japan. This spurred a lot of serious questions about costs and other aspects of the idea. On the spot, I made a phone call to Dr. NOMURA Masaharu, who was a friend (division head of KEK-PF at that time), and talked to him about the possibility of constructing a beamline for India at KEK. Obtaining his agreement to participate, I turned to Dr. Rao and explained how a beamline could be an important pillar of Japan-India scientific collaboration. Agreeing, he made a snap decision to fund the construction of an Indian beamline at KEK if the cost could be kept to below about 200 million yen. Then, the three of us proposed the project to the Council.

As to JSPS's response, they said that they would have no objection to us proceeding freely with the project outside the parameters of the Japan-India Cooperative Programme. With that, the discussion continued between KEK, DST and Dr. Sanyal. In September 2007, a meeting was held at KEK attended by the director and members of KEK-PF, Indian Scientific Advisory Council chair Dr. Rao, the Embassy of India Counsellor, DST executives, Dr. Sanyal, and myself. Ms. Maesawa, head of JSPS's Asian Programme Division, also attended meeting, at which DST and KEK signed a Letter of Intent toward constructing the Indian beamline. Then in 2008, the Director of KEK and the Indian Ambassador signed an MoU to build the "Indian Beamline at Photon Factory." This sequence of events started at the Japan-India Science Council meeting hosted by JSPS was simultaneously announced on KEK's website. The project became a byproduct of the Science Council. While reiterating my admiration for Dr. Rao and the strength of his commitment to initiating this project, I also remember the flexibility shown by JSPS in allowing the project to get off the ground.

Transitions in the Science Council itself, governmental policies and fiscal situations of the two countries, and Asia's societal environments have spurred changes in the Japan-India Cooperative Scientific Programme. Looking back, however, I think all the members of Science Council poured their heart and energy into carrying out the mission and mandate of this Cooperative Science Programme, which was a pivotal symbol of what could be accomplished by two Asian countries working together at that time. I would truly be happy if you'd share with me this sentiment.

Engineering the shapes and properties of nanoparticles by swift heavy ion irradiation (2011~2012)

— Toward "High-Energy Nanotechnology" —

Japanese side PI: Dr. AMEKURA Hiroshi
(National Institute for Materials Science (NIMS), Tsukuba)
Indian side PI: Prof. Devesh Kumar AVASTHI*
(Inter-University Accelerator Centre (IUAC), New Delhi)
(*Present affiliation: Amity University, New Delhi)

Swift heavy ions (SHIs), i.e., heavy ions with extraordinarily high energy (~100 MeV), were formerly used in the study of nuclear and high-energy physics only. Recently, SHIs have been recognized as a powerful tool for modifying the shapes and properties of nanostructures. Using them, a new field of nanotechnology is being pioneered. In Japan, however, there is a limited number of accelerator facilities capable of applying SHIs to nanotechnology studies. IUAC (New Delhi) is a unique accelerator facility widely open to material science and nanotechnology research. Figure 1 shows the appearance of the accelerator tower at IUAC. The gigantic tower of approximately 50 meters in height houses a 15 UD pelletron tandem accelerator, which generates swift heavy ions, e.g., 120 MeV Ag^{9+} ions.

Fig. 1. Gigantic accelerator tower of approximately 50 m tall at IUAC, in which swift heavy ion (SHI) beams are generated.

In this collaborative programme, the target was focused on a phenomenon called "shape elongation of embedded nanoparticles (NPs)," which has received much attention within the nanoscience community for these decades. As is schematically shown in Fig. 2, NPs embedded in an amorphous matrix, such as silica, exhibit shape transformation from spheres to nano-rods under SHI irradiation. Since each NP elongates to the same direction parallel to the SHI beam, this method is a promising method for forming nano-rods of macroscopic numbers, all of which align to the same direction.

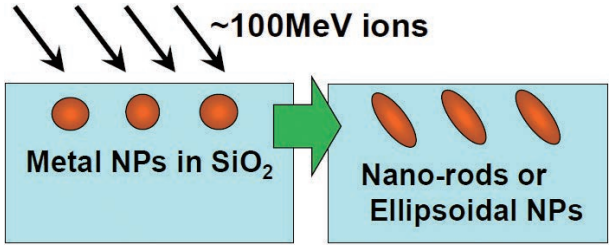


Fig. 2. The phenomenon called "shape elongation of embedded NPs" is schematically depicted. The rectangles show the cross-sections of the SiO_2 matrix including NPs. Under SHI irradiation, spherical NPs deform to nano-rods.

One of the highlights of the joint study is shown in Fig. 3. Using three big accelerators in Japan and India, i.e., the tandem accelerators in IUAC, New Delhi, in the Institute of Physics (IOP), Bhubaneswar, and in the Japan Atomic Energy Agency, Tokai (JAEA-Tokai), the fluence dependences of NP shape elongation were evaluated under irradiations with a wide variety of ion-species and energies, from 1.7 MeV Si^{+} to 200 MeV Au^{13+} [1]. The data measured in the same way across this wide

range gave us important clues to elucidate the mechanism of this phenomenon [1].

With regard to the researcher exchanges conducted in 2011, Mr.* S.A. Khan (IUAC) stayed for weeks at NIMS to study linear dichroism spectroscopy. Mr.* P.K. Kulriya visited and held a seminar at NIMS. In 2012, Dr. D. Kabiraj, Mr.* U.B. Singh, and Dr. Avasthi attended conferences held in Kyoto and Yokohama. (Mr.* was their titles at the time of their visits. Now, all the three have doctorates.)

Also in 2011, Dr. Avasthi (PI) visited not only NIMS but also JAEA-Tokai, and universities of Osaka, of Osaka-prefecture, and of Nagoya. The friendships initiated through these visits grew through the return visits of three Japanese professors to India for the SHIMEC 2012 conference. As the Japanese PI invited another four scientists, a total of seven highly reputed Japanese scientists attended SHIMEC 2012 using their own budgets and they gave invited talks.

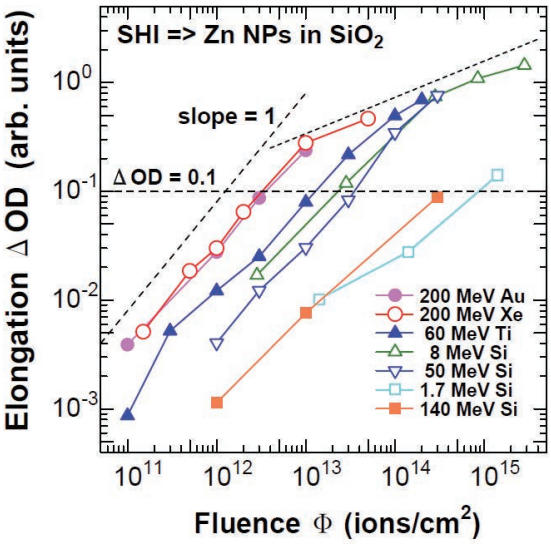


Fig. 3. Fluence dependences of the shape elongation of Zn NPs embedded in silica. The samples were irradiated with a wide variety of ion species and energies, ranging from 1.7 MeV Si^{+} to 200 MeV Au^{13+}, using three different accelerator facilities in Japan and India [1].

Researchers from the Japan side visited India four times under this programme: twice for irradiation experiments in IUAC, and twice to attend conferences held at IUAC and Ahmedabad, India. In the Ahmedabad conference, Dr. Amekura (PI) was selected as the only one speaker to give a keynote lecture, which was special honor that he had never before experienced.

Joint Presentations: 10 conferences (including 1 keynote lecture and 1 invited talk).

Joint publications: 4 papers shown below:

Fig. 4. Picture of invited speakers and organizers of the international conference SHIMEC 2012, held at IUAC. (The total number of the participants was ~200.) The conference was not supported by this programme budget. However, as Dr. Avasthi (PI) had made several visits to Japanese universities using this budget in 2011, some Japanese professors made a return visit to this conference. Totally, seven highly reputed Japanese scientists attended the conference using their own budget, and they gave invited talks.

[1] H. Amekura, S. Mohapatra, U.B. Singh, S.A. Khan, P.K. Kulriya, N. Ishikawa, N. Okubo, and D.K. Avasthi, *Shape elongation of Zn nanoparticles in silica irradiated with swift heavy ions of different species and energies: scaling law and some insights on the elongation mechanism*, Nanotechnology **25**, 435301 (2014).

[2] C. Pannu, U.B. Singh, D.C. Agarwal, S.A. Khan, S. Ojha, R. Chandra, H. Amekura, D. Kabiraj, and D.K. Avasthi, *A study on the consequence of swift heavy ion irradiation of Zn–silica nanocomposite thin films: electronic sputtering*, Beilstein Journal of Nanotechnology **5**, 1691 (2014).

[3] H. Amekura, N. Okubo, N. Ishikawa, D. Tsuya, K. Mitsuishi, Y. Nakayama, U.B. Singh, S.A. Khan, S. Mohapatra, and D.K. Avasthi, *Swift heavy ion irradiation of ZnO nanoparticles embedded in silica: Radiation-induced deoxidation and shape elongation*, Appl. Phys. Lett. **103**, 203106 (2013).

[4] U.B. Singh, D.C. Agarwal, S.A. Khan, S. Mohapatra, H. Amekura, D.P. Datta, A. Kumar, R.K. Choudhury, T.K. Chan, T. Osipowicz, and D.K. Avasthi, *Synthesis of embedded Au nanostructures by ion irradiation: influence of ion induced viscous flow and sputtering*, Beilstein Journal of Nanotechnology **5**, 105 (2014).

Presentation at the 20th Meeting of Japan-India Science Council (March, 2019)

Prof. SUZUKI Iwane

(Professor, University of Tsukuba)

Metabolic pathway engineering of *Synechocystis* for effective production of scytonemin, a potential anti-proliferative and UV protecting compound

Iwane Suzuki, U. Tsukuba

&

J.S.S. Prakash, U. Hyderabad

The 20th Meeting of Japan-India Science Council,
Hotel Grand Palace,
1 Mar., 2019

1. Arun PV, Bakku RK, Subhashini M, Singh P, Prabhu NP, Suzuki I, Prakash JS. CyanoPhyChe: a database for physico-chemical properties, structure and biochemical pathway information of cyanobacterial proteins. (2012) ***PLoS One***. **7**: e49425
2. Krishna PS, Rani BR, Mohan MK, Suzuki I, Shivaji S, Prakash JS. A novel transcriptional regulator, Sll1130, negatively regulates heat-responsive genes in *Synechocystis* sp. PCC6803. (2013) ***Biochem. J.*** **449**: 751-760
3. Prakash JS, Krishna PS, Sirisha K, Kanesaki Y, Suzuki I, Shivaji S, Murata N. An RNA helicase, CrhR, regulates the low-temperature-inducible expression of heat-shock genes *groES*, *groEL1* and *groEL2* in *Synechocystis* sp. PCC 6803. (2010) ***Microbiology***. **156**: 442-451
4. Prakash JS, Sinetova M, Zorina A, Kupriyanova E, Suzuki I, Murata N, Los DA. DNA supercoiling regulates the stress-inducible expression of genes in the cyanobacterium *Synechocystis*. (2009) ***Mol. Biosyst.*** **5**: 1904-1912
5. Chintalapati S, Prakash JS, Singh AK, Ohtani S, Suzuki I, Murata N, Shivaji S. Desaturase genes in a psychrotolerant *Nostoc* sp. are constitutively expressed at low temperature. (2007) ***Biochem. Biophys. Res. Commun***. **362**: 81-87
6. Chintalapati S, Prakash JS, Gupta P, Ohtani S, Suzuki I, Sakamoto T, Murata N, Shivaji S. A novel Δ9 acyl-lipid desaturase, DesC2, from cyanobacteria acts on fatty acids esterified to the *sn*-2 position of glycerolipids. (2006) ***Biochem. J.*** **398**: 207-214

Medicinally important secondary metabolites

Source	Compound	Activity	Class of compound
Phormidium tenue	Sulfolipid	Anti-HIV activity	Fatty acid (sulfo)
Nostoc punctiforme	Scytonemin	UV –Protectant, Antiproliferative	Indole alkaloid
Calothrix sp.	Calothrixin	Antimalarial, Anticancer	Indoles
Lyngbya lagerheimii	Sulfolipid	Anti-HIV activity	Fatty acid (sulfo)
Lyngbya majuscula	Curacin , α,7-dimethylindole-3-carboxaldehyde	Anticancer	Thiazoline containing Cyclopropyl compound
Microsystis sp.	Diarrhetic toxin	Cytotoxic	Lipopeptide
Aphanothece sp.	Poly-3-hydroxyalkanoates	-	Hydrocaebon
Nostoc muscorum	Muscoride	Antibiotic	Lipopeptide
Spirulina platensis	Calcium spirulan, poly-β-hydroxybutyrate, phycocyanin	Anticancer, anti-HIV activity, free-radical scavenger	Saccharides
Synechocystis trididemni	Didemnin	Anticancer, Antiviral, Immunosuppressive	Lipopeptide

Adapted from Burja et al., Tetrahedron 57, 9347 – 9377 **(2001)**

Curacin A

- Isolated from *Lyngbya majuscula*[1]
- Exhibits anti-proliferative and cyto-toxic activities[1]
- Tubulin polymerization inhibition

Cryptophycin I

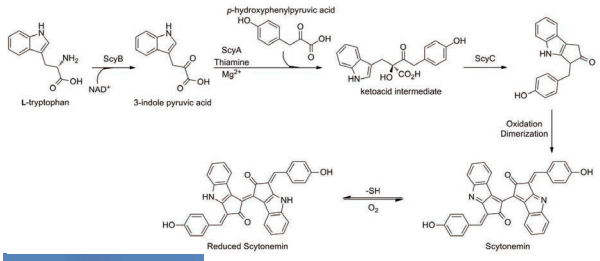
- Produced by *Nostoc sp.* [2]
- Most potent tubulin-destabilizing compound[2]
- In clinical trials for the development of cancer therapeutics[3]

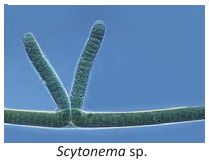
Scytonemin

- Produced by filamentous cyanobacteria[4]
- UV protectant[4]
- Exhibits anti-proliferative activity by inhibiting *polo* –like- kinase[5]

1 Chang, et al., *J. Nat. Prod. 67*, 1356–1367. doi:10.1021/np0499261 **(2004)**
2.Piel, J. *Nat. Prod. Rep. 27*, 996–1047. doi:10.1039/B816430B **(2010)**
*3.*Beilstein et al., *J. Org. Chem. 7*, 1622–1635 **(2011)**
4.Pichel and Catenholz *J.Phycol , 27*, 395 – 409 **(1991)**
5.Stevenson et al., *J Pharma Exp Therapeutics* 303, 858 – 866 **(2002)** .

Scytonemin, anti-proliferative activity & UV protectant

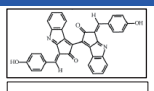


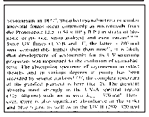


Scytonema sp.

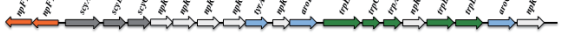
Genes for Scytonemin synthesis

- *Nostoc, Scytonema, Calothrix* and *Chlorogloeopsis*
- Absorbs UV-A, UV-B and UV-C radiation
  (315- 400; 280 - 315; 100 - 280 nm)
- Effective against cancer cells only by inhibiting polo-like kinase
  (Stevenson et al., *J Pharma exp Therapeutics* 303, 858 – 866, 2002)
- Encoded by a large gene cluster consisting of 18 genes (24.3 Kb)





(Proteau et al., Experientia 49, 825 – 820, 1993)



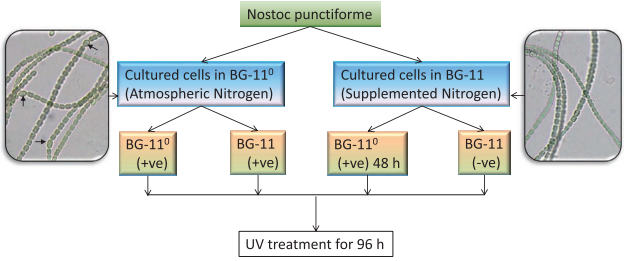
Scytonemin biosynthesis
- NpR1276 – ThDP dependent enzyme
- NpR1275 – Leucine dehydrogenase
- NpR1274 - *scyC*

Tyrosine biosynthesis
- NpR1267 – 3-Dehydroquinate synthase
- NpR1269 – Prephenate dehydrogenase
- NpR1260 - aldolase

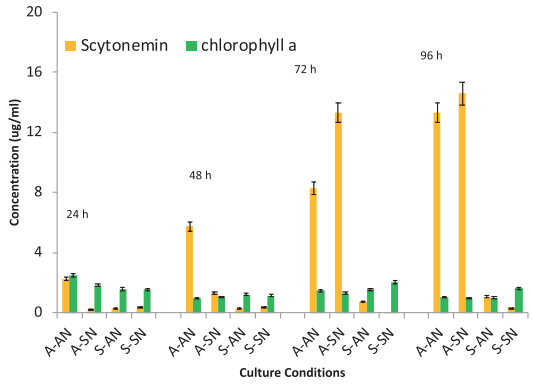
Tryptophan biosynthesis
- NpR1266 – Anthranilate synthase
- NpR1265 – Indole-3-glycerol phosphate
- NpR1264 – Tryptophan synthase α -subunit
- NpR1262 – Tryptophan synthase β -subunit
- NpR1261 – Anthranilate phosphoribosyl transferase

Hypothetical proteins
- NpR1273
- NpR1272
- NpR1271
- NpR1270 type I glycosyl transferase
- NpR1268 DSBA oxidoreductase
- NpR1263 Putative tyrosinase
- NpR1259

N-assimilation and production of scytonemin



N-assimilation and production of scytonemin



7

Objectives

To generate a cyanobacterium, *Synechocystis* sp. PCC6803 for biosynthesis of Scytonemin using the following genetic and pathway engineering methods:

I. Cloning and inducible expression of the clusters of genes (total 18 genes) of *Nostoc punctiforme*, which are involved in biosynthesis of scytonemin (*Npun_R1276-Npun_R1259* and *Npun_F5232-Npun_F5236*) into the genome of the cyanobacterium *Synechocystis.*

II. Inactivation of the gene for ADP-glucose pyrophosphorylase (*glgC; slr1176*) to disrupt synthesis of glycogen and enhance the accumulated level of phosphoenolpyruvate (PEP), required for biosynthesis of L-tryptophan, a precursor of scytonemin.

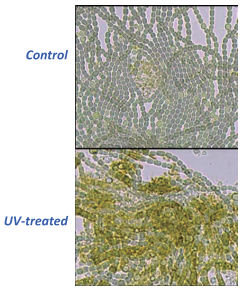
III. Over expression of transketolase (*sll1070*) and 3-phosphoglycerate dehydrogenase (*sll1908*) to increase the levels of erythrose-4-phosphate and serine respectively, which are involved in the biosynthesis of scytonemin.

IV. Metabolic profiling and quantification of PEP, erythrose-4-phosphate, L-serine, L-tryptophan, scytonemin and its intermediates before and after induction of the engineered scytonemin biosynthetic pathway in *Synechocystis.*

8

Induction of Scytonemin

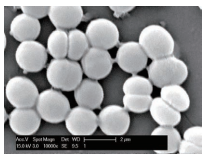
UV inducible expression
Nostoc punctiforme



UV source: TL' 20W/05 Philips)
(300 to 460 nm with max at 365 nm
100% acetone extraction – overnight at 4˚C
Absorbance at 384 nm

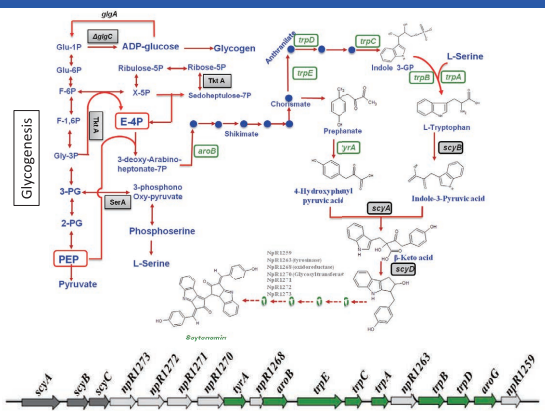
Cobalt inducible expression
(PcoaT promoter)

Synechocystis



9

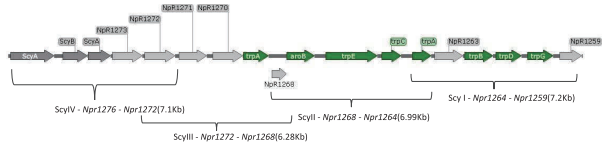
Genetic and metabolic engineering to produce Scytonemin



10

Cloning of the gene cluster into the genome of *Synechocystis*

- Divide the 24.3 kb gene cluster into following 4 parts:



Gene fragments of scytonemin gene cluster:

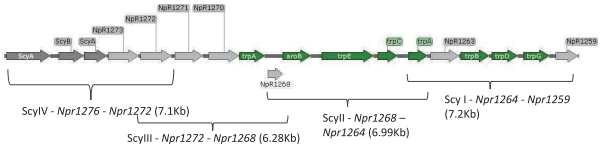
Scy I – *Npr1264 - Npr1259* (7.2Kb)
ScyII – *Npr1268 – Npr1264* (6.99 Kb)
ScyIII – *Npr1272 –Npr1268* (6.28 Kb)
Scy IV – *Npr1276 – Npr1272* (7.1 Kb)

- Clone the four segmented genes into a suitable vector to insert the scytonemin genes into the neutral site i.e. *slr2030* and *slr2031* of the *Synechocystis* genome.

11

Cloning of the gene cluster into the genome of *Synechocystis*

- Divide the 24.3 kb gene cluster into following 4 parts:



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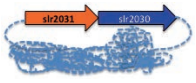
Scy IV – *Npr1276 – Npr1272* (7.1 Kb)

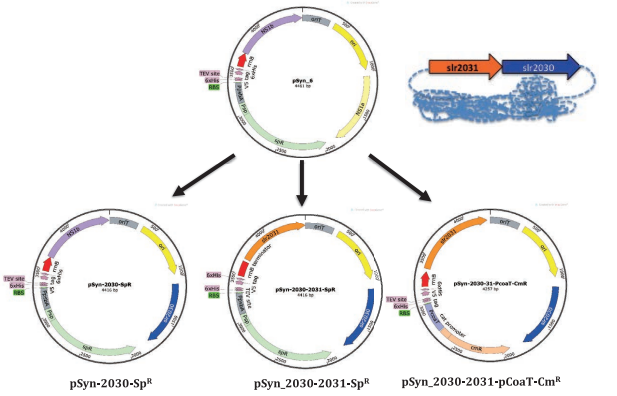


- Clone the four segmented genes into a suitable vector to insert the scytonemin genes into the neutral site i.e. *slr2030* and *slr2031* of the *Synechocystis* genome.

12

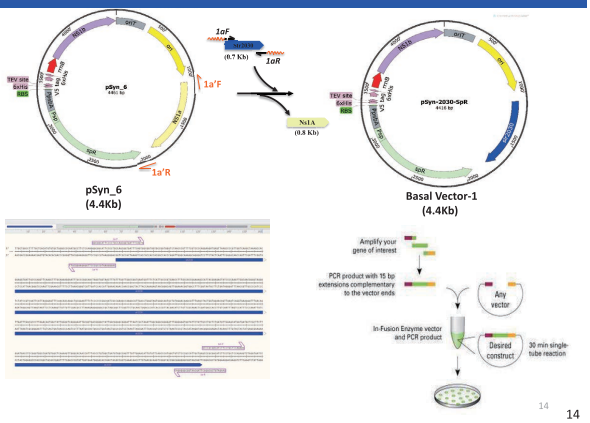
III. 1. Joint Research Projects

Cloning of the Scytonemin gene cluster into *Synechocystis*



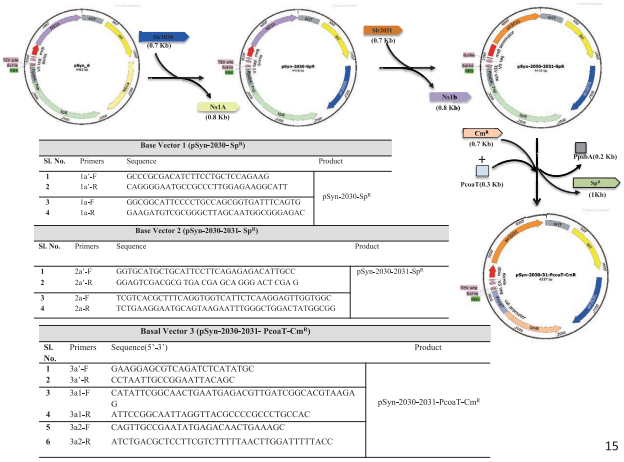
13

Construction by In-Fusion cloning kit from Takara Bio



14

14



Base Vector 1 (pSyn-2030- Sp^R)

Sl. No.	Primers	Sequence	Product
1	1a'-F	GCCCGCGACATCTTCCTGCTCCAGAAG	pSyn-2030-Sp^R
2	1a'-R	CAGGGGAATGCCGCCCTTGGAGAAGGCATT	
3	1a-F	GGCGGCATTCCCCTGCCAGCGGTGATTTCAGTG	
4	1a-R	GAAGATGTCGCCGGCTTAGCAATGGCGGGAGAC	

Base Vector 2 (pSyn-2030-2031- Sp^R)

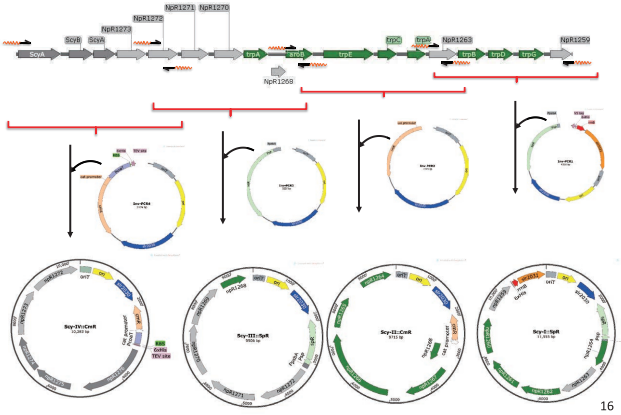
Sl. No.	Primers	Sequence	Product
1	2a'-F	GGTGCATGCTGCATTCCTTCAGAGAGACATTGCC	pSyn-2030-2031-Sp^R
2	2a'-R	GGAGTCGACGCG TGA CGA GCA GGG ACT CGA G	
3	2a-F	TCGTCACGCTTTCAGGTGGTCATTCTCAAGGAGTTGGTGGC	
4	2a-R	TCTGAAGGAATGCAGTAAGAATTTGGGCTGGACTATGGCGG	

Basal Vector 3 (pSyn-2030-2031- PcoaT-Cm^R)

Sl. No.	Primers	Sequence(5'-3')	Product
1	3a'-F	GAAGGAGCGTCAGATCTCATATGC	pSyn-2030-2031-PcoaT-Cm^R
2	3a'-R	CCTAATTGCCGGAATTACAGC	
3	3a1-F	CATATTCGGCAACTGAATGAGACGTTGATCGGCACGTAAGA G	
4	3a1-R	ATTCCGGCAATTAGGTTACGCCCGCCCTGCCAC	
5	3a2-F	CAGTTGCCGAATATGAGACAACTGAAAGC	
6	3a2-R	ATCTGACGCTCCTTCGTCTTTTTAACTTGGATTTTTACC	

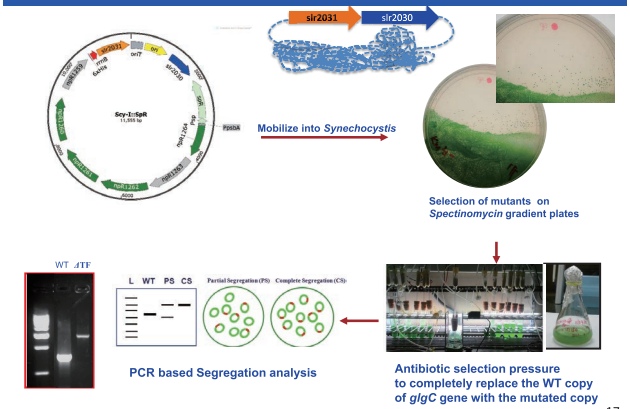
15

Design and development of plasmid vectors



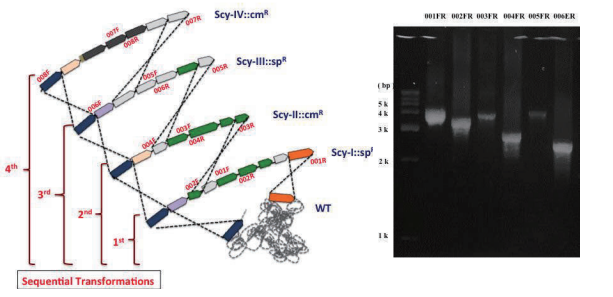
16

Introduction of the Scytonemin gene cluster into *Synechocystis*



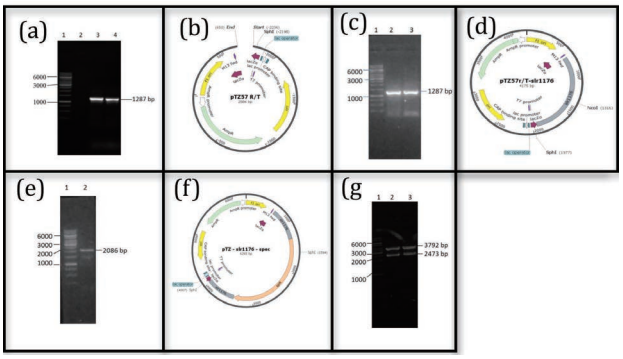
17

Scy-I, Scy-II and Scy-III were integrated into the genome



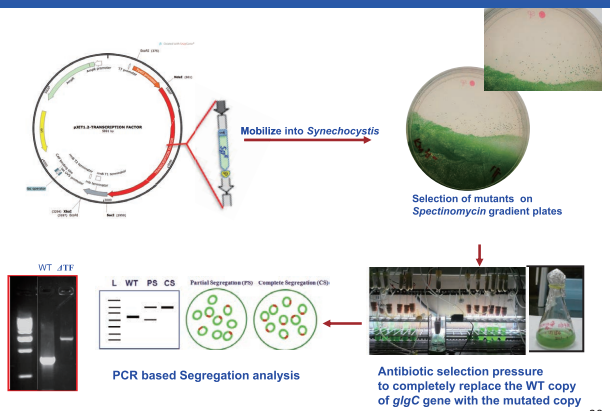
18

ΔglgC plasmid DNA construct



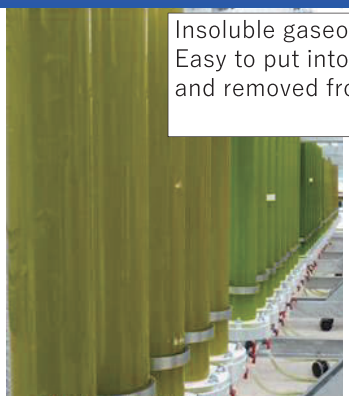
19

Targeted mutagenesis of *glgC* (G-1-P adenylyltransferase)

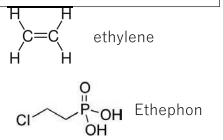


20

Candidates of gaseous signal compound

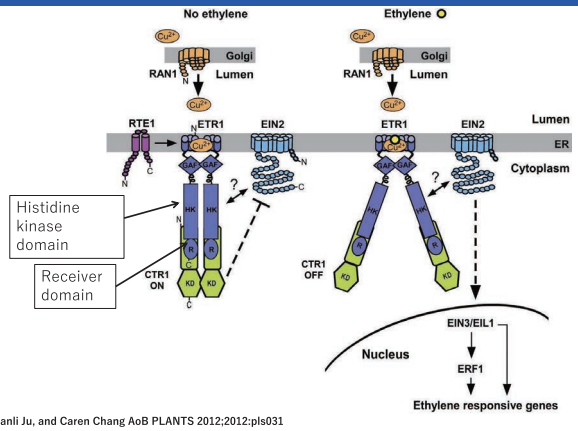


Insoluble gaseous compounds,
Easy to put into the aeration gasses and removed from the culture.



21

Ethylene perception and signal transduction

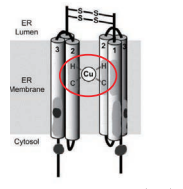


Chuanli Ju, and Caren Chang AoB PLANTS 2012;2012:pls031

22

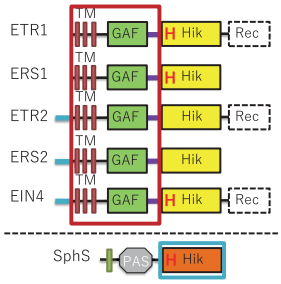
Ethylene sensor in land plants

Domain for ethylene binding

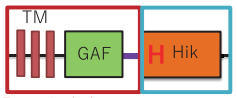


Brenda P. Hall, *et. al.* PGR(2007)

Five ethylene receptors from *Arabidopsis*



Chimeric ethylene sensor

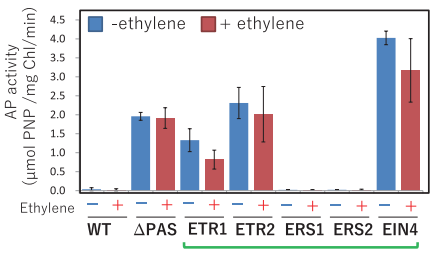


From *Arabidopsis* From *Synechocystis*

Introduction to *Synechocystis* cells

23

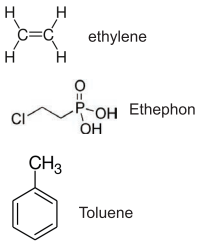
AP activity in cells expressing chimeric sensors



24

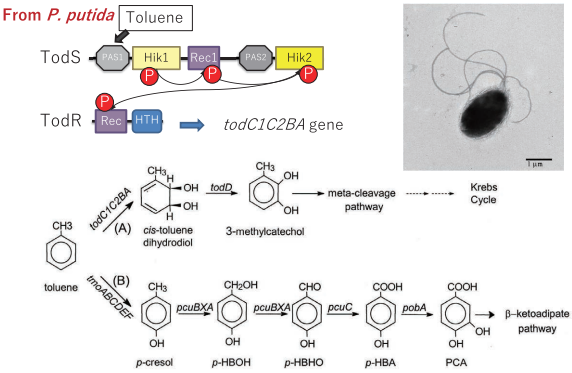
Candidates of gaseous signal compound

Insoluble gaseous compounds,
Easy to put into the aeration gasses
and removed from the culture.



25

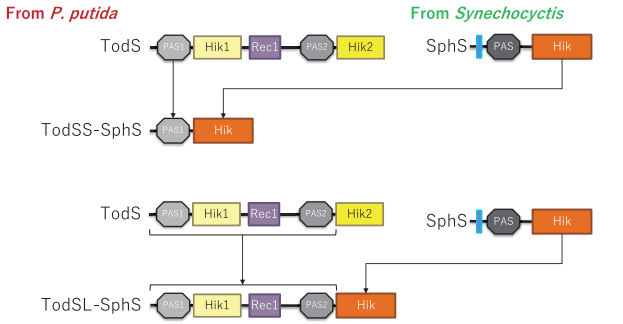
Toluene sensor from *Pseudomonas putida*



Maria-Isabel Ramos-González et al.
Appl. Environ. Microbiol. 2003; 69: 5120-5127

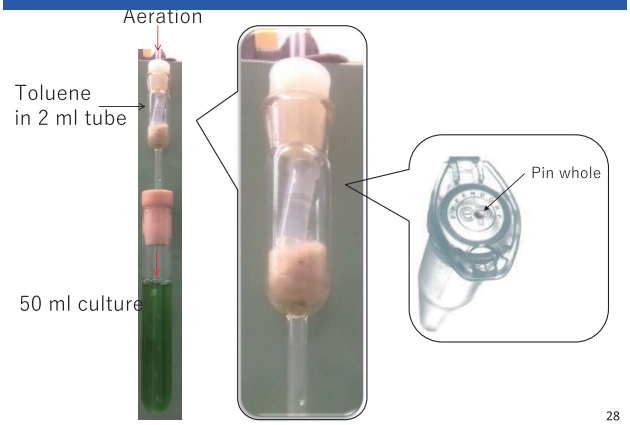
26

Toluene sensor from *Pseudomonas putida*



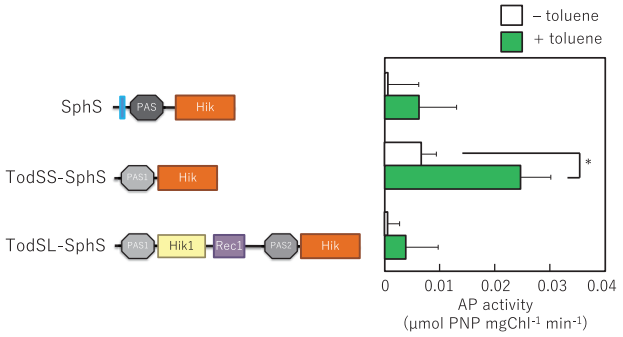
27

Way of addition of toluene into the aeration gas



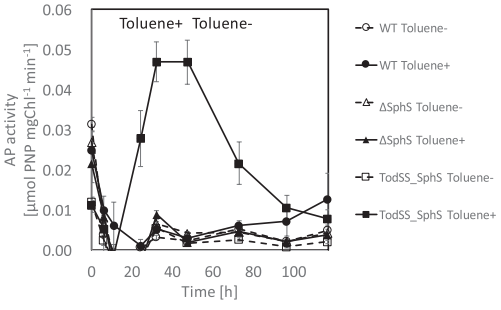
28

Response of the chimeric toluene sensor



29

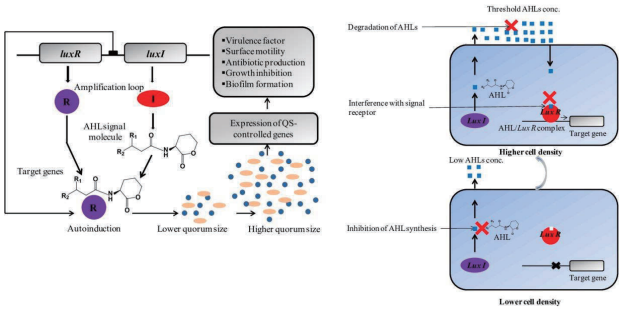
Induction of AP activity with toluene



The induction by toluene was reached at the plateau after 30 h and after cessation of the toluene exposure the AP activity was decrease half per day.

30

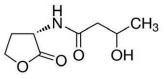
Application of quorum sensing



31

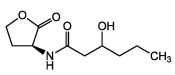
Hiks sensing AHL from *Vibrio*

***N*-3-Hydroxybutyryl-L-homoserine lactone;**
HC4-AHL



LuxN (*Vibrio harveyi*)

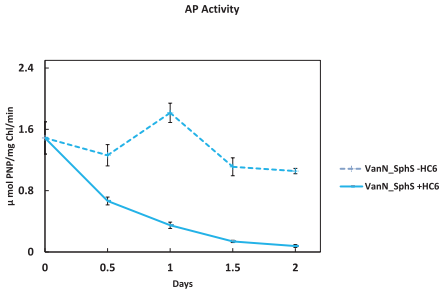
***N*-(3-Hydroxyhexanoyl)-L-homoserine lactone**
HC6-AHL



VanN (*Vibrio anguillarum*)

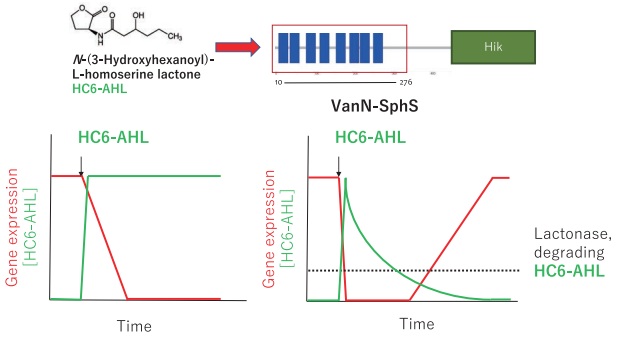
32

VanN chimeric sensor responds to HC6



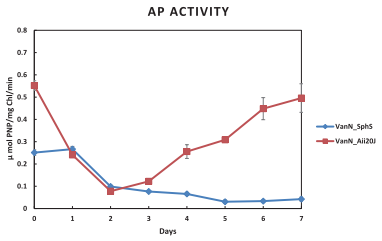
33

Constitutive expression of lactonase



34

VanN/Aii20j transiently responds to HC6



35

Cloning of the gene cluster into the genome of *Synechocystis*

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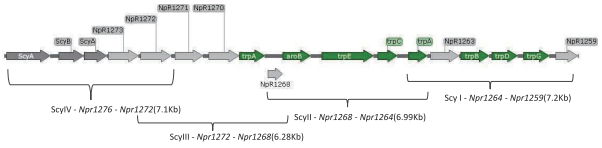

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- Clone the four segmented genes into a suitable vector to insert the scytonemin genes into the neutral site i.e. *slr2030* and *slr2031* of the *Synechocystis* genome.

36

Indo-Japan Binational seminar in 2013

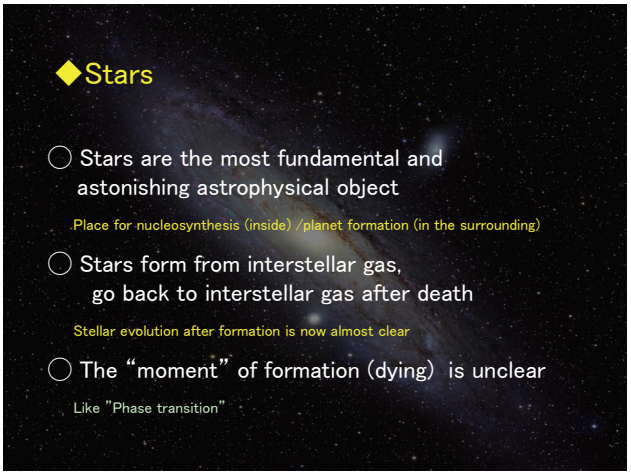
Contracting MoU between UT/UH in 2017

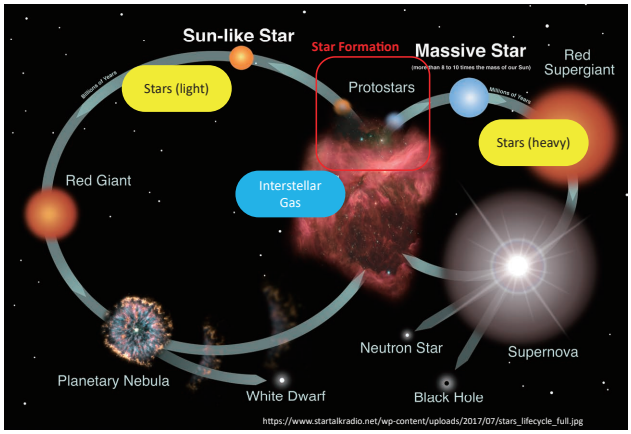
Kick-off meeting at Tsukuba Global Science Week

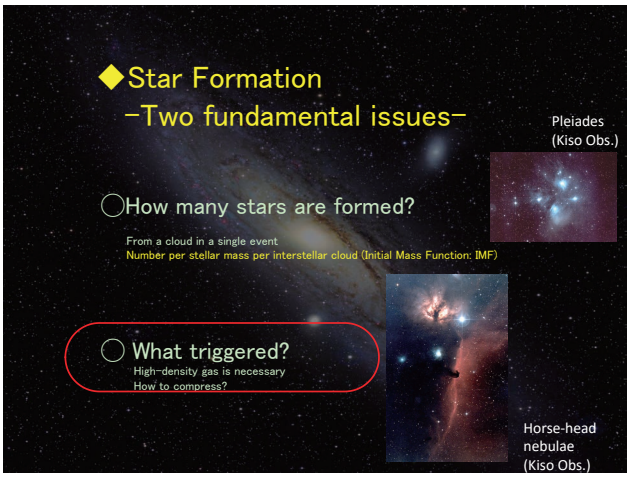
37

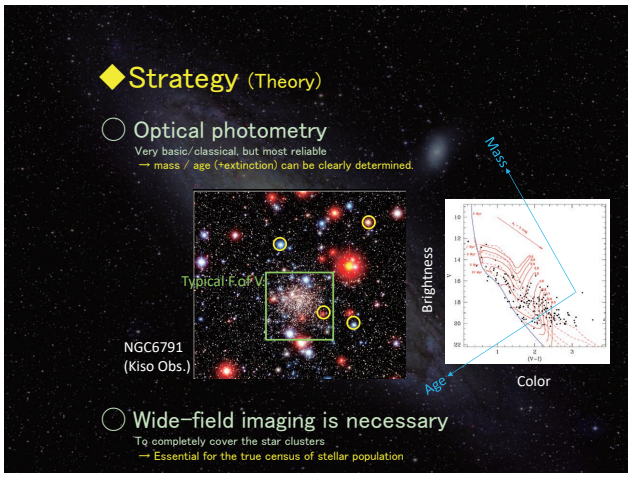
Presentation at the 20th Meeting of Japan-India Science Council (March, 2019)

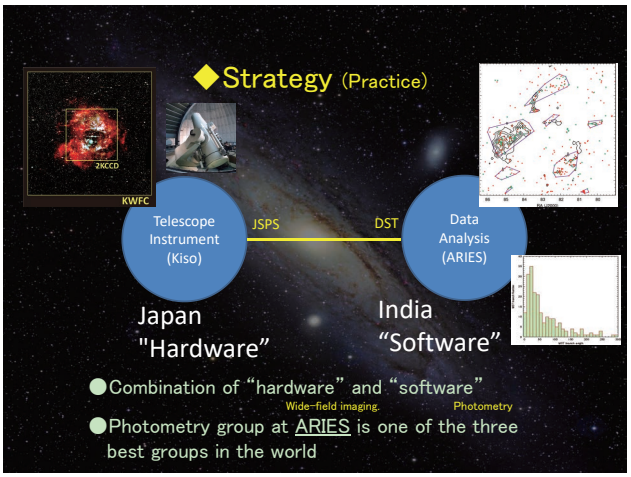
Prof. KOBAYASHI Naoto
(Associate Professor, The University of Tokyo)











Aryabhata Research Institute of observational Sciences (ARIES, 2004-present)

Objectives of ARIES

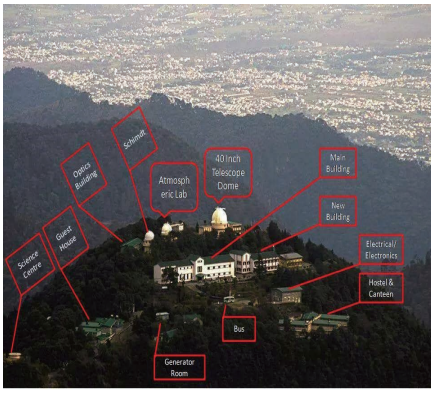
To conduct research in the fields of ***Astronomy & Astrophysics*** and ***Atmospheric Sciences***

~100 staff
(15 astronomers / 19 scientists)
(12 engineers)
(~60 supporting staff)

~40 students/posdocs

One of the three large astronomical institutes in India.

Reincarnated as ARIES under the Department of Science & Technology (DST), Govt. of India as an autonomous body on ***March 22, 2004***

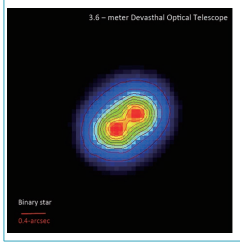


A part of Indian Himalaya

Telescope vital parameters

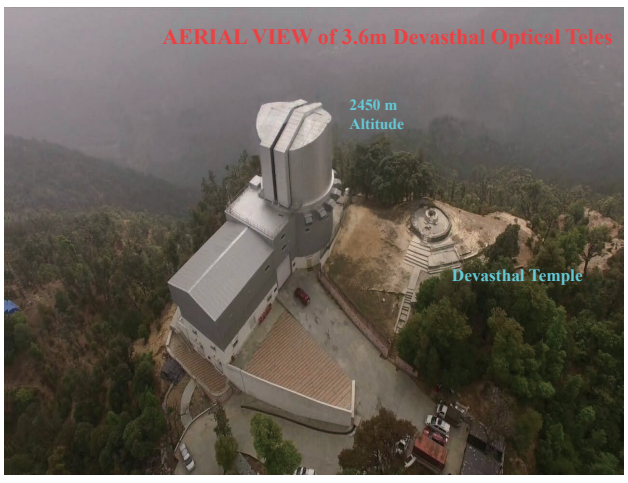
Pointing Accuracy
1.2 arc sec (Main and side ports)

Tracking Accuracy
- 0.1 arc sec RMS for 1 hour in close loop
- 0.4 arc sec RMS for 15 min in open loop

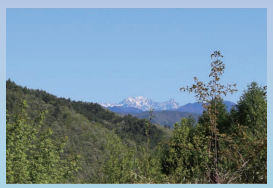


Technical activation of India's Largest Optical Telescope of 3.6m Aperture

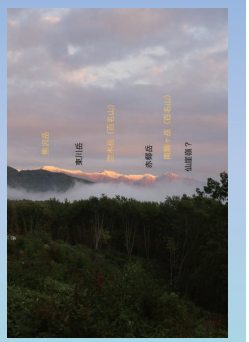
(by honorable Prime Minister of India, Shri Narendra Modi and Honorable Prime Minister of Belgium, Mr. Charles Michel on 30th March 2016)



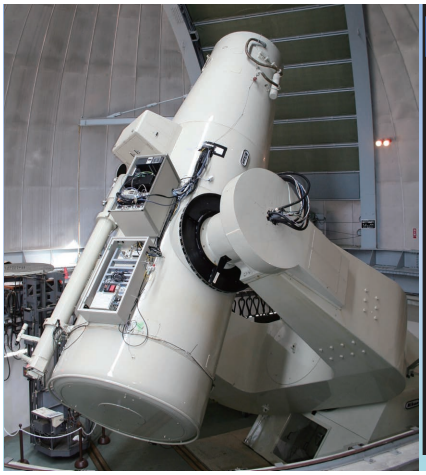
Mt.Ontake
3067m



Mt.Hodaka
3190m



Mid. Alps mountains
(~3000m)



Kiso 105cm Schmidt Telescope

1974–

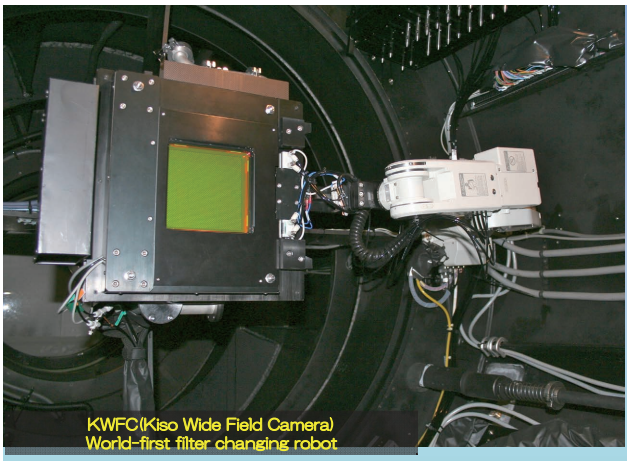
"Largest camera made by NIKON"

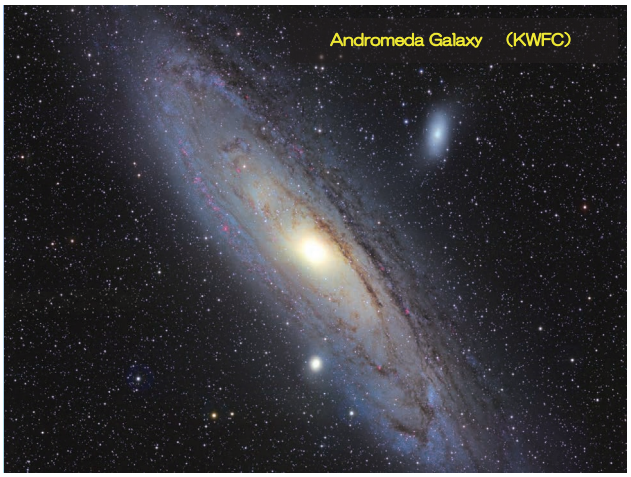
Max F.o.V covers 9-degree, or 18 moons, in diameter.

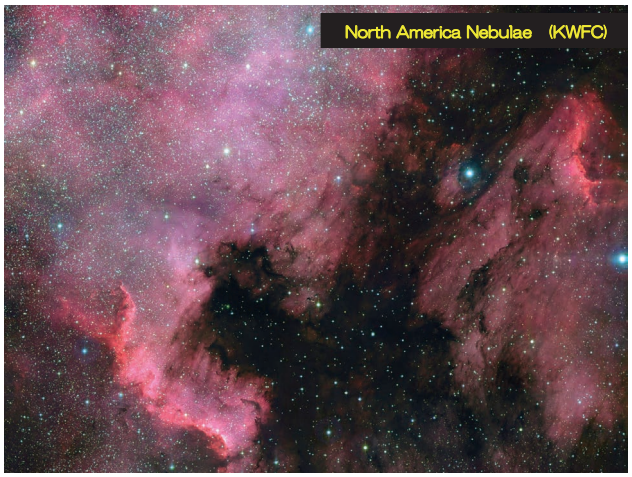
Schmidt

Typical ○

Plate diameter	105	cm
Focal length	330	cm
Length.	800	cm
Mirror diameter	150	cm
Weight	69	t

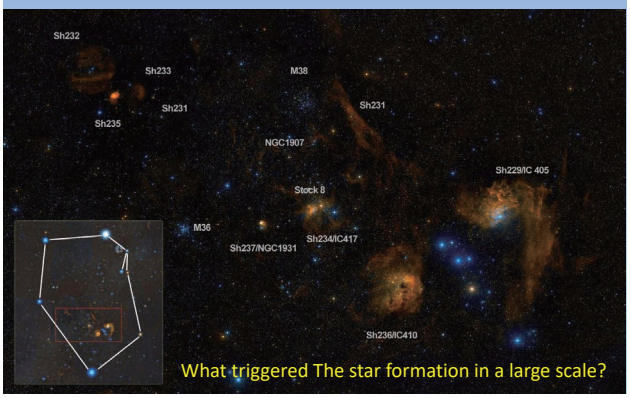






Present work: AURIGA STAR-FORMING REGION ぎょしゃ座

Group of H II regions, clusters,
~ 6x6 degree square at l=173 degree, b= 1.3 degree Distance: 2 kpc



Optical Observations:

The Kiso Wide Field Camera (KWFC) on 105-cm Schmidt telescope, Kiso Observatory of the University of Tokyo.

Eight CCD chips with a total of 8k x 8k pixels cover a field-of-view of 2.2 x 2.2 degrees on the sky

Band	Sources in the Auriga Region	Detection Limit (mag)	90% Completeness Limit
V	470876	21.21	19.00
I	470876	20.03	17.75
J	550210	17.31	15.80
H	538281	15.51	15.10
K	500720	14.55	14.30
W1	696985	17.06	15.75
W2	671510	17.30	15.50
W3	50900	11.71	11.25
W4	1001	6.80	6.25

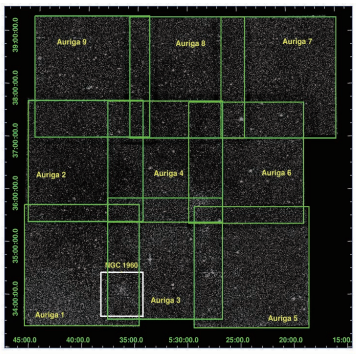
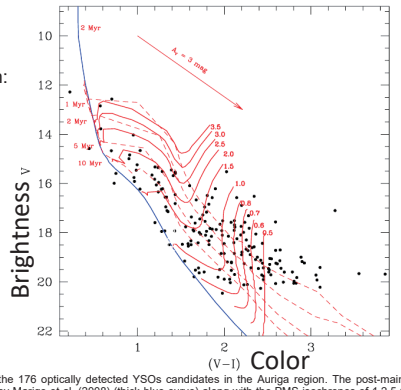


Figure 1. The observed region (~ 6 × 6 degree^2) of Auriga. The nine pointings (green boxes) along with the standard field (NGC 1960: white box) are also shown.

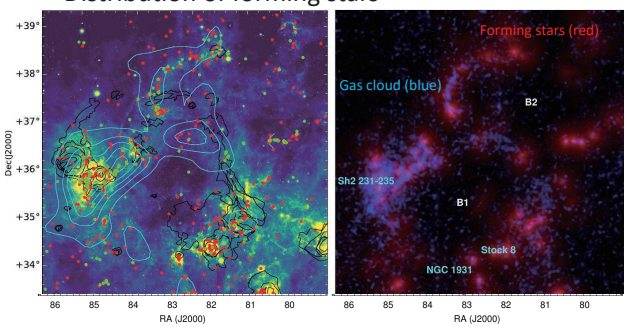
YSO characterization:

HR diagrams



V /(V − I) CMD for the 176 optically detected YSOs candidates in the Auriga region. The post-main sequence isochrone for 2 Myr by Marigo et al. (2008) (thick blue curve) along with the PMS isochrones of 1,2,5,10 Myr (red dashed curves) and the evolutionary tracks of different masses (thin red curves) by Siess et al. (2000) are also shown. All the isochrones and evolutionary tracks are corrected for the distance of 2.2 kpc and reddening E(B − V) = 0.5 mag.

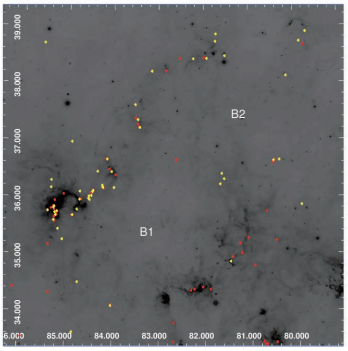
Distribution of forming stars



left-hand panel: Spatial distribution of YSOs superimposed on the 6◦ × 6◦ W ISE 12 µm image of the Auriga Bubble region. Class I (175) and Class II (535) YSOs are shown by green and red dots, respectively. The cyan and black curves are 12 CO and H i contours taken from Dame et al. (2001) and Furst et al. (1990), respectively.
Right-hand panel: Extinction map (blue color) and YSOs density map (red colour) for the Auriga Bubble region smoothened to a resolution of 18 arcmin.

Auriga Bubles:

Probably the largest star-forming *coherent* structure ever found



Embedded clusters are truly stellar nurseries, more than 90 per cent of the stars in our Galaxy are formed in such associations (Zinnecker & Yorke 2007). Since they are young (with ages of less than 2–3 Myr), they still contain the imprints of the parental molecular cloud. Moreover, the wide range of number stars (10–10^4, Lada & Lada 2003) and high density of members (more than 20 stars pc^{-2}, Lada & Lada 2003) makes embedded clusters perfect laboratories to study cluster dynamics, stellar evolution and star formation theories.

Among embedded clusters, those harbouring massive stars (hereafter massive embedded clusters) are particularly important since both the formation of massive stars and the impact of massive stars feedback on the other cluster members and the parental molecular cloud are still not well understood.

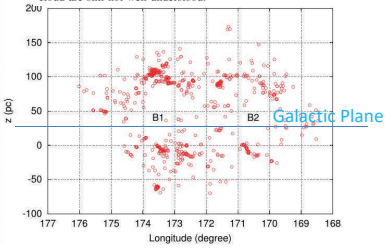


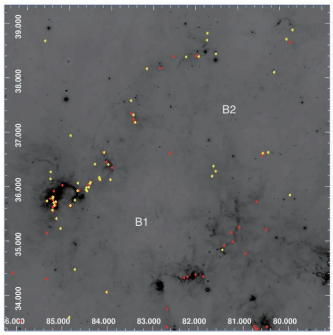
Figure 21. Left-hand panel: Spatial distribution of the YSOs having age <1.0 Myr superimposed on the 6° × 6° *WISE* 12 µm image of the Auriga Bubble region. The X-axis and Y-axis represents RA and DEC in the J2000 epoch, respectively. Right-hand panel: Distribution of all the identified YSOs in the $l - z$ plane.

◆What triggered?

- ○ Bubbles by (multiple) supernovae explosions?
  - No energy source was found inside the bubbles.
- ○ This mechanism appear to be dominant In the significant portion of the Galaxy disk
  - Though very preliminary
- ○ Stellar death (explosions) might be the dominant source of triggering
  - Literally "life-cycle"

Auriga Bubles:

Three generation of star formations



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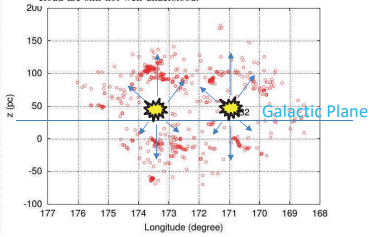
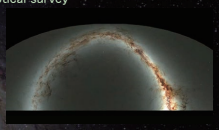


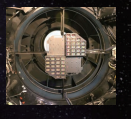
Figure 21. Left-hand panel: Spatial distribution of the YSOs having age <1.0 Myr superimposed on the $6° \times 6°$ *WISE* 12 μm image of the Auriga Bubble region. The X-axis and Y-axis represents RA and DEC in the J2000 epoch, respectively. Right-hand panel: Distribution of all the identified YSOs in the $l - z$ plane.

◆Next step

- ○ Continuing study for all regions along the Galactic plane
  - But making use of the images from the latest large optical survey (PanStarrs, etc) now available



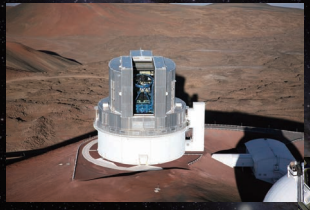
- ○ New frontier: Time variation
  - Kiso new super wide-field movie camera "Tomo-e Gozen" (Sako+2018)
  - D=9-deg F.o.V. (2Hz)
  - Time variation of stars in open clusters → stellar rotation/transiting planets



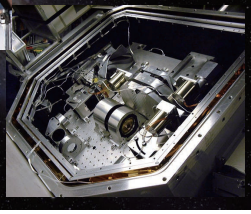
◆Members

- ○ India: ARIES (under DST)
  - Former Director: Anil Pandey
  - Associate Professor: Saurabh Sharma
  - Other 3 members + many young students
- ○ Japan: U.of Tokyo
  - Associate Professor: Naoto Kobayashi
  - Professor emeritus: Katsuo Ogura (Kokugakuin)
  - Other 5 members (=young researchers)

- Subaru Project : 1994–



Facility instrument:
Infrared Camera/Spectrograph
(Kobayashi+2000)

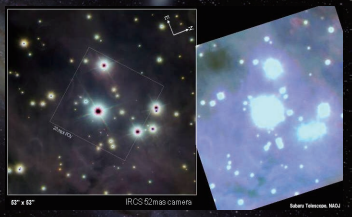


Subaru Telescope 8.2m
Mauna kea, Hawaii
(altitude 4200m)

- Science with Subaru

Adaptive optics

Orion star forming region



w/AO ← w/o AO
(as clear as Hubble telescope)

Large project: short turnaround (quick results) is required//

◆History

○ Prof.Pandey(ARIES) – Prof.Ogura (Kokugakuin)

Met in 1994 at IIA, Bangalore in Conference organized under India-Japan science collaborative program. Three Nights on Kiso telescope were allocated in 1999. This collaboration continued during 1999 – 2005 using travel grants provided under India-Japan science collaboration program.

Followed by JSPS-DST Programs:
1. 2006-2007 JSPS-DST Ogura-Pandey
2. 2008-2009 JSPS-DST Ogura-Pandey

○ Kobayashi (U.of Tokyo) took over

Took over in 2012

Continued JSPS-DST Programs:
3. 2013-2014 JSPS-DST Kobayashi-Pandey
4. 2016-2017 JSPS-DST Kobayashi-Pandey (present one)

Almost 20yrs

◆Outcome

○ Science

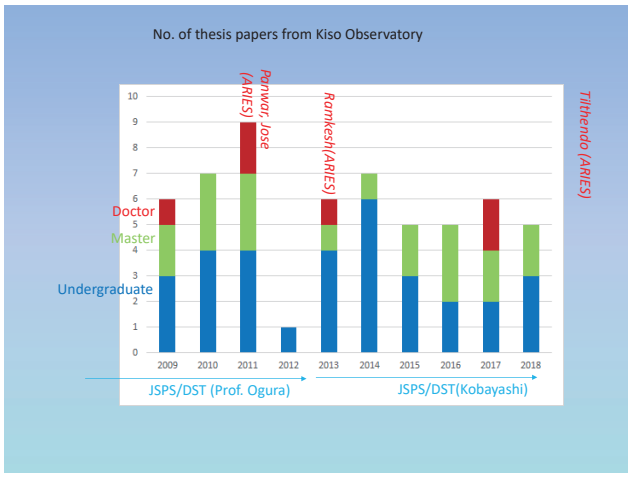
35 papers in refereed journals (2000–)

○ Education

6 thesis (India) using the Kiso Data (2000–)

1. Karunakar Upadhaya: Principal in Senior Secondary School (KVS)
2. Tejbir Singh: in Canada as software/hardware engineer.
3. Saurabh: Faculty (Researcher) in ARIES.
4. Jessy Jose, Faculty (Researcher) in IISER
5. Neelam Panwar: Faculty (Researcher) in ARIES
6. RamKesh, Staff (Researcher) at NARIT, Thailand

(7. Tirthendu Sinha: (Currently working towards his PhD at ARIES))



◆Future

○ MoU between ARIES/U.ofTokyo

Discussion on-going

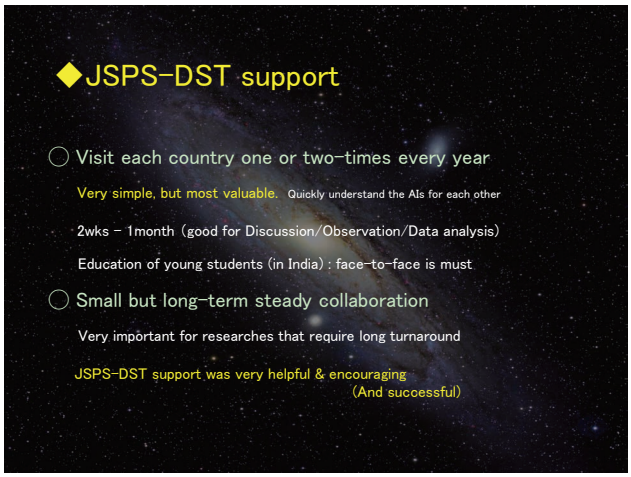
○ New Instrument development for DST 3.6m

Discussion on-going

E.g., Next-generation NIR High-resolution spectrograph

Instrumentation technique growing in India (TIFR etc.)

This may lead to instrumentation for future large telescopes in India//


◆JSPS-DST support
◯ Visit each country one or two-times every year
Very simple, but most valuable. Quickly understand the AIs for each other
2wks – 1month (good for Discussion/Observation/Data analysis)
Education of young students (in India) : face-to-face is must
◯ Small but long-term steady collaboration
Very important for researches that require long turnaround
JSPS-DST support was very helpful & encouraging
(And successful)

JSPS-DST Asian Academic Seminar (FY 2013)

Prof. KOTANI Motoko
(Professor, Tohoku University)

On this occasion of the twentieth anniversary of exchange between the Department of Science and Technology (DST) and the Japan Society for the Promotion of Science (JSPS), I offer a hearty word of congratulations and am delighted to be able to contribute this commemoratory publication.

Under the Japan-India Cooperative Science Programme, my field of Mathematics and Computational Science has been covered since 2013 when the programme was adjusted, reorganizing priority areas from six to five. That made me a relatively new member of the programme. Needless to say, however, there is a long history of exchange between mathematicians from Japan and India, which discovered "zero," the very symbol of mathematics, and is now making great strides in the IT industry. Those exchange have been carried out across a wide spectrum of mathematics including theory, algebraic geometry, geometry, representation theory, number theory, and combinatorial theory. Many Japanese mathematicians participated in the 2010 International Congress of Mathematicians held in India.

The Japan-India Cooperative Science Programme broadened the pipeline between individual Japanese and Indian researchers, organizing them in an organic and strategic manner while inviting new members into the fold. In 2013, the Asian Academic Seminar was convened on the theme "Discrete Mathematics and its Application," held at the Graduate School of Mathematical Sciences, The University of Tokyo, on 3-10 November. It was organised by Dr. TOKIHIRO Tetsuji, professor of the Graduate School of Mathematical Sciences and myself on the Japan side and Dr. Bimal K. Roy, director of the Indian Statistical Institute, on the Indian side.

Discrete Mathematics is drawing attention as a field of science that focuses on discrete objects and their inter-relationships. It makes it possible to observe natural phenomena and various types of information as discrete data. Through efficient and highly accurate analyses, discrete mathematics makes possible the discovery of principles and structures that underlie such phenomena. The process of devising fundamental theories that span issues encountered in mathematical science and developing discrete analytical methods based on them is accruing to the establishment of important new fields of research. The theories and methods that have so-far been developed are being applied and contributing to fields of engineering, physical and life science, and social science, and these applications are making striking contributions to society. For examples, discrete mathematics includes cryptography as an application of number theory; discrete graph analysis applied to materials science; integrable systems used to analyze fluid dynamics; wavelet analysis as an application of representative theory and real analysis; simulation methods using numerical analysis and quantum information; and statistical physics using discrete stochastic processes. Discrete mathematics has become a critical field in what's called the data-driven, digital 21st century.

This seminar was held to advance research collaboration in discrete mathematics and its applications between Japan and India, in which fundamental and application theories possessed by the two countries in their respective fields of specialization were

merged. It also worked to provide cutting-edge theoretical training to young Japanese and Indian researchers who will with colleagues from other countries go on to shoulder the future of this field in Asia. Finally, the seminar sought to generate seeds for advancing joint research between the two countries in this field. It had two main themes: Combinatorial Design and Discrete Integrable Systems. These were amplified by four sub-themes: Analysis of Graphs and Graph Analysis, Number Theory and Combinatorial Cryptography, Representation Theory, and Mathematical Physics.

Altogether, the seminar drew 74 participants, 40 from Japan and 26 from India. Eight more attended from Taiwan, Korea, Cambodia and the Philippines. Some 34 Indian and Japanese researchers delivered presentations to a 40-person audience that included 25 graduate students. Toward the next generation discovering their own issues and techniques, the attending students and young researchers were divided into five groups where they discussed themes related mainly to open challenging problems. On the last day of the seminar, each group delivered a report, with an award presented for the best one. Over the course of the event, the young participants ate and lodged together, giving them an ideal change to deepen their discussions, broaden a shared interest in a variety of issues, and create lasting friendship relations.

As mentioned above, this Asian Academic Seminar merely marked the start of the inclusion of Mathematics and Computational Science within the Japan-India Cooperative Science Programme. I look forward to it providing the impetus for ever-stronger colleagueal ties and the advancement of joint research between Indian and Japanese researchers. In fact, I am pleased to hear that related inquires and recruitments are already increasing under the Special Lecture Programme and for Joint Seminars.

<December, 2014>

JSPS-DST Japan-India Forum for Advanced Study (FY 2019)

Prof. KOTANI Motoko

The FY2019 Japan-India Forum for Advanced Study was held on 1-8 January at the Indian Statistical Institute in Kolkata on the theme “Mathematics and Computational Science.” It comprised a seminar, tutorial, and workshops. Held for students and young researchers, the tutorial featured a series of lectures on the mathematical science underpinnings of quantum computation and quantum information. In conveying basic knowledge, the lectures were not hypothetical but intensely introductory in nature. The last day of the tutorial took the form of an “Interacting Session” in which the students and young researchers themselves wrapped up the lecture series and sought out research themes that could be advanced. In the workshops, invited lectures were delivered by frontline scientists on important topics related to the mathematical sciences used in quantum computation and information, and poster presentations were given by the students and young researchers, who also received guidance from the frontline scientists on ways to enhance their research themes.

The main points of the seminar and the lectures given were as follows.

Today’s computer, both in theory and practice are based on classical physics. They are limited by locality and by the classical fact that systems can be in only one state at the time. However, modern quantum physics tells us that the world behaves quite differently. A quantum system can be in a super position of many different states at the same time, and can exhibit interference effects during the course of its evolution. Moreover, spatially separated quantum systems may be entangled with each other and operations may have “non-local” effects because of this. Quantum computation is the field that investigates the computational power and other properties of computers based on quantum-mechanical principles with the apprehension that they might be able to solve some complex problems more quickly. With initial formalisation of a quantum computer by Yuri Manin, Richard Feynman, and Paul Benioff, complexity theory by Sanjeev Arora, it started gaining momentum after the development of Deutsch and Jozsa algorithm, providing exponential speedup over best known classical algorithm for the same problem. However, interest in the field increased tremendously after Peter Shor’s very surprising discovery of efficient quantum algorithms for the problems of integer factorization and discrete logarithms. Since most of current classical cryptography is based on the assumption that these two problems are computationally hard, the ability to actually build and use a quantum computer would allow us to break most current classical cryptographic systems, notably the RSA system. At the same time a quantum primitives of cryptography was also proposed by Bennett and Brassard.

To what extent will quantum computers ever be built? At this point in time, it is just too early to tell. The first small 2-qubit quantum computer was built in 1997 and in 2001 a 5-qubit quantum computer was used to successfully factor the number 15. Since then, experimental progress on a number of different technologies has been steady but slow. Currently, the largest quantum computers have a few dozen qubits. The practical problems facing physical realizations of quantum computers seem formidable. The problems of noise and decoherence have to some extent been solved in theory by the discovery of quantum error-correcting codes and fault-tolerant computing but these problems are by no means solved in practice. Moreover, while the difficulties facing the implementation of a full quantum computer may seem daunting, more limited applications involving quantum communication have already been implemented with some success, for example teleportation.

[Lectures]

Jan. 3

Poslutes of Quantum Mechanics: Guruprasad Kar (ISI-Kol)

Quantum Teleporation & Superdense Coding: Manik Banik (ISI-Kol)

Jan. 4

Introduction to Quantum Computing: Arpita Maitra (CRRAO-AMSCS-Hyd)

Design Patterns: Quantum Algorithms: Tamal Guha (ISI-Kol)

Programming with IBM-Q: Adarsh Chandrashekhar (ISI-Kol)

Experience with Quatum True Randm Number Generator: Bappaditya Ghosh (ISI-Kol)

Jan. 5

Analysis of Cryptographic Properties of Boolean Functions in Quantum Age: Subhamony Maitra (ISI-Kol)

Jan. 6

Exploiting Randomization in Quantum Algorithms: Debajyoti Bera (IIIT-D)

Mathematics of Topological Quantum Computing and Operator Algebras: Kawahigashi Yasuyuki (The University of Tokyo)

Non Commutative Geometry and Topological Phase: Kotani Motoko (Tohoku University)

Quantum Annealing and Machine Learning: New Directions of Quantum Annealing: Ohzeki Masayuki (Tohoku University)

Quantum Attacks in Public Key System: Abhijit Das (IIT-KGP)

Quantum True Random Number Generator: Goutam Paul (ISI-KOL)

Jan. 7

Quantum Key Distribution: Arpita Maitra (CRRAO-AMSCS-Hyd)

Extremal Finite Sets in Spheres and Projective Spaces: Munemasa Akihiro (Tohoku University)

Quantum Machine Learning: Sourav Chakraborty (ISI-KOL)

Coding Based Crytography in Quantum Age: Abhik Mukherjee (IIEST)

Computational Problems in Post-Quantum Cryptography: Takagi Tsuyoshi (The University of Tokyo)

Post-Quantum Cryptography from Supersingular Elliptic Curve Isogenies: Takashima Katsuyuki (Mitsubishi Electric/ Kyushu University)

Jan. 8

Superconducting Qubit and Others in the Light of Quantum Computer Architecture: Hirokawa Masao (Hiroshima University)

Challenges in Designing Efficient Fault-Tolerant Quantum Computing Circuits: Susmita Sur-Kolay (ISI-Kol)

Measurement Device Independent Randomness Certification: Manik Banik (SNBNCBS)

<February, 2020>

Provisional Translation: the original manuscript was written in Japanese in May 1995 in GAKUJYUTU-GEPPO (Vol. 48, No. 5, "学術月報") published by JSPS.

Dr. ITO Mitsuo passed away in November 2019.
We express our heartfelt gratitude for his permission to use this article and offer our deepest condolences to his family and colleagues.

Asian Academic Seminar on Molecular Science and Molecular Materials

Dr. ITO Mitsuo

(Director of Okazaki National Research Institutes, Institute for Molecular Science, Professor Emeritus of Tohoku University)

1. Up to Holding the Seminar

As a long-time programme of the Japan Society for the Promotion of Science (JSPS), Asian Academic Seminars had as their purpose the fostering of young researchers from the Asian region and the promotion of research exchange. Through these seminars, the young researchers received lectures on selected themes from topflight, frontline researchers in the subject field and made observations visits to related research facilities and institutions.

The first meeting of the Japan-India Science Council was held in New Delhi in August, 1993. At it, the co-chairs, Dr. NAGAKURA Saburo, President, The Graduate University for Advanced Studies, and Dr. C.N.R. Rao, President, Jawaharlal Nehru Centre for Advanced Scientific Research, agreed to hold the Council's first Asian Academic Seminar on the theme "Molecular Science and Molecular Materials" in Bangalore in November of the following year.

In recent years, rapid advances had been made in molecular science and molecular materials as boundary domains of chemistry, physics and biology, so the seminar covered a broad range of topics from single-cell molecule structure to the development of functional materials as molecular assemblies. Vigorous research activities were being carried out in these fields within the Asian region, with Japan, India, China and Taiwan boasting particularly high levels of science. This fact is witnessed in three Asian researchers (Drs. C.V. Raman of India, FUKUI Kenichi of Japan, and Y.T. Lee of Taiwan) having won Nobel Prizes in fields of Molecular Science.

Despite the fact that the research standard in Asian countries was high, research collaboration and information exchange among researchers in fields of molecular science was sorely lacking when compared to European countries. To say nothing of the virtual nonexistence of exchange among young molecular science researchers. Breaking through this milieu and deepening exchange among researchers in the molecular sciences, especially young researchers, would we believed stimulate and encourage research in molecular sciences and materials, while having a large impact on strengthening colleagueship and friendship among the region's young researchers. This was precisely the objective sought in holding Asian Academic Seminars.

Based on an agreement between Professors Nagakura and Rao, JSPS and the Indian government's Department of Science and Technology (DST) were to co-organise the seminar on Molecular Science and Molecular Materials, with the Institute for

本原稿は学術月報第48巻第５号（64～67ページ，1995年）から抜粋したものです．

伊藤先生は2019年11月に逝去されました．
本稿の使用許可を頂いたことに心から感謝申し上げるとともに，謹んでご冥福をお祈り致します．

アジア学術セミナー「分子科学と分子材料」

伊藤　光男

1. セミナー開催まで

アジア学術セミナー（以下「セミナー」という）は，日本学術振興会 (JSPS) の事業の一環として，アジア地域の若手研究者の育成と研究交流を図る目的で数年前より実施されているものであり，特定のテーマを設定してその分野で活躍中の一流の研究者による講演と関連する研究所，研究機関の見学から成っている．

1993年８月，ニューデリーで開催されたインド－日本科学会議において，長倉三郎教授（総合研究大学院大学長）と C.N.R. Rao 教授（ネールセンター長）との間で，本セミナーを“分子科学と分子材料”のテーマの下で1994年11月にインドのバンガロールにおいて開催することが合意された．分子科学，分子材料は化学，物理，生物の境界領域として近年急速な発展を示している研究分野であり，単一分子の構造，機能に関する基礎的研究から分子集合体としての機能性材料の開発に至る広い範囲にわたっている．アジア地域におけるこの分野の研究活動は活発に行われており，とくに日本，インド，中国，韓国，台湾の研究水準は極めて高く，このことはこの地域で３人のノーベル賞分子科学者（インドの C.V. Raman，日本の福井謙一，台湾の Y.T. Lee（本セミナーの講演者））を輩出していることからもうかがえる．

これらアジア各国の研究水準は高いにもかかわらず，各国の分子科学研究者間の研究交流，情報交換は欧州諸国に対するものと比較して稀薄であると言わざるを得ない．まして若手の分子科学研究者間の交流は皆無に近い状態である．この現状を打破し研究者，とくに若手研究者の交流を深めることは，アジア地域における分子科学，分子材料の研究に大きな刺激を与え研究の発展をうながすとともに，若手研究者の連帯感と友情を深めるのに大きな効果をもつものと考えられる．これはまさにアジア学術セミナーの目的にほかならない．

こうして長倉－Rao の間の合意に基づいて，“分子科学と分子材料”に関するアジア学術セミナーを日本学術振興会とインド科学技術省（DST）が共同主催し，日本側は分子科学研究所が，インド側はネールセンターがそれぞれ世話機関となり準備を進めることになった．まず，セミナーは1994年11月22日～12月２日にバンガロールのインド科学研究所（Indian Institute of Science）で行うことが決まり，日本側はセミナー前半の講演を，インド側は後半の研究所見学をそれぞれ分担して立案し，実施することになった．セミナーの実施方法，講演主題，講師，見学場所の選定等，組織委員会（Table 1）は約１年にわたって準備を行った．若手研究者の参加募集は Table 1 に掲げた開催趣意書を各国の著名な研究者に配布するとともに，優秀な35歳以下の若手研究者の推薦を依頼した．その結果，インドから17名，日本から８名，中国５名，韓国３名，シンガポール１名，タイ１名，フィリピン１名が出席した．なおこのほかにオーストラリア２名，ニュージーランド１名，ロシア１名の若手研究者が講師の資格で参加したので，総計40名となった．また講演者は，ノーベル化学賞受賞者である Y.T. Lee 教授を含めて22名で，７ヶ国にわたった．（Table 2）

インド以外の国から参加した講師，若手研究者の旅行日程及び旅費の手当は日本側が面倒を見ることになっていたため，個々の研究者との連絡，旅行日程の調整はすべて岡崎国立共同研究機構の事務官２名と私があたった．この作業にはかなり

Molecular Science on the Japan side and the Nehru Centre on the India side coordinating the seminar. At that, preparation to hold the seminar started. First, it was decided to hold the seminar in Bangalore during the period from 22 November through 2 December, 1994. A plan was made and carried out in which the Japan side delivered lectures in the first half of the seminar and the India side conducted research facility observation tours in the second half. Preparation by the organizing committee for holding the seminar was carried out over a period of about one year, which included establishing an implementation method, choosing lecture topics, selecting lecturers, and choosing places for conducting research observations. (Please see Table 1.)

In recruiting young researchers to participate in the seminar, a prospectus (seen in Table 1) was distributed to distinguished researchers in Asian countries, who recommended several excellent young researchers of under 35 years of age. Among them were 17 from India, eight from Japan, five from China, three from Korea, and one from Singapore, Thailand, and the Philippines. As young researchers, two researchers from Australia and one from New Zealand and Russia were added, making a total of 40 seminar participants. There were 22 lecturers hailing from seven countries, headed by Dr Y.T. Lee, Nobel laureate in Chemistry. (Please see Table 2.)

The Japan side arranged the travel schedules and supported the travel costs of the lecturers and young researchers attending the seminar from countries other than India. For this purpose, I and two administrative staffs of the Okazaki Institute of Molecular Science contacted each researcher and coordinated all of their travel schedules. This task took a great deal of time and effort. A huge number of faxes were transmitted in communicating with the participants. I extend my hearty thanks to staff members of International Research Cooperation Division at Okazaki, who devoted themselves to carrying out this rigorous task. I was lucky that the two staffs were there to help this time. If researchers had to do all of this preparation by themselves, it would be at the significant sacrifice of their research activities. I hoped that a strategy could be devised to lighten the workload on the coordinating organisations when holding the next Asian Academic Seminar.

At the same time, people on the India side work hard to coordinate the seminar's implementation plan, help to acquire visas for the participants to enter India, secure lodging for each of them, and devise measures to respond to the periodically occurring plague clamour in India. In doing these various things, we were greatly assisted by Professors B. Bagchi and S. Ramasesha of the Indian Institute of Science and the administrative staffs of the Nehru Centre. To all of them, I take this opportunity to express my hearty appreciation.

2. Holding the Seminar

I thought that we had done everything we needed to do and we're ready to hold the seminar. But, if I were to say that I was free of anxiety before arriving in India, it would be less than truthful. The arrival of my flight in Bombay was 10 hours late, while the domestic flights of other Japanese were abruptly cancelled for the excuse that they didn't have the required number of passengers to take off. Feeling flurried, I encountered many unanticipated things, which kept occurring. However, my anxiety was relieved when arriving at the Indian Institute of Science, the venue for the seminar in Bangalore. Located in the southern Indian state of Karnataka, Bangalore is a lusciously green garden city perched atop a 700-meter high plateau. It is well known as a place where people go to escape to India's summer heat. Situated in the northeast part of the city, the Indian Institute of Science has an expansive campus—evoking a feeling of being in a different world, it's dotted with historical, stately buildings enveloped in thick groves of large trees. In November, the air was dry, giving way to a wide expanse of clear, blue

の時間と労力を要し，各参加者と交信したファックスだけでも膨大な量にのぼった．この苛酷な作業に献身的にあたっていただいた管理局国際研究協力課の相原課長，石川研究協力専門員に心からお礼を申しあげる．今回は幸いにもこの２人の事務官の方があたっていただいたが，これを研究者がやらなければならないとしたら研究活動を相当に犠牲にせざるを得ないであろう．今後のアジア学術セミナーの発展のためにも世話機関の労力軽減の方策を切に望みたい．

一方，セミナー実施計画の調整，インド入国のためのビザの取得，各人の宿舎の確保，はてはたまたま起こったペスト騒ぎに対する対応等，インド側の関係者のご苦労は大変なものであった．とくにインド科学研究所の B. Bagchi 教授，S. Ramasesha 教授，ネールセンター事務局の方々には大変お世話になった．ここに感謝の意を表する次第である．

2. セミナーの概要

セミナーの準備は万端ととのえたつもりであったが，実際にインドに着くまでは心配がなかったと言えば嘘になる．私自身ボンベイ到着が約10時間遅れ，他の日本人の方は予約していたインド国内の航空便が客が少ないという理由で突然欠航となり泡を食ったりと，いろいろと予想しないことが多かった．

しかし，セミナー会場であるバンガロールのインド科学研究所に着き不安は一掃された．南インドのカルナータカ州の州都であるバンガロールは標高700m の高原に位置する緑あふれるガーデン・シティーであり，避暑地としても有名である．市の北西部にあるインド科学研究所は広大なキャンパスを占め，うっそうと茂る大樹の森の中に由緒ある重厚な建物が点在する別天地であった．11月は乾期にあたり，澄んだ青空が拡がり，柔らかい日射しが樹々の葉に照りかがやいている風景は，ここに来るまで想像だにしなかったものである．また，よく整備された快適な宿舎はインドまでの長旅の疲れをいやしてくれるに十分であった．

セミナーの会場は，今世紀初頭に建てられた Faculty Hall という英国風の重厚で気品あふれる石造りの建物（Figure 1）の中にあり，これもまた英国の国会議事堂内を思わせるような200人くらいが収容できる立派な講義室であった．セミナーは，C.N.R. Rao ネールセンター長の歓迎の辞，長倉三郎総合研究大学院大学長，菊池健日本学術振興会理事及び私の挨拶のあと，各講師による講演がプログラムに従って進行した．講演は午前に２つ，午後に２～３つという比較的ゆったりしたもので，討論の時間も十分に設けられた．コーヒーブレークや立食形式の昼食は，講義室に隣接する貴族の舞踏会場を思わせるような壮大な部屋があてられ，そこで討論の続きがなされたり，また講師と若手研究者との活発な交流が行われた．夕方５時から７時までの２時間は若手研究者がそれぞれの研究を発表するプレゼンテーションにあてられ，活発な討論が展開され大いに盛り上がった．

このようにすべての参加者が朝９時から夕方７時頃まで行動をともにした一週間であった．こう書くと大変ハードな１週間と聞こえるかもしれないが，ゆったりとした和気藹々の楽しい１週間であった．なお，11月25日以降の講義は同じキャンパス内にあるネールセンターの講義室に会場を移して行われたが，ここも熱帯の色鮮やかな花でかこまれたすばらしい場所であった．

3. 感想，その他

今回のセミナーは，一流の研究者による第一線の研究をじっくり聞くことを主限としたため，これら研究者の研究に対する哲学というか，考え方，アプローチ等，通常の学会等ではとても聞けない貴重な話を聞くことができた．このように，ノーベル賞受賞者を含む22名の著名な分子科学研究者からそれぞれまとまった講演を一週間にわたって，しかも限られた少人数で受けることができたのは贅沢の極みと言うべきであろう．若手研究者はもとより講師をつとめたシニアーの研究者にとっても極めて有意義であった．

また若手研究者によるプレゼンテーションも素晴らしいもので，意欲あふれる優秀な研究者がアジアで確実に育ちつつあることを実感した．若手研究者たちはセミナー開催中，同じ宿舎で寝食をともにし，互いに深い友情と強い連帯感が生まれ

sky. Leaves of the trees reflected soft rays of the sun filtering through them. Before coming here, I hadn't imagined such a sublime scene. Moreover, the comfortable lodging accommodations provided for us were more than adequate to rest our weary bones after such a long flight.

As to the venue of the seminar, it was held in the Faculty Hall. Constructed at the turn of the 20th century, it is a stone building abounding in refined British architecture. (Please see Figure 1.) Inside the building is a splendid conference hall, evocative of the inside of the British House of Parliament, which accommodates about 200 people.

To kick off the seminar, Dr. C.N.R. Rao delivered welcoming remarks, followed by messages from Dr. Nagakura and Dr. KIKUCHI Ken, President of JSPS. Then, the programme proceeded with lectures by distinguished scientists. Two lectures were scheduled for the mornings and two or three for the afternoons, which gave the proceedings a fairly laid back pace, allowing ample time for discussions. The coffee breaks and buffet-style lunches were held in an adjacent room—a large and regal room bearing resemblance to a dance hall designed for the nobility. Discussions were continued throughout these periods, with spirited exchanges enjoyed between the lecturers and young researchers. During the two hours between 5 and 7 in the evening, the young researchers gave presentations on their various research pursuits, spurring vigorous discussions and interactions.

Over the course of this week, the participants acted together from nine in the morning to seven in the evening in carrying out the many activities packed into this seminar programme. From November 25th, the lectures were carried out in the conference hall of the Nehru Centre located on the same campus—also a splendid hall surrounded by brightly coloured tropical flowers.

3. Impressions

Differing from regular seminars, this one was not limited to listening to research presentations from frontline researchers; it also gave the participants an opportunity to learn first-hand about the philosophies, ways of thinking, and approaches of top-tier scientists. It gave some 22 prominent researchers, including a Nobel laureate, a platform over a period of one week to address a small but very attentive audience—providing a uniquely meaningful opportunity for not only the young researchers but also their senior colleagues.

Watching the young researchers as they enthusiastically delivered their presentations gave me a vivid sense that vibrant scientists with outstanding potential were being fostered in Asia. Over the course of the seminar, the young researchers lodged and ate together, giving them a rich opportunity to form close friendships along with strong collegial ties, which would be sure to play a catalytic role in advancing future molecular science research within the Asian community.

The India side accorded the seminar participants warm hospitality in a variety of ways, including a welcoming get-together party, an opportunity to watch a sensational Indian dance performance, an outdoor dinner under the stars at a superb hotel, and an excursion to Mysore, the City of Palaces, at the end of the week. All of these events gave us an opportunity to savour and enjoy splendid Indian scenery and culture. Moreover, the opportunity given by the Indian side to the young researchers to observe research institutions was very meaningful for them as it allowed them to visit labs where they met Indian researchers fervently engaged in carrying out basic research.

たように思う．この友情と連帯感は，アジア地域における分子科学研究の今後の発展に重要な役割を果たすに違いない．

インド側による種々の歓迎と接待 Get Together Party，すばらしいインド舞踊の観賞，満天の星空の下，豪華なホテルでの野外夕食会，週末のマイソールへの遠足－いずれもインドのすばらしい風物と文化に触れることができた楽しい時であった．また，若手研究者の研究所見学はインドの基礎研究の現場を見，研究者のひたむきな姿に接する貴重なものとなった．

4. おわりに

以上がセミナーの大雑把な経緯と私の感想である．はたしてセミナーが成功であったかどうかは私が判断することはできない．しかし，若手研究者から私に寄せられた30以上のレポートはその評価を知る材料になるかもしれない．

最後に本セミナーの開催にあたり物心両面で全面的なご支援をいただいた日本学術振興会に衷心よりお礼申しあげたい．とくに遠路はるばるインドまで駆けつけていただいた日本学術振興会の菊池健理事，内山博之地域交流課長に感謝いたします．本セミナーの口火を切られ，最後までいろいろとご指導，ご援助をたまわった長倉三郎総合研究大学院大学長，C.N.R. Rao ネールセンター長に心からお礼申しあげます．組織委員会の方々及び岡崎国立共同研究機構管理局の方々には準備の作業で大変ご苦労をおかけしました．ここに改めてお礼申しあげます．

インド側の暖かいおもてなしと心のこもったご配慮にはお礼の言葉もありません．セミナーを支えていただいたインド科学技術省，セミナーの運営にあたっていただいた B. Bagchi, S. Ramasesha 両教授，ゆきとどいたお世話をいただいたネールセンター事務官の Nagaraja Rao 氏に感謝の意を表します．

伊藤光男（いとう・みつお，1929年生）
岡崎国立共同研究機構分子科学研究所長，東北大学名誉教授，九州大学理学部卒，理学博士
研究課題：分子分光学／分子の電子・振動状態
受　　賞：日本化学会賞（昭和63年）／日本分光学会賞（平成元年）

Dr. C.N.R. Rao

Dr. NAGAKURA Saburo

Dr. ITO Mitsuo

Lecture at the Choksi Hall

4. In Conclusion

What I described above is roughly how the seminar went and my impression of its activities. Not being a participant myself it's not my place to judge the seminar's success; however, the more than 30 reports I received from the young participants attested vividly to its success.

Lastly, I wish to express my heartfelt appreciation to the Japan Society for the Promotion of Science whose staff provided their full support, both physically and spiritually, in the holding of this seminar. My particular thanks goes to JSPS President KIKUCHI Ken and JSPS Regional Interchange Division Head UCHIYAMA Hiroyuki, who travelled a long distance to attend this event. I am also sincerely grateful to the Science Council's co-chairs, Drs. Nagakura and Rao, who kicked off the seminar and ushered it through to the end with their valuable guidance and support. The herculean effort of both the members of the organizing committee and of the Okazaki National Research Institutes' administrative staff in preparing the seminar accrued greatly to its success. Here, I would like to reiterate my appreciation to all involved in carrying out this first Asian Academic Seminar.

I have no words to adequately express my appreciation to the Indian side for their thoughtful treatment and warm hospitality accorded the participants during the seminar. To DST for its support of the seminar and to Professors B. Bagchi and S. Ramasesha for their work in implementing it, I wish to extend my hearty thanks, and last but not least to Nehru Centre Director Dr. Nagaraja Rao.

Figure 1. Seminar venue: Faculty Hall at Indian Institute of Science (sketched by author)

Table 1

Seminar Prospectus (Summary)
FY1994 Asian Academy Seminar on Molecular Science and Molecular Materials

1. Purpose
This seminar offered young researchers from Asian countries an opportunity to take an intensive course in molecular science and molecular materials. Its aim is to contribute to the cultivation of excellent researchers while elevating research standards in Asia.

2. Organizer
Japan Society for the Promotion of Science
Institute for Molecular Science, Okazaki National Research Institutes
Indian Institute of Science
Jawaharlal Nehru Centre for Advanced Scientific Research

3. Date / Venue
22 November to 2 December, 1994
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India

4. Organizing Committee
ITO Mitsuo, Director-General, Institute for Molecular Science
NAGAKURA Saburo, President, The Graduate University for Advanced Studies
KAYA Koji, Professor, Faculty of Science and Engineering, Keio University
YAMAGUCHI Kizashi, Osaka University
IWAMURA Hiizu, Professor, Kyushu University
MARUYAMA Yusei, Professor, Institute for Molecular Science
YOSHIHARA Keitaro, Professor, Institute for Molecular Science
KITAGAWA Teizo, Professor, Institute for Molecular Science

Table 2

Lectures and Presentations in Asian Academy Seminar on Molecular Science and Molecular Materials

22 November: "Molecular Spectroscopy"
- Laser Spectroscopies for Molecules and Ions in Supersonic Jet: ITO Mitsuo (Institute of Molecular Science)
- Low Frequency Vibronic Spectroscopy of Jet Coold Molecules: M. Chowdhury (Indian Association for Cultivation of Science)
- Electronic Spectroscopy of Small Clusters: KAYA Koji (Keio University)
- Time-Resolved Resonance Raman Spectroscopy and Its Application: KITAGAWA Teizo (Institute of Molecular Science)
- Presentation by 6 young researchers

23 November "Molecule Dynamics"
- Dynamics of Concerted Molecular Dissociation and Mode Selective Photochemistry: Y.T. Lee (University of California, Barkley)
- Molecular Relaxation in Liquids: B. Bagchi (Indian Institute of Science)
- Dynamics of Energy and Electron Transfer in Supramolecular Systems: K.P. Ghiggino (The University of Melbourne)
- Vibrational and Rotational Relaxation Studies by Femtosecond CARS and Raman Echo: YOSHIHARA Keitaro (Institute of Molecular Science)
- Chemical Reaction Dynamics and Molecular Clusters: KAJIMOTO Okitsugu (Kyoto University)
- Presentation by 6 young researchers

24 November "Molecular Theory"
- Recent Advances in the Theory of Molecular Electronic Structure and Dynamics: MOROKUMA Keiji (Emory University)
- Molecular Theory of Water and Protein: Mu Shik Jhon (Center for Molecular Science, Korea, Advanced Institute of Science)

25 November "Molecular Properties"
- Characterization of Molecular Solids: INOKUCHI Hiroo (Okazaki National Research Institutes)
- Design and Synthesis of Molecular Based Magnetic Materials: IWAMURA Hiizu (Kyushu University)
- Optical and Magnetic Properties of Organic Systems with External Conjugation: S. Ramasesha (Indian Institute of Science)
- Some Exotic Properties of Molecular Materials – Solid State Fullerenes: MARUYAMA Yusei (Institute for Molecular Science)
- Functional Molecular Materials with Conjugated Polymers: SHIMIZU Takeo (Kyoto University)

26 November "Molecular Materials"
- Solid State Properties of Fullerenes, Carbon Nanotubes and Related Systems: C.N.R. Rao (Jawaharlal Nehru Centre for Advanced Scientific Seminar)
- Novel Molecular Materials Based on Metal Complexes: Allan.E. Underhill (University of Wales)
- Intelligent Photo-Interfaces–Fundamental and Applications: FUJISHIMA Akira (The University of Tokyo)
- Formation and Properties of LB-Film: Daoben Zhu (Institute of Chemistry, Academia Sinica)
- Molecular Photodiodes and Scanning Probe Microscopies: FUJIHIRA Masamichi (Tokyo Institute of Technology)
- Presentation by 6 young researchers

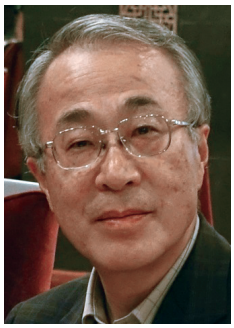
27 November "Excursion to Mysore"

From 28 November to 2 December "Visits to Research Laboratories for Young Participants"
28 November: Indian Institute of Science, Bangalore
29 November: Transfer from Bangalore to Bombay
30 November: Tata Institute of Fundamental Research, Bombay
National Centre of the Government of India for Nuclear Science and Mathematics, Bombay
1 December: Bhabha Atomic Research Centre, Bombay
2 December: Free time in Bombay

Scientific Highlights; Mizushima-Raman Lectures

Dr. ENOKI Toshiaki
(Member of the Council, Professor Emeritus of Tokyo Institute of Technology)

The Mizushima-Raman Lecture is one of the key elements in the activities of Japan-India Cooperative Science Programme. This lectureship is named in honor of Prof. MIZUSHIMA Sanichiro in Japan and Prof. C. V. Raman in India, the Nobel laureate, who are the pioneers in molecular spectroscopy, and the lectures were delivered by leading scientists who have made outstanding scientific achievements in molecular sciences. In every year, a scientist elected by the JSPS-DST Council delivered his/her lecture in the partner country. The first Lecture was delivered by Prof. ITO Mitsuo, the director of the Institute for Molecular Science at the time, in Bangalore in 1997. In 1999, Prof. C. N. R. Rao and Prof. NAGAKURA Saburo, who initiated the Japan-India Cooperative Science Programme, delivered their lectures in Tokyo. Including these 3 scientists, 11 scientists from Japan and 9 scientists from India have been awarded the lectureship in these 23 years till 2019. The lectures by the Japanese scientists were delivered mainly in the National Symposium in the Chemical Research Society of India, while those by the Indian scientists were in the Annual Meeting of the Molecular Science Society of Japan. In the activities of the Mizushima-Raman Lectureship, many of the lecturers visited several institutions along with the Lecture, for scientific exchanges during their stay in the partner country. The Mizushima-Raman Lecture together with the scientific exchanges in the institution visits played an important role in the scientific interactions between the two countries. In particular, young students and researchers were encouraged by the lectures and scientific exchanges in the institution visits. This has contributed strongly to enhancing the bilateral interactions in molecular science field and related physical chemistry areas. The Mizushima-Raman Lectureship will come to the end after the lecture by Prof. TAHARA Tahei in 2019. We are convinced that what the Mizushima-Raman Lecture series have accomplished will be inherited in the molecular science communities in both countries and will give seeds in creating future scientific developments in various directions.



Mizushima-Raman Lecture (2017) Report

Dr. TAKATSUKA Kazuo
(Research Leader of Fukui Institute for Fundamental Chemistry, Kyoto University, Professor Emeritus of The University of Tokyo, Japan)

It is my great honor to have given the Mizushima-Raman Lecture for the year of 2017 at 22th National Symposium in Chemistry in the Chemical Research Society of India (CRSI) on the 3rd, February 2018. I could take this opportunity to visit four world renown research institutions, where I was invited to deliver lectures and enjoyed fruitful discussions with scientists and questions from many graduate students. Below is my report on the travel during the Mizushima-Raman lectureship.

Right after arriving at Delhi on the January 30th, I visited Jawaharlal Nehru University (JNU) to see my old friend, Professor Ramakrishna Ramaswamy, School of Physical Sciences (SPS), who kindly hosted me together with Professor Pradipta Bandyopadhyay, School of Computational and Integrative Sciences (SCIS). I enjoyed very exciting discussion with front-running experimentalists of molecular science at SPS. I also had opportunity talk with the Dean of SCIS and other professors on the designing of the graduate school of bioinformatics with future scopes to prepare systematic educational programmes for those from different fields of science; biology, chemistry, physics, mathematics, information science and so on. On the next day (the 31st), I gave a talk in a joint seminar of SPS and SCIS, with a title "Mechanism and Dynamics of Charge Separation in Water Splitting", in which about 50 staff and graduate students joined. Active discussions and questions were casted in this talk. On the February 1st, Professor Parbati Biswas and Rama Kant kindly invited me to the Department Seminar at Department of Chemistry, University of Delhi. I gave a talk on "Mechanism and Dynamics of Charge Separation in Water Splitting" in a rather instructive way tracking the way of understanding from proton transfer to electron dynamics. Among more than 60 people getting together, I noticed far higher ratio of woman graduate students in the audience than in the Japan standard. Since then I kept being impressed with the extremely high activities performed by women scientists and engineers in India.

The February 2nd was devoted to traveling to Raipur for CRSI meeting.

I delivered on Feb. 3rd a Mizushima-Raman lecture in the award talk session in CRSI at the Pt. Ravishankar Shukla University. The title of my talk was "Electron Dynamics in Chemical Reactions: Time-Domain Quantum Chemistry", which is about theoretical chemistry I have been developing as a new field of chemical realm beyond the Born-Oppenheimer paradigm. The president of CRSI is Professor Narayanasami Sathyamurthy, a renowned theoretical chemist, with whom I became acquainted way back in 1980s at Institute of Molecular Science, Japan. I enjoyed talking with him during the meeting. I was asked questions by many graduate students mostly on how they should prepare to achieve great scientific performances. I wish I could have known it when I was young! I could only advise them to start from and stay long very basic and fundamental studies but not to

jump easily to application studies. Maybe I am wrong.

February 4th was devoted to traveling to Kolkata to visit Indian Association of Cultivation of Science (IACS).

Visiting IACS, the second time, was mentally comfortable, since this is one of the leading places of theoretical chemistry. On the 5th, I was honored to be invited to give a Sadhan Basu Memorial Lecture under the title "Molecular Science beyond the Born-Oppenheimer Paradigm". I enjoyed discussions very much with Professors Satrajit Adhikari and Debashis Mukherjee, who are among the world leaders in theoretical chemistry.

February 6th was a traveling day to Munbai to visit Institute of Chemical Technology (ICT).

On the 7th I gave a seminar talk about "Mechanism and Dynamics of Charge Separation in Water Splitting", to which about 30 very serious graduate students joined along with my host Prof. Lakshmi Kantam, the member of the Japan-India Science Council, and Professor Milan Sanyal, the Indian co-chairman of the Japan-India Science Council. I was guided to the activities in ICT and could see and talk with the Vice-Chancellor (equivalent to a president in Japan), Professor G. D. Yadav. This institute is an amazing place and very different from other science-oriented universities and research institutes I have ever visited, not only in India but in Japan, in that every research group here has a strong intension to quickly scale up their research results in the laboratories to an industrial level. This strong will to contribute to society through engineering seems to make this institute extremely active.

I aimed back at Japan on the next day.

This travel has been my fourth visit to India, and I met many Indian scientists who told me that they enjoyed staying in Japan while they were young as graduate students and postdocs. I am sure that our relationship will become even wider and deeper.

Last but not least, I would like to express my deepest gratitude to all the hosts at the individual visiting places, in particular, Professor Lakshmi Kantam, who has kindly planned and arranged such a perfect and comfortable visit to the places in India. I also deeply thank Professor Toshiaki Enoki and Professor Milan Sanyal for their devoted management of the Mizushima-Raman Lecture in the Japan-India Collaborative Science Programme.

<February, 2018>

Mizushima-Raman Lecture (2018) Report

Prof. Chandrabhas Narayana
(Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore)

It was an honor to be chosen to deliver the Mizushima-Raman Lecture for the year 2018. This lecture is held annually under the joint leadership of DST, New Delhi and JSPS, Tokyo and alternates between Indian and Japanese Academician.

I presented my Mizushima-Raman Lecture for the year 2018 in the Annual meeting of Molecular Science Society conducted in Fukuoka during Sept 10–13, 2018.

I arrived on the September 9, 2018 from Bangalore, India and delivered my lecture on Sept 12, 2018. My lecture was titled "Application of Raman spectroscopy from MOFs to Drug Discovery" and was very well received by the over 100 attendees. There were several interesting and thought-provoking questions at the end of the lecture and in the discussions afterwards. It was an honor to receive the certificate of the lecture and a memento from Prof. Tahei Tahara, President, Japanese Molecular Science Society. It was interesting for me to see the high standard, vibrancy and active engagement that the Japanese colleagues displayed in their talks and discussions throughout the sessions that I attended. I was invited to the Banquet that evening and was asked to give a speech in the Banquet. This was an honor as there were over 800 participants in the Banquet. I could interact and make friends during this period.

From Fukuoka, I moved to Tokyo on Sept 13, 2018. On September 14, 2018, I visited Prof. TAHARA Tahei's group in Molecular Spectroscopy Laboratory, RIKEN. I spent the whole day with Tahara's group and gave a lecture titled "Application of Raman Spectroscopy from Condense Matter to Biology". This was my first visit there and it was exciting to see the various activities in the laboratories related to molecular spectroscopy. The programme ended with a dinner with Prof. Tahei Tahara.

On September 15, 2018, I had the opportunity to visit Prof. KAGI Hiroyuki of The University of Tokyo. Here I got an opportunity to the state-of-the-art High Pressure and Temperature setup to do structural determination in Geochemical Research Center. I gave a talk titled "Transformation to body centered cubic face in Aluminium and multiple phases analogous to Ice in Ammonium Fluoride". It was received well and we are planning to continue the collaborations in future on High Pressure Neutron Diffraction studies. We went out for a lunch after the lecture together and had interaction during lunch to further collaboration.

September 17 and 18, 2018, I spent in Kyoto visiting Profs. KITAGAWA Susumu, KITAGAWA Hiroshi, HORIGE Satoshi in Kyoto University. I got an opportunity to interact with representatives of Horiba (a spectroscopy company in Kyoto) and a dinner with them on September 17, 2018. Here I gave the talk titled "Molecular Origin of Gas Adsorption in MOFs". This is a group which are leaders in the field of MOFs and it was a great learning interacting and getting to know the laboratory. On September 18, 2018, we had a great dinner with the host.

I returned from Kyoto on September 19, 2018 and went directly to The University of Tokyo to meet Prof. NISHIHARA Hiroshi

in Hongo Campus. Here I interacted with his group and gave a talk on “Understanding at molecular level using Raman Spectroscopy in Chemistry and Biology”. It was a great experience to learn about the Chemistry Department and interact with the students and staff of Prof. Nishihara’s laboratory. We had a nice outing at the end of the day with a few of the laboratory members and Prof. Nishihara.

On September 20, 2018, I had the opportunity to visit Institute for Solid State Physics, The University of Tokyo. I was hosted by the Director of the Institute Prof. MORI Hatsumi. Here I got a chance to see the excellent facilities in the laser spectroscopy and some of the state-of-the-art facilities for Solid State Physics research. I delivered the Condense Matter Seminar at this institute titled “Elucidating new topological transitions under pressure”. I was hosted by Prof. Mori for a excellent Sushi lunch with her colleagues.

On September 21, 2018, I had the opportunity to visit Gakushuin University and was hosted by Prof. IWATA Koichi. It was a great opportunity to see the time resolved Laser spectroscopic studies on some of the best condense matter systems. Here I delivered a lecture titled “Understanding at molecular level using Raman Spectroscopy in Chemistry and Biology”. After spending a whole day in the laboratory, Prof. Iwata took me to an excellent restaurant for Tempura. It was a great experience to have some live tampuras.

I returned to India on September 22, 2018. I hope my visit for the Mizushima-Raman Lecture and the resulting scientific exchanges will contribute to further strengthening the bilateral scientific exchanges between Japan and India, triggering new paths for collaboration and enhancing scientific work on both sides. I thank the Department of Science and Technology (DST), India and the Japan Society for Promotion of Science (JSPS), Japan, for awarding me this lectureship.

I am the coordinator of the Indian Beamline, Photon Factory, KEK, Tsukuba, Japan as part of the Japan-India Joint MoU for synchrotron experiments under the DST. Hence I would be repeatedly coming to Japan to do experiments and for administering the exchanges from India. Hence I am sure these interactions will be blooming in the coming in years.

I am indebted to Prof. Enoki Toshiaki, Professor Emeritus of the Tokyo Institute of Technology, who meticulously planned my visit, which helped me in going to so many laboratories and interact with the best faculty in my area of research even when it was a vacation season for many of the universities. He engaged with me for more than half a year, constantly suggesting the schedules, getting me in touch with the JSPS officials and then offering me company in my travel from Tokyo to Fukuoka and back. I believe he went well beyond his responsibility and took great interest in ensuring that my stay in Japan was well organise and smooth. Thank you very much Toshiaki, for your continuous and elaborate efforts! I express my deep gratitude to Prof. Enoki Toshiaki, I am indebted to Prof. Milan Sanyal and Prof. M. Lakshmi Kantham for this wonderful opportunity. I thank the DST and JSPS Offices for all the administrative support.

<February, 2019>

IV. Future Prospects

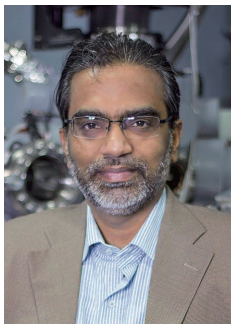
Important partnership between Japan and India for science and technology in the globe and its future

Dr. ENOKI Toshiaki
(Member of the Council, Professor Emeritus of Tokyo Institute of Technology)

As a scientist who has been collaborating with Indian colleagues for over 23 years and who has been working on the Japan-India Science Council since 2005, it is my great pleasure to have this opportunity to convey my expectations and views regarding the future prospects of the Japan-India Cooperative Science Programme and its framework beyond.

Since the Japan-India Cooperative Science Programme, initiated by Prof. S. Nagakura and Prof. C. N. R. Rao, was started in the mid-1990s, bilateral scientific interaction between Japan and India has strengthened continuously while expanding to a wide variety of science fields along with a growing number of scientists involved. This is partly due to economic growth in both countries but more importantly it owes to the efforts that individual Japanese and Indian scientists have made through their collaborations. These bilateral collaborations, workshops, Asian Academic Seminars and exploratory exchanges carried within the framework of the JSPS-DST Programme have worked as a catalyst in both enhancing scientific interaction and creating close friendship. The seeds of research work, nurtured so far through these scientist collaborations, have sprouted big and important scientific achievements in various fields involving mathematics & information science, physics & chemistry, materials sciences, bioscience, and earth & space science.

At this point along the road we have paved over the past 25 years, we can envision future prospects for bilateral scientific exchange. The bilateral collaborations supported by the JSPS-DST Programme are expected to advance research even more efficiently and robustly in ways that will propel milestone developments in science and technology. Each country has its own areas of strength: India is taking strong initiatives in basic science and information science, while Japan promotes robust interaction between academia and industry, which facilitates the transfer of scientific achievements to practical applications in industries. Bilateral interactions between the two countries having different research trends are expected to create a diversity in science and technology, resulting in building new research areas. Also expected is the greater involvement of young researchers, such as PhD students and postdocs, along with senior scientists in bilateral exchanges so as to vitalize future bilateral initiatives. In this respect, bilateral scientific workshops and invitations of senior leading scientists to the partner country can be utilized effectively in fostering young researchers. Long-term stays in laboratories in the partner country to do collaborative work will encourage young researchers in ways that strengthen our future partnership. In the coming decade, the activities of Asian countries, involving Japan and India, are expected to become increasingly more important in many aspects within the global community. I am confident that the interplay between our two countries within framework of the strong partnership created over the past 25 years is certain to play a pivotal role in leading the global advancement of science and technology.



Toward enhancing the horizon of materials, in the years ahead

Prof. Thalappil Pradeep

(Professor, Indian Institute of Technology Madras)

Materials science has expanded tremendously in the past three decades. It has probably witnessed more and more excitements each passing year, during this period. This may be seen in epoch making discoveries such as the bulk synthesis of fullerenes in 1990, discovery of nanotubes and graphene in 1990s and 2000s, respectively, emergence of 2D materials, semiconductor quantum dots, atomically precise clusters, functional materials, soft matter, and many others, in the very same period, although not in any chronological order. It has been the period in which many of these materials have found their way into technology, in the form of new displays, diagnosis and imaging in biology, etc. Yet, several of the applications of such materials researched upon, although very much in the air, have not been ready for the market.

Despite all around expansion of activities, the period has also been marked with increased economic disparity. Over 20% of the people in India do not have access to potable water. Affordable healthcare is still a distant dream for many. Sustainable agriculture has to be practiced for India and many parts of the world to ensure that their populations do not go hungry. Increased mineral load on the soil due to unsustainable agricultural practices, poor planning and inadequate resources make it impossible to solve the problems at hand in a reasonable time. Environment is increasingly threatened.

Solutions to each one of the problems above fall in the domain of advanced materials. There is a lot more that can be accomplished by working together as problems transcend national boundaries. This is especially true in areas where large scale synthesis, thorough characterization using advanced tools, prototyping and testing and evaluation at point of use are needed to ensure returns for the society. It is also important to realize that without collective partnership, massive problems of this kind cannot be solved.

The collaborative scientific programmes between our nations, besides the obvious scientific returns, have brought people together. They have in fact brought together the best of people between the countries. Yet there are more, outside the loop. In the following, some of the important aspects that need to be looked into for lasting impact of collaborative research are presented, in the specific context of India-JSPS interactions.

1. The bilateral programme has mostly been limited to exchange visits between the countries. Full benefits of exchange have not been available in view of the limited period of funding, operational differences in both the sides, quantum of funding, etc. For example, it is nearly impossible to recruit PhD students in any project, considering the funding period. Without such dedicated manpower, it is impossible to deliver results of larger importance.
2. The programme has to include industries. Industrial challenges have to be taken up with industrial participants with the objective of wealth creation. Industries at both the ends have to be eligible to be included in the programme. About 20% of the projects may be with such collaborative efforts.
3. Disciplinary boundaries have changed in the past several years. Several boundaries have vanished completely and

several others emerged as well. In the years ahead, more linkages with computational, artificial intelligence and other disciplines are likely to emerge.

4. Research and publishing are changing tremendously and technology is shifting publishing industry to explore different options. International funding has to adapt to this change.
5. Meaningful impact with limited funding requires new ideas to be explored. For that to happen, highly efficient distribution of resources is needed. It is often not the quantum of money, but the efficiency of distribution that matters –for example in supporting travel for joint research, for joint measurements at central facilities, etc. More efficient time-bound selection of projects is needed.
6. Career opportunities in advanced science are shrinking across nations. Joint research experience should provide greater opportunities to participating researchers, even in areas outside academic research.

While many of the aspects above are common to other disciplines, societal and industrial relevance are likely to be more in materials.

Future Perspectives: the Past, Present, and Future of Materials Research

Prof. SUZUKI Atsushi
(Professor, Yokohama National University)

One of the Council's priority areas before 2011 was "Advanced Materials, including Polymers and Nano-materials (Engineered Materials Systems; Engineering and Processes)." With the strong leadership of Prof. M. Doyama and Prof. G. Sundararajan cooperation in this area between the two countries developed with the researcher network of materials scientists extending throughout the joint programmes (i.e. Research Projects, Seminars, Visits of Scientists—Exploratory Exchange, later Special Lecture Tour Programme under JICSP—and Asian Academic Seminars). The human network created during the first 18 years took over the new priority area "Materials and System Engineering: Man-made Systems," which continued for 8 more years. During the period of the Science Council's operation, a huge transformation in academia and the economy occurred in both countries.

Over the past 26 years (1993-2019), materials science has rapidly expanded across its traditional boundaries of physics, chemistry, and biology. New journals on materials topics have been rapidly launched by many diverse societies. Concurrently, materials science has attracted broad interest in cross-disciplinary fields. During this period, Asian countries have shown the fastest growth in scientific output in fields of materials science. In terms of the number of papers, India climbed from a low status in the mid-1990s to a top-ten status in the 2000s. This is correlated with its economic growth, and India will continue to be one of the world's fastest growing nations in the next decade.

The situation surrounding today's academia and industry are quite different from that at the beginning of 1990s greatly due to global environmental issues. An increased awareness of global effects on the environment has called for technological innovation in the materials science field. In this situation, developing countries as well as developed countries are no longer able to develop while yielding heavy environmental loading such as in the second half of 20th century, but are now requested to develop with minimum environmental loading. This necessitates the creation of a sustainable growth model for the 21st century. In establishing an Indian model, growth will be achieved based on a new sense of values, not on imitating or merely adopting the technologies of other countries. To that end, joint development of advanced environmental technologies, such as new materials and materials processing (which are strengths of Japan's academia and industry) is not only desirable but essential for propelling the next generation of both countries. Given this viewpoint, bilateral collaboration can be accelerated in many aspects of materials science, including innovation in research and development and in educational systems.

Established over the past 26 years, the researcher network between our two countries will play an important role in leading global technological innovations in materials science and technology. I look forward to researchers in both our countries starting to take specific action in creating a new stage for promoting collaboration in science and technology beyond the existed priority areas.

V. Appendix-1

Members of the Japan-India Science Council

* The following list of the council members are put in alphabetical order.
* An affiliated institution is given based on the most recent information obtained during the period for which the person was commissioned. An honorary title such as Emeritus Professor is added accordingly.

	Japanese members			Indian members		
Co-Chairpersons	NAGAKURA Saburo	Professor Emeritus, The University of Tokyo and Institute for Molecular science, President, The Japan Academy	1994.1.31 – 2005.3.31	C.N.R. RAO	Honorary President, Jawaharlal Nehru Center for Advanced Scientific Research	1994.1.31 – 2009.12.31
	YOSHIHARA Keitaro	Professor Emeritus, Institute for Molecular Science, SOKENDAI and Japan Advanced Institute of Science and Tchnology, Visiting Professor, Tokyo Metropolitan University	2005.4.1 – 2011.3.31	Thirumalachari RAMASAMI	Secretary, Department of Science and Technology, Government of India	2010.1.1 – 2014.4.30
	SUZUKI Atsuto	President, Iwate Prefectural University	2011.4.1 – 2020.3.31	Milan K. SANYAL	Director, Surface Physics and Material Science Division, Saha Institute of Nuclear Physics	2014.5.1 – 2019.3.31
Members of the Council and Coordinators	DOYAMA Masao	Professor Emeritus, The University of Tokyo, Professor, Teikyo University of Science	1997.4.1 – 2008.3.31	D. BALASUBRAMANIAN	Director of Research, L.V. Prasad Eye Institute	
	ENOKI Toshiaki	Professor Emeritus, Tokyo Institute of Technology	2005.4.1 – 2020.3.31	S. S. BHARTIA	Managing Director, Vam Organic and Chemical Ltd.	
	FUJIMORI Atsushi	Professor, Waseda University	2017.4.1 – 2020.3.31	Kankan BHATTACHARYA	Professor, Indian Association for the Cultivation of Science, Kolkata	
	IGARASHI Kazuhiko	Professor, Tohoku University	2013.12.1 – 2020.3.31	Ramnath COWSIK	Director, Indian Institute of Astrophysics	
	ISHIHAMA Akira	Professor Emeritus, National Institute of Genetics and SOKENDAI, Professor, Hosei University	2002.4.1 – 2014.3.31	S.G. DHANDE	Director, Indian Institute of Technology, Kanpur	
	IWASAWA Yasuhiro	Director, Innovation Research Center for Fuel Cells, The University of Electro-Communications	2002.4.1 – 2017.3.31	Amitabha GHOSH	Director, Indian Institute of Technology, Kharagpur	
	KAWAGISHI Ikuro	Professor, Hosei University	2014.9.1 – 2020.3.31	J.N. GOSWAMI	Director, Physical Research Laboratory	
	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	1994.1.31 – 2011.3.31	M. Lakshmi KANTAM	DR. B. P. Godrej Distinguished Professor, Department of Chemical Engineering, Institute of Chemical Technology, Mumbai	
	KOTANI Motoko	Distinguished Professor, Director, Tohoku University	2013.1 – 2020.3.31	S. S. KAPOOR	Director, Physics and Electronics & Instrumentation Group, Bhabha Atomic Research Centre	
	KUNIEDA Hideyo	Senior Advisor, Japan Science and Technology Agency	2012.4.1 – 2020.3.31	R. A. MASHELKAR	Director General, Council of Scientific and Industrial Research and Secretary, Department of Scientific & Industrial Research	
	MITSUISHI Mamoru	Professor, The University of Tokyo	2011.4.1 – 2020.3.31	V. NAGARAJA	President, Jawaharlal Nehru Centre for Advanced Scientific Research	
	MURATA Norio	Professor, National Institute for Basic Biology	1999.4.1 – 2002.3.31	Rajaram NITYANANDA	Center Director, National Center of Radio Astrophysics, Pune	
	ODA Minoru	Professor Emeritus, The University of Tokyo, President, Tokyo University of Information Sciences	1994.1.31 – 1999.3.31	T. PRADEEP	Professor, Indian Institute of Technology, Madras	
	OKADA Tokindo	Director General, JT Biohistory Research Hall	1994.1.31 – 1999.3.31	V.S. Ramamurthy	Secretary, Department of Science and Technology, Government of India	
	SHIBAI Hiroshi	Professor, Osaka University	1994.4.1 – 2012.3.31	M.R.S. RAO	President, Jawaharlal Nehru Center for Advanced Scientific Research	
	SUGIMOTO Daiichiro	Professor Emeritus, The University of Tokyo, Professor, The University of the Air	1994.1.31 – 1999.3.31	P. Rama RAO	Vice Chancellor, University of Hyderabad	
	SUZUKI Atsushi	Professor, Yokohama National University	2008.4.1 – 2020.3.31	Bimal K. ROY	Head, Cryptology Research Group, Indian Statistical Institute	
	TAKEUCHI Ikuo	Professor Emeritus, National Institute for Basic Biology	1994.1.31 – 1999.3.31	Milan K. SANYAL	Professor, Saha Institute of Nuclear Physics	
	YOSHIKAWA Hiroyuki	President, The University of Tokyo, and Science Council of Japan	1994.1.31 – 1997.3.31	Harinder P. SINGH	Professor, Department of Physics & Astrophysics, University of Delhi	
	YOSHIHARA Keitaro	Research fellow, Toyota Physical and Chemical Research Institute	1994.1.31 – 2005.3.31	G. SUNDRARAJAN	Director, International Advanced Research Center for Power Metallurgy and New Materials, Hyderabad	

V. Appendix-2

AGREED MINUTES OF THE FIRST MEETING OF INDIA-JAPAN SCIENCE COUNCIL, NEW DELHI, AUGUST 23 AND 24, 1993

1. The Council noted that Prof. C.N.R. Rao and Prof. S. Nagakura are the Co-Chairmen of the Council from the Indian side and the Japanese side, respectively.

2. The Council noted the historical relations between India and Japan in scientific research and looked forward to the promotion of bilateral ties in the future.

3. The agenda of the meeting is given in the Annex.

Joint research programmes, projects and seminars

4. Taking note of the six areas identified at the Tokyo meeting and the discussions held by the JSPS Science Delegation to India in March 1993, the Council agreed on the following five priority areas of cooperation :

i. Molecular Structure, Spectroscopy and Dynamics
ii. New Materials, including Polymers
iii. Modern Biology and Biotechnology
iv. Manufacturing Science
v. Astronomy and Astrophysics

Each area of cooperation shall be for a period of three years, with some flexibility.

It was agreed that some Indian scientists will be assisted, whenever necessary, in using the Japanese accelerator beam line and solar energy facilities.

5. Coordinators will be nominated in each of the above areas by the two sides, whose task will include

- identification of priority topics
- identification of individuals and institutions
- preparation of brief proposals (including financial requirements)
- coordination of implementation

These inputs will be processed by DST and JSPS in consultation with each other. The Coordinators will also decide about the seminars to be organised.

6. The international travel cost of visiting scientists will be met by the sending side, while the receiving side will meet the expenditure on local costs and local travel.

JSPS will earmark about 25 million yen annually for supporting joint research and seminars in the five identified areas. A similar amount will be provided by the Indian side.

...2/-

Fellowships

7. JSPS will award

i. 5 post-doctoral fellowships, and
ii. 4 pre-doctoral fellowships

to Indian scientists selected by the Indian side of the Science Council.

Asian Academic Seminar

8. An Asian Academic Seminar will be held at the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, during the financial year 1994. The topic will be Molecular Science and Molecular Materials. It was agreed to set up a joint organising committee for this purpose. The international travel cost (upto the venue of the Seminar) of the non-Indian lecturers and participants will be met by JSPS. The Indian side will take care of

- local costs (board, lodge etc.) of non-Indian as well as Indian lecturers and participants;
- domestic travel costs of Indian lecturers and participants;
- organisational expenditure

Other Topics

9. It was noted that DST and JSPS will be the counterpart agencies.

10. Prof. C.N.R. Rao informed the Council that Dr. P. Rama Rao had nominated Dr. J. Dhar to handle the work of the Council in DST.

11. The next meeting of the Council will be held in Tokyo in October 1994.

(S. Nagakura)
Co-Chairman from the
Japanese side

(C.N.R. Rao)
Co-Chairman from the
Indian side

CONFIRMATION OF AGREED MINUTES OF
FIRST MEETING OF INDIA-JAPAN SCIENCE COUNCIL,
NEW DELHI, AUGUST 23-24, 1993

The Department of Science and Technology of the Government of India and the Japan Society for the Promotion of Science have, recognising the importance of the Agreed Minutes of the First Meeting of the India-Japan Science Council (New Delhi, on August 23-24, 1993), which was based on the outcome of the meeting between JSPS and the Indian Delegation held in Tokyo in June, 1992, agreed to launch and implement, in close cooperation, the India-Japan Cooperative Science Programmes.

(Hitoshi Osaki)
Director General,
The Japan Society for
the Promotion of Science

(P. Rama Rao)
Secretary,
Department of Science
and Technology

Annex

FIRST MEETING OF INDIA-JAPAN SCIENCE COUNCIL
NEW DELHI, AUGUST 23-24, 1993

Venue : Villa Medici, Taj Mahal Hotel
Time : 1000 hrs.

Agenda

1. Appointment of Prof. C.N.R. Rao and Prof. S. Nagakura as the Chairmen from the Indian and the Japanese sides, respectively.
2. Opening remarks by Prof. C.N.R. Rao and Prof. S. Nagakura
3. Introduction of Participants
4. Remarks by Dr. P. Rama Rao and Mr. H. Osaki
5. Review of the Tokyo Meeting
6. Discussion on future cooperation
   - i. Joint research programmes, projects and seminars
     - a. Priority areas
     - b. Funding arrangement
   - ii. Joint Seminars
     - a. Areas
     - b. Funding arrangement
   - iii. Fellowships
     - a. Post-doctoral fellowships
     - b. Pre-doctoral fellowships
     - c. Funding arrangement
   - iv. Asian Academic Seminar
   - v. Other topics
   - vi. Venue and dates for the next meeting of the Science Council

Documents :

i. List of participants
ii. Programme for August 23 & 24, 1993.
iii. Main points of outcome at the Tokyo Meeting
iv. INSA publication "Science in India"

FIRST MEETING OF INDIA-JAPAN SCIENCE COUNCIL
NEW DELHI, AUGUST 23-24, 1993

List of participants

Japanese Delegation

Prof. Dr. S. Nagakura
President,
Graduate University of
Advanced Studies, Kanagawa-ken

Prof. Dr. M. Oda
President, Institute of Physical and
Chemical Research,
Saitama-ken

Prof. Dr. T. S. Okada
Director,
Biohistory Research Hall,
Osaka-fu
(Prof. Emer., Kyoto University)

Mr. Hitoshi Osaki
Director General,
Japan Society for the Promotion of Science,
Tokyo

Mr. Uchiyama
Regional Interchange Division,
Japan Society for the Promotion of Science,
Tokyo

Ms. Yuko Furukawa
Regional Interchange Division,
Japan Society for the Promotion of Science,
Tokyo

...p.2

List of participants (contd.)

Indian Delegation

Professor C.N.R. Rao
Director,
Indian Institute of Science,
Bangalore

Dr. P. Rama Rao
Secretary,
Department of Science & Technology,
New Delhi

Dr. D. Balasubramanian
Director,
Centre for Cellular and Molecullar Biology,
Hyderabad

Dr. S.S. Kapoor
Director, Physics Group,
Bhabha Atomic Research Centre,
Bombay

Dr. R.A. Mashelkar
Director,
National Chemical Laboratory,
Pune

Shri S.S. Bhartia
Managing Director,
Vam Organic & Chemicals Ltd.
New Delhi

Dr. J. Dhar
Adviser,
Department of Science & Technology,
New Delhi

Dr. V.K. Misra
Joint Adviser,
Department of Science & Technology,
New Delhi

Dr. Om Vikas
Counsellor (S&T),
Embassy of India,
Tokyo, Japan

FIRST MEETING OF INDIA-JAPAN SCIENCE COUNCIL
NEW DELHI, AUGUST 23-24, 1993

Venue : Villa Medici, Taj Mahal Hotel

Programme

August 23, 1993

1.	Meeting of the India - Japan Science Council	1030 hrs. to 1330 hrs.
2.	Lunch at Taj Mahal Hotel	1330 hrs. to 1430 hrs.
3.	Council Meeting (continues)	1430 hrs. to 1730 hrs.
4.	Dinner by Director General, CSIR at Hyatt Regency Hotel	1930 hrs.

August 24, 1993

5.	Council Meeting (continues)	0930 hrs. to 1230 hrs.
6.	Lunch hosted by JSPS at Taj Mahal Hotel	1300 hrs.
7.	Post Council Meeting discussions	1500 hrs.

THE MEETING BETWEEN JSPS AND INDIAN DELEGATION
FOR FUTURE COOPERATION

1 June 1992
Tokyo, Japan

Agenda

* Opening Remarks by Mr. Hitoshi Osaki, Director General JSPS

* Remarks by Prof. C.N.R. Rao, Head of the Indian Delegation

* Introduction of Participants

I. Discussion on Possible Scientific Cooperation

- Fields of cooperation
- Mode of cooperation
- Others

II. Other Topics

Documents:

1. List of Participants
2. JSPS Pamphlet
3. JSPS Annual Report

5 June 1992

MAIN POINTS OF OUTCOME
THE MEETING BETWEEN JSPS AND THE INDIAN DELEGATION
HELD ON JUNE 1ST AND 5TH 1992
AT JSPS, TOKYO

Both the Indian and Japanese sides agreed on an overall framework toward scientific cooperation between the two countries. The basic elements of the framework are as follows:

1. In order to facilitate and coordinate the cooperative activities, it is proposed to establish an "Indo-Japan Council for Science."

   The Council will be composed of 4 to 5 senior scientists from each country, and it will, in principle, meet once every year alternately in India and Japan.

   The Department of Science and Technology in India and the Japan Society for the Promotion of Science in Japan will facilitate the work of the Council.

2. Both sides will support scientists for the following aspects of collaboration:

   a) Postdoctoral fellowships and Dissertation Ph.D. fellowships for bright young Indian scientists.

   b) Joint research projects between Indian and Japanese scientists in chosen areas of science (including engineering) which could involve inter-institutional collaboration.

   c) Workshops on topics of mutual interest.

3. It is proposed to support exploratory visits by scientists concerned with a view to exploring possible fields of cooperation, formulating modes of cooperation, or searching for counterpart research groups.

4. Possible priority areas for collaboration are shown in Annex.

Annex

Possible Priority Areas for Collaboration

* Spectroscopy molecular structure and chemical dynamics

* New materials (including polymers).

* Beam line science using synchrotron radiation sources and other facilities

* Modern biology and biotechnology

* Solar energy related areas

* Manufacturing sciences

V. Appendix-3

The Number of Researchers Exchanged during FY1993–FY2018

FY	Joint Research Projects/Joint Workshops		Exploratory Exchanges (2006-) Special Lecture Tour Programme (2014-)		Asian Academic Seminar (1994-) Japan-India Forum for Advanced Study (2017-)		Mizushima-Raman Lecture		Total Number of Exchanged Researchers under the Programme	
	Japan → India	India → Japan	Japan → India	India → Japan	Japan → India	India → Japan	Japan → India	India → Japan	Japan → India	India → Japan
1993	10	6							10	6
1994	26	25			20				46	25
1995	22	22							22	22
1996	28	39							28	39
1997	42	16			8		1		51	16
1998	23	26							23	26
1999	28	21					1		29	21
2000	20	27			17				37	27
2001	34	37			5		1		40	37
2002	27	49							27	49
2003	40	54			3			1	43	55
2004	61	37					1		62	37
2005	25	52							25	52
2006	31	25	16	10	13			1	60	36
2007	57	42	8	17			1		66	59
2008	75	69	14	10	25			1	114	80
2009	59	50	19	19		27	1		79	96
2010	60	49	6	5	13			1	79	55
2011	82	65	4	8		24	1		87	97
2012	73	62	10	10	35			1	118	73
2013	58	68	10	10		26	1		69	104
2014	77	79	9	10	23			1	109	90
2015	83	66	10	8			1		94	74
2016	77	77	5	4		20		1	82	102
2017	75	75			14		1		90	75
2018	85	76				21		1	85	98
Total	1,278	1,214	111	111	176	118	11	8	1,576	1,451

* The Chairman Prof. Nagakura who delivered a lecture at the FY1999 Mizushima-Raman Lecture is not counted in the list as he wasn't dispatched to India.

V. Appendix-4

Transition of Priority/Subject areas since FY1993

1993～	1997～	1999～	2003～	2007～	2009～		2013～	Keywords
Molecular Structure, Spectroscopy and Dynamics	Molecular Structure, Dynamics, and Molecular Materials, including Supramolecular Science	Molecular Structure, Dynamics, and Molecular Materials, including Supramolecular Science	Molecular Structure, Dynamics, and Molecular Materials, including Supramolecular Science	Molecular Science and Molecular Materials including Dynamics and Supramolecular Science	Molecular and Supramolecular Sciences	→	[A] Fundamental Sciences: Physical and Chemical Systems	1. Condensed Matter Physics 2. Molecules and Molecular Assembly Science 3. Interface Science and Catalysis
		Surface and Interface Science	Surface and Interface Sciences (,including Catalysis) * added ( ) in 2005	Surface and Interface Sciences, including Catalysis	Surface and Interface Science, including Catalysis			
New Materials, including Polymers	Advanced Materials	Advanced Materials	Advanced Materials, including Polymers and Nano-materials	Advanced Materials, including Polymers and Nano-materials	Advanced Materials, including Polymers and Nanomaterials	→	[B] Materials and System Engineering: Man-made Systems	1. Advanced Materials and Nanotechnology (this keyword includes areas of metal, ceramics, polymer science & engineering, and materials processes) 2. Engineering Sciences (this keyword includes areas of manufacturing science and engineering, and synthesis & analysis/ optimization & simulation of engineering processes and systems)
Manufacturing Sciences	Manufacturing Sciences	Manufacturing Sciences	Manufacturing Sciences	Manufacturing Sciences	Manufacturing Sciences			
Modern Biology and Biotechnology	Modern Biology and Biotechnology	Modern Biology and Biotechnology	Modern Biology and Biotechnology	Modern Biology and Biotechnology	Modern Biology and Biotechnology	→	[C] Natural Systems: Life Sciences and Bioengineering	1. Molecular and Chemical Biosciences 2. Biotechnology and Bioengineering 3. Medical Biosciences 4. Cognitive Science
Astronomy and Astrophysics	Astronomy and Astrophysics	Astronomy and Astrophysics	Astronomy and Astrophysics	Astronomical & Space Science	Astronomical and Space Science	→	[D] Sciences for Earth-Space, Marine, and Environment: Global Systems ⇒ (2014～) Astronomy, Space, Earth Systems and Sciences	1. Astronomy, Astrophysics, and Space & Planetary Science 2. Geosciences (Marine, Meteorology, Geology, Paleontology) 3. Geophysics and Geochemistry for Global Issues (Global Warming and Natural Resource)
							[E] Mathematics and Computational Science	1. Mathematical Science 2. Computational Science and Engineering 3. Big Data analytics 4. Machine Learning

V. Appendix-5

List of Joint Research Projects and Joint Workshops/Seminars (FY1993-FY2005)

1. Molecular Structure, Dynamics, and Molecular Materials, Including Supermolecular Science

FY	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Title	Coordinators/Organisers	
Research Projects		★												1. Electron Transfer Reactions, Molecular Dynamics	Keitaro Yoshihara	Institute for Molecular Science, Okazaki National Research Institutes
			J: 2p/43pd	J:1p/12pd											Biman Bagchi	Indian Institute of Science, Bangalore
		I: 1p/61pd		I: 1p/40pd												
				★										2. Magnetic Properties of Materials based on Novel Graphite Intercalation Compounds	Toshiaki Enoki	Tokyo Institute of Technology
				J: 1p/7pd											Radhakarishnan Thavarool Puthiyedath	University of Hyderabad
				I: 1p/26pd												
					★									3. Molecular Structure, Dynamics, and Molecular Materials, including Supermolecular Science	Keitaro Yoshihara	Japan Advanced Institute of Science and Technology, Hokuriku
					J: 3p/45pd	J: 4p/46pd		J: 1p/10pd	J:1p/15pd	J: 2p/15pd					C.N.R. Rao	Jawaharlal Nehru Centre for Advanced Scientific Research
					I: 5p/212pd	I: 2p/73pd	I: 4p/76pd	I: 1p/62pd	I: 3p/140pd	I: 4p/127pd						
									★					4. Dynamical Behavior of Molecules Confined in Reverse Micelles	Keisuke Tominaga	Kobe University
										J: 1p/7pd					Kankan Bhattacharya	Indian Association for the Cultivation of Science
											I: 1p/43pd	I: 1p/60pd				
											★			5. Femtosecond near-infrared Spectroscopic Studies on charge-carrier dynamism, exciplex dynamics and organic pigments	Koichi Iwata	The University of Tokyo
											J: 7p/66pd	J: 4p/42pd	J: 1p		Siva Umapathy	Indian Institute of Science
											I: 5p/178pd	I: 2p/42pd	I: 2p			
											★			6. Electronic and Nonlinear Optical Properties of Organic Thin Films	Jun Kawamata	Yamaguchi University
											J: 1p/8pd		J: 1p		Radhakarishnan Thavarool Puthiyedath	University of Hyderabad
											I: 1p/30pd	I: 1p/16pd	I: 1p			
											★			7. Developments of Novel Butadiene Based Photoresponsive Liquid Crystals	Nobuyuki Tamaoki	National Institute of Advanced Industrial Science and Technology
											J: 1p/7pd		J: 2p		Suresh Das	Council of Scientific and industrial Research
											I: 1p/62pd	I: 2p/77pd	I: 4p			
													★	8. Novel Magnetic Systems; Applications in Nonlinear Optics and Spin Transport Phenomena	Seiji Miyashita	The University of Tokyo
															Swapan K. Pati	Jawaharlal Nehru Centre for Advanced Scientific Research
Seminar			★Oct. 21–22, Hayama											1. Information Exchange Seminar for Molecular Structure, Spectroscopy and Dynamics	Keitaro Yoshihara	Institute for Molecular Science, Okazaki National Research Institutes
															C.N.R. Rao	Jawaharlal Nehru Centre for Advanced Scientific Research
					★ Jan 19–21, Bangalore									2. India-Japan Workshop on Carbon Science	Toshiaki Enoki	Tokyo Institute of Technology
					J: 5p/40pd										C.N.R. Rao	Jawaharlal Nehru Centre for Advanced Scientific Research
								★Jan, 12–13, Bangalore						3. Structure and Dynamics of Chemical and Biological System		
								J: 5p/10pd								
									★ Mar. 14–16, Tokyo					4. Japan-India Meeting on Molecular and Supermolecular Materials from Chemistry, Physics and Materials Science Aspects	Toshiaki Enoki	Tokyo Institute of Technology
									I: 6p/18pd						C.N.R. Rao	Jawaharlal Nehru Centre for Advanced Scientific Research
										★Jan. 28–29, Tokyo				5. Structure and Dynamics of Complex Molecular Systems: From a Molecule to a Living Cell	Hiroo Hamaguchi	The University of Tokyo
										I: 6p/12pd					Biman Bagchi	Indian Institute of Science, Bangalore
											★ Mar. 17–22, Bangalore			6. 2nd Japan-India Meeting on Molecular and Supermolecular Materials from Chemistry, Physics and Materials Science Aspects	Toshiaki Enoki	Tokyo Institute of Technology
											J: 6p/60pd				C.N.R. Rao	Jawaharlal Nehru Centre for Advanced Scientific Research
												★ Dec. 3–4, Kolkata		7. Frontiers of Molecular Science Developed by Advanced Spectroscopy	Keisuke Tominaga	Kobe University
												J: 6p/12pd			Kankan Bhattacharya	Indian Association for the Cultivation of Science
															Biman Bagchi	Indian Institute of Science, Bangalore
													★ Feb. 16–18, Tokyo	8. 3rd Japan-India Workshop on Molecular and Supermolecular Materials	Toshiaki Enoki	Tokyo Institute of Technology
													I: 8p		Kankan Bhattacharya	Indian Association for the Cultivation of Science
Visiting Scientists	J: 2p/17pd	J: 1p/9pd		J: 2p/19pd							J: 1p/11pd					
	I: 1p/29pd	I: 4p/306pd	I: 2p/76pd	I: 2p/46pd					I: 1p/11pd	I: 1p/7pd						
Total	J: 2p/17pd	J: 1p/9pd	J: 2p/43pd	J: 4p/38pd	J: 8p/85pd	J: 4p/46pd		J: 6p/30pd	J: 11p/35pd	J: 3p/22pd	J: 16p/131pd	J: 10p/54pd	J: 4p			
	I: 1p/29pd	I: 5p/367pd	I: 2p/76pd	I: 4p/112pd	I: 5p/40pd	I: 2p/73pd	I: 4p/76pd	I: 1p/62pd	I: 10p/211pd	I: 11p/164pd	I: 8p/313pd	I: 6p/159pd	I: 15p			

* "J: 2p/17pd" means that, by using the budget of this programme, two Japanese scientists (2 person) visited India and the total amount of implementation is seventeen person-days (17 pd).

* Each title, the names of Coordinators / Organisers and the places in which seminars were held were added based on the data saved as the reference material of the ninth Japan-India Science Council meeting while other past materials were also referenced.

2. Advanced Materials, including Polymers and Nanomaterials

FY	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Title	Coordinators/Organisers	
Research Projects		★												1. Structure Characterisation of Advanced Multilayer Materials by High-resolution X-Ray Techniques	Hiroo Hashizume	Tokyo Institute of Technology
			J: 1p/8pd	J:1p/6pd											M.K. Sanyal	Saha Institute of Nuclear Physics
		I: 6p/32pd	I: 1p/8pd	I: 2p/18pd												
			★											2. Fabrication, Analysis and Measurement of New Magnetic Thin Film Materials for Recording Applications	Mitsunori Matsumoto	Shinshu University
			J: 2p/24pd		J: 2p/34pd										Shiva Prasad	IIT Bombay
					I: 2p/42pd	I: 2p/22pd										
			★											3. Laser Induced Crystallization of Hydrogenated Amorphous Silicon (a-Si:H)	Masayoshi Umeno	Nagoya Institute of Technology
			J: 1p/11pd	J: 1p/11pd		J: 2p/16pd									R.M. Mehra	University of Delhi South Campus
				I: 1p/28pd	I: 2p/48pd	I: 3p/59pd										
							★							4. Materials Design by First Principles Computer Simulation	Yoshiyuki Kawazoe	Tohoku University
							J: 1p/8pd	J: 2p/27pd	J: 2p/23pd						S. Yashonath	Indian Institute of Science
							I: 2p/25pd	I: 3p/122pd	I: 1p/29pd							
								★						5. Investigation of the Optical and Electrical Properties of Tetrahedral Amorphous Carbon (ta-C) Films by Pulsed Laser Deposition and Application to Photovoltaic Device	Masayoshi Umeno	Nagoya Institute of Technology
															R.M. Mehra	University of Delhi South Campus
								I: 2p/36pd	I: 2p/44pd	I: 2p/18pd						
										★				6. Preparation and Characterization of Thin Films of Conjugated Polymers Suitable for Optoelectronic Devices	Mitsuyoshi Onoda	University of Hyogo
										J: 1p/6pd	J: 2p/44pd	J: 2p/15pd	J: 5p		P.K. Bhatnagar	University of Delhi South Campus
										I: 2p/30pd		I: 2p/36pd	I: 5p			
										★				7. Fabrication of semiconductor nanocrystals and Thin Biosensor Application	Shinji Nozaki	The University of Electro-Communications
												J: 1p/14pd			Surendra Nath Sahu	Indian Institute of Physics
										I: 1p/9pd		I: 1p/14pd				
													★	8. Solid-State Dye-Sensitized Solar Cells Based on Nanostructured Zinc Oxide	Tetsuo Soga	Nagoya Institute of Technology
															R.M. Mehra	Delhi University
													★	9. Design of Novel Liquid Crystalline Precursors for Stabilization and Delivery of Enzymes	Shigeo Yamamura	Toho University
															Paradkar Anant	Bharati Vidyapeeth Deemed University
Seminar		★ Oct. 17–18, Tokyo												1. Seminar on New Materials	Saburo Nagakura	Kanagawa Academy of Science and Technology
		I: 4p/23pd													P. Rama Rao	Department of Research and Development, Ministry of Defense
				★ Oct. 21–22, Hyderabad										2. Japan-India Joint Seminar on Computational Materials Science	Saburo Nagakura	Kanagawa Academy of Science and Technology
				J: 7p/47pd											P. Rama Rao	Department of Research and Development, Ministry of Defense
				★ Feb. 23–24, Chiba										3. India-Japan Joint Seminar on Oxide Electronics	Mitsuru Itoh	Tokyo Institute of Technology
				I: 5p/39pd											C.N.R. Rao	Jawaharlal Nehru Centre for Advanced Scientific Research
						★ Oct. 9–10, Bangalore								4. Application of the 3MVUltrahigh Voltage Electron Microscope to Materials Science	Hirotaro Mori	Osaka University
						J: 2p/12pd									Sikumar Banerjee	Bhabha Atomic Research Center
						★ Oct. 12, Bangalore								5. India-Japan Joint Seminar on Computational Materials Science	Masao Doyama	Teikyo University of Science and Technology
						J: 4p/23pd									S. Yashonath	Indian Institute of Science
							★ Dec. 6–9, Vallabh Vidyanagar							6. India-Japan Workshop on Advanced Fibers and Composites	Eiichi Yasuda	Tokyo Institute of Technology
							J: 5p/40pd								L.M. Manchanda	Sardar Patal University
								★ Nov. 23–25, New Delhi						7. Workshop on Smart Materials and Structures	Akira Yoshida	Toyohashi University of Technology
								I: 6p/24pd							Vikram Kumar	Solid State Physics Laboratory
											★ Oct. 10–12, Yokohama			8. India-Japan seminar on Materials Education, Research Strategy and Advanced Materials	Masao Doyama	Teikyo University of Science and Technology
											I: 7p/45pd				Pallerama R. Rao	International Advanced Research Centre for Powder Metallurgy and New Materials
											★ Dec.11–13, Kyushu			9. India-Japan Workshop on Advanced Molecular Electronics and Bionics	Keiichi Kaneto	Kyushu Institute of Technology
											I: 9p/55pd				Bansi D. Malhotra	National Physical Laboratory
												★ Aug. 24–27		10. India-Japan Workshop on Solvothermal Reaction	Masahiro Yoshimura	Tokyo Institute of Technology
												J: 5p/20pd			K. Bvrappa	University of Mysore
												★ Nov. 25–26		11. Recent Advances in the area of the Advanced Carbon	Asao Oya	Gunma University
												J: 3p/6pd			K. Vikram	National Physical Laboratory
													★ Jan. 9 to Feb. 2, Bangalore	12. Novel Giant-Magnatoresistive Materials and their Electronic Structure	Atsushi Fujimori	The University of Tokyo
													J: 4p		DD Sarma	IISc, Bangalore
Visiting Scientists			J: 1p/7pd				J: 1p/6pd	J: 1p/11pd	J: 4p/45pd			J: 6p/47pd				
		I: 1p/31pd	I: 6p/149pd	I: 1p/60pd	I: 1p/63pd	I: 1p/16pd	I: 3p/32pd	I: 3p/73pd	I: 1p/43pd			I: 1p/120pd				
Total			J: 5p/50pd	J: 9p/62pd	J: 2p/34pd	J: 8p/51pd	J: 7p/54pd	J: 3p/38pd	J: 6p/68pd	J: 1p/6pd	J: 2p/44pd	J: 17p/102pd	J: 9p			
		I: 8p/86pd	I: 7p/157pd	I: 9p/145pd	I: 5p/183pd	I: 6p/97pd	I: 5p/57pd	I: 14p/255pd	I: 4p/116pd	I: 5p/57pd	I: 16p/100pd	I: 12p/186pd	I: 5p			

* "J: 2p/17pd" means that, by using the budget of this programme, two Japanese scientists (2 person) visited India and the total amount of implementation is seventeen person-days (17 pd).
* Each title, the names of Coordinators / Organisers and the places in which seminars were held were added based on the data saved as the reference material of the ninth Japan-India Science Council meeting while other past materials were also referenced.

3. Modern Biology and Biotechnology

FY	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Title	Coordinators/Organisers	
Research Projects		★												1. Molecular Biology: Stringent Regulation in E.coli	Akira Ishihama	National Institute of Genetics
		J: 1m/14md													Dipankar Chatterji	Centre for Cellular and Molecular Biology
			I: 1m/24md	I: 1m/26md												
		★												2. Molecular Biology: In Vitro Transcription Studies on ProU operon of E.coli	Akira Ishihama	National Institute of Genetics
															J. Gowrishankar	Centre for Cellular and Molecular Biology
		I: 1m/25md	I: 1m/25md	I: 1m/29md												
			★											3. Stress Biology: Transgenic Plants	Norio Murata	National Institute for Basic Biology, Okazaki National Research Institutes
															P. Pardha Saradhi	Centre for Bioscience, Jamia Millia Islamia
			I: 1p/76pd	I: 2p/180pd												
				★										4. Developmental Biology: Roles of the Cell Cycle in Cell Differentiation and Pattern Formation in Dictyostelium Development	Yasuo Maeda	Tohoku University
															Vidyanand Nanjundiah	Developmental Biology and Genetics Laboratory, IIIS
				I: 1p/25pd												
					★									5. Regulatory Mechanisms of Gene Transcription in Bacteria for Survival under Various Environments	Akira Ishihama	National Institute of Genetics
					J: 1p/9pd		J: 1p/7pd	J: 1p/5pd							Dipankar Chatterji	CCMB
					I: 1p/21pd	I: 2p/45pd	I: 2p/51pd	I: 2p/61pd								
							★							6. Polyunsaturated Fatty Acids and Desaturases in Cryophilic Cyanobacteria in Antarctica	Norio Murata	National Institute for Basic Biology, Okazaki National Research Institutes
								J: 1p/9pd							Sisinthy Shivaji	Centre for Cellular and Molecular Biology
							I: 2p/120pd	I: 2p/36pd	I: 1p/61pd							
							★							7. Screening, Isolation and Characterization of Anticancer Compounds from Marine Organisms	Tatsuo Higa	University of Ryukyus
							J: 2p/10pd								K. Padmakumar	University of Kelara
							I: 1p/23pd									
								★						8. Molecular Studies of Morphogenesis and Cell Differentiation in Animal Development	Makoto Asashima	The University of Tokyo
															Sophan P. Modak	Pune University
								I: 1p/30pd								
								★						9. Molecular mechanisms of pattern formation, Development and Differentiation	Kunio Yasuda	Nara Institute of Science and Technology
															D. Balasubramanian	L.V. Prasad Eye Institute, Hyderabad
								I: 1p/11pd								
									★					10. Molecular Approaches of Organogenesis In Vitro in Animal Development	Makoto Asashima	The University of Tokyo
															Sophan P. Modak	Karnatak University
									I: 1p/30pd	I: 2p/49pd	I: 1p/32pd	I: 1p/29pd	I: 1p		Surendra Ghaskadbi	Agharkar Research Institute
									★	No. 15				11. Global Regulation of Gene Transcription in Bacteria Growing under Various Environments	Akira Ishihama	Nippon Institute of Biological Science
															Dipankar Chatterji	Indian Institute of Science
									I: 2p/51pd							
										★				12. Identification, Characterization and Physical Mapping of Z-Chromosome Linked Genes of The Silkworm Bombyx mori	Toru Shimada	The University of Tokyo
										J: 1p/7pd	J: 1p/7pd				Javare Gowda Nagaraju	Centre for DNA Fingerprinting and Diagnostics
										I: 1p/7pd	I: 1p/17pd	I: 1p/20pd				
										★				13. Chromatin-mediated transcriptional regulation	Masami Horikoshi	The University of Tokyo
															Tapas Kumar Kundu	JNCASR, Bangalore
										I: 1p/21pd	I: 1p/31pd	I: 1p/21pd	I: 1p			
										★				14. Molecular Basis of Cold Acclimation	Norio Murata	National Institute of Basic Biology, Okazaki
										J: 1p/7pd					Sisinthy Shivaji	Center for Cellular and Molecular Biology
										I: 1p/43pd	I: 1p/25pd	I: 1p/30pd				
													★	Molecular Basis of Cold Adaptation: Antarctic Cyanobacteria and Bacteria as Model Systems	Hidetoshi Okuyama	Hokkaido University
													J: 1p		Sisinthy Shivaji	Center for Cellular and Molecular Biology
													I: 1p			
										★				15. Global Regulation of Gene Transcription in Bacteria Growing under Various Environments	Akira Ishihama	Nippon Institute of Biological Science
											J: 1p/12pd		J: 1p		Dipankar Chatterji	Indian Institute of Science
										I: 1p/17pd	I: 2p/46pd	I: 2p/68pd	I: 2p			
										★				17. Microbial Study on Mortality of Natural Zooplankton	Kazuhiro Kogure	The University of Tokyo
											J: 1p/12pd				Iddya Karunasagar	University of Agricultural Science
											I: 1p/12pd					
											★			18. The Relationship between Structure and Function of Influenza virus RNA Polymerase	Kazufumi Shimizu	Nihon University
											J: 1p/10pd		J: 1p		Ayae Honda	Hosei University
											I: 1p/32pd		I: 1p		Chattopadhyay Dhrubajyoti	Calcutta University
													★	Molecular Cytogenetic Analysis of Rye (Secale cereale) Chromatin Introgressed into Wheat (Triticum aestivum) through Fluorescence in Situ Hybridization	Yasuhiko Mukai	Osaka Kyoiku University
													J: 1p		HK Chaudhary	CSK HP Agricultural University
													I: 1p			
												★		19. Characterization of Optineurin Interacting Proteins & Proteomic Analysis of AMD Patient Serum	Takeshi Iwata	National Hospital Organization Tokyo Medical Center
												J: 1p/7pd			D. Balasubramanian	L. V. Prasad Eye Institute Research Center
												I: 1p/9pd				

V. Appendix-5

FY	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Title	Coordinators/Organisers	
Seminar		★ Feb. 18–21, Mysore												1. India-Japan Seminar on Morphogens, Genes and Development	Kunio Yasuda	Nara Institute of Science and Technology
		J: 7p/53pd													Vidyanand Nanjundiah	Developmental Biology and Genetics Laboratory, IIIS
		★ Mar. 27-Apr. 2, Hyderabad												2. The 1st India-Japan Molecular Biology Workshop on Gene Transcription in Prokaryotes	Akira Ishihama	Nippon Institute of Biological Science
		J: 4p/28pd													Dipankar Chatterji	Center for Cellular and Molecular Biology
				★ Apr. 1–4, Hayama										3. The 2nd India-Japan Molecular Biology Workshop on Regulation of Gene Expression	Akira Ishihama	Nippon Institute of Biological Science
				I: 6p/31pd											Dipankar Chatterji	Center for Cellular and Molecular Biology
				★ Mar. 26–31, Hyderabad										4. The 3rd India-Japan Molecular Biology Workshop on DNA Protein Footprinting Analysis	Akira Ishihama	Nippon Institute of Biological Science
				J: 5p/35pd											Sikumar Banerjee	Bhabha Atomic Research Center
					★ Feb. 5–7, New Delhi									5. Stress Tolerance in Plants-impairment and Repair	Norio Murata	National Institute for Basic Biology, Okazaki National Research Institutes
					J: 10p/69pd										Prasanna Mohanty	Jawaharlal Nehru University
						★ Apr. 5–12, Naini Tal								6. Concepts and Models in Developmental Biology	Tokindo Okada	National Institute for Basic Biology, Okazaki National Research Institutes
						J: 2p/24pd									Vidyanand Najundiah	Indian Institute of Science
									★ Nov. 8–10, Hyderabad					7. Fundamental Mechanisms of Stress Response	Akira Ishihama	Nippon Institute of Biological Science
									J: 10p/53pd						Sisinthy Shivaji	Center for Cellular and Molecular Biology
												★ Jan. 20–23, Bangalore		8. Understanding of Chromatin Structure Functions – a workshop and discussion	Masami Hirokoshi	The University of Tokyo
												J: 6p/47pd			Tapas K. kundu	JNCASR, Bangalore
Visiting Scientists		J: 2p/20pd														
					I: 1p/29pd	I: 1p/6pd	I: 1p/20pd			I: 2p/36pd	I: 1p/15pd					
Total		J: 14p/115pd		J: 5p/35pd	J: 10p/69pd	J: 2p/24pd		J: 2p/14pd	J: 10p/53pd	J: 2p/14pd	J: 4p/41pd	J: 7p/54pd	J: 4p			
			I: 3p/125pd	I: 11p/291pd	I: 1p/30pd	I: 1p/6pd	I: 1p/20pd	I: 5p/138pd	I: 4p/142pd	I: 8p/173pd	I: 8p/195pd	I: 7p/177pd	I: 8p			

* "J: 2p/17pd" means that, by using the budget of this programme, two Japanese scientists (2 person) visited India and the total amount of implementation is seventeen person-days (17 pd).

* Each title, the names of Coordinators / Organisers and the places in which seminars were held were added based on the data saved as the reference material of the ninth Japan-India Science Council meeting while other past materials were also referenced.

4. Manufacturing Science

FY	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Title	Coordinators/Organisers	
Seminar		★par. 13–18, Tokyo												1. The 1st India-Japan Seminar on Manufacturing Science of Advanced Composites	Terufumi Machida	Tamagawa University
		I:6p/48pd													Raghunath A. Mashelkar	National Chemical University
			★Feb. 22–28, New Delhi											2. The 2nd India-Japan Seminar on Manufacturing Science of Advanced Composites	Terufumi Machida	Tamagawa University
			J: 3p/21pd												Anil K. Gupta	National Physical Laboratory
			★ par. 13–14, Pune											3. The 1st India-Japan Seminar on Molecular Level Design of Materials and Functions	Meguru Tezuka	Saitama Institute of Technology
			J: 5p/25pd												K.N. Ganesh	National Chemical Laboratory
				★ par. 17–22, Tokyo										4. The 1st India-Japan Seminar on Advanced Manufacturing System	Manabu Kiuchi	The University of Tokyo
				I: 5p/41pd											Nukala Viswanadham	IIS Bangalore
				★ par. 17–22, Tokyo										5. The 3rd India-Japan Seminar on Manufacturing Science of Advanced Composites	Terufumi Machida	Tamagawa University
				I: 6p/48pd											Erode S.R. Gospal	National Physical Laboratory
					★ Nov. 24–28, Bopbay									6. The 2nd India-Japan Seminar on Advanced Manufacturing System	Manabu Kiuchi	The University of Tokyo
					J: 7p/46pd										S. S. Pande	Indian Institute of Technology, Powai
					★ Jan. 19–24, padras									7. The 4th India-Japan Seminar on Manufacturing Science of Advanced Composites	Terufumi Machida	Tamagawa University
					J: 7p/49pd										N.G. Nair	Indian Institute of Technology, Madras
						★ Oct. 19–24, Tokyo								8. The 3rd India-Japan Seminar on Advanced Manufacturing System	Manabu Kiuchi	The University of Tokyo
						J: 6p/48pd									Amitabha Ghosh	Indian Institute of Technology, Kharagpur
						★ Oct. 19–24, Tokyo								9. The 5th India-Japan Seminar on Manufacturing Science of Advanced Composites	Terufumi Machida	Tamagawa University
						I: 6p/48pd									N.G. Nair	Indian Institute of Technology, Madras
							★ Feb. 20–25, Kharagpur							10. The 4th India-Japan Seminar on Advanced Manufacturing System	Manabu Kiuchi	The University of Tokyo
							J: 6p/43pd								Amitabha Ghosh	Indian Institute of Technology, Kharagpur
							★ Feb. 21–26, Kharagpur							11. The 6th India-Japan Seminar on Manufacturing Science of Advanced Composites	Manabu Kiuchi	The University of Tokyo
							J: 6p/48pd								Amitabha Ghosh	Indian Institute of Technology, Kharagpur
									★ Sep. 2–9, Tokyo					12. The 5th India-Japan Seminar on Advanced Manufacturing System	Manabu Kiuchi	The University of Tokyo
									I: 5p/40pd						Amitabha Ghosh	Indian Institute of Technology, Kharagpur
									★ Sep. 3–8, Tokyo					13. The 7th India-Japan Seminar on Manufacturing Science of Advanced Composites	Terufumi Machida	Tamagawa University
									I: 5p/39pd						Niranjan K. Naik	Indian Institute of Technology, Bombay
										★ Nov. 30-Dec. 7, New Delhi				14. The 6th India-Japan Seminar on Advanced Manufacturing	Manabu Kiuchi	Teikyo Heisei University
										J: 6p/48pd					Amitabha Ghosh	Indian Institute of Technology, Kharagpur
										★ Dec. 1–7. India				15. The 8th India-Japan Seminar on Manufacturing Science of Advanced Composites	Terufumi Machida	Tamagawa University
										J: 6p/48pd					Niranjan K. Naik	Indian Institute of Technology, Bombay
											★ Feb. 16–21, Japan			16. The 7th India-Japan Seminar on Advanced Manufacturing System	Manabu Kiuchi	Teikyo Heisei University
											I: 6p/42pd				Amitabha Ghosh	Indian Institute of Technology, Kharagpur
											★ Feb. 16–21, Japan			17. The 9th India-Japan Seminar on Manufacturing Science of Advanced Composites Materials	Terufumi Machida	Tamagawa University
											I: 6p/48pd				Niranjan K. Naik	Indian Institute of Technology, Bombay
												★ Feb. 21–26, India		18. The 8th India-Japan Seminar on Advanced Manufacturing System	Manabu Kiuchi	Teikyo Heisei University
												J: 6p/36pd			Amitabha Ghosh	Indian Institute of Technology, Kharagpur
												★ Feb. 21–26, India		19. The 10th Anniversary Japan-India Joint Seminar on Advanced Composites Manufacturing Science	Terufumi Machida	Tamagawa University
												J: 8p/48pd			Niranjan K. Naik	Indian Institute of Technology, Bombay
													★ Feb. 14–26. Tokyo	20. The 1st Japan-India Joint Seminar on Micro/Nano Manufacturing Science	SG Dhande	Indian Institute of Technology, Kanpur
													I: 13p		Manabu Kiuchi	Teikyo Heisei University
Visiting Scientists	J: 5p/45pd					J: 1p/8pd										
					I: 1p/9pd		I: 1p/11pd		I: 1p/15pd				I: 1p			
Total	J: 5p/45pd		J: 8p/46pd		J: 14p/95pd	J: 1p/8pd	J: 12p/91pd			J: 12p/96pd		J:14p/84pd				
		I: 6p/48pd		I: 11p/89pd	I: 1p/9pd	I: 12p/96pd	I: 1p/11pd		I: 11p/94pd		I: 12p/90pd		I: 13p			

* "J: 2p/17pd" means that, by using the budget of this programme, two Japanese scientists (2 person) visited India and the total amount of implementation is seventeen person-days (17 pd).
* Each title, the names of Coordinators / Organisers and the places in which seminars were held were added based on the data saved as the reference material of the ninth Japan-India Science Council meeting while other past materials were also referenced.

V. Appendix-5

5. Astronomy and Astrophysic

FY	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Title	Coordinators/Organisers	
Research Projects	★													Astronomical Observations with Advanced Research	Daiichiro Sugimoto	University of the Air
															Hiroshi Shibai	Nagoya University
															Ramanath Cowsik	Indian Institute of Astrophysics
															Rajaram Nityananda	National Centre for Radio Astrophysics
Sub Themes	★													1. Ground-Based Astronomy from Hanle		
	J: 1p/9pd		J: 4p/33pd	J: 3p/26pd	J: 1p/10pd	J: 1p/8pd	J: 2p/8pd			J: 2p/14pd	J: 1p/10pd	J: 1p/12pd				
	I: 2p/25pd	I: 2p/71pd	I: 1p/27pd		I: 1p/29pd	I: 2p/42pd	I: 2p/35pd	I: 1p/20pd	I: 1p/14pd	I: 1p/12pd	I: 2p/29pd	I: 1p/8pd				
	★													2. Cosmic Ray Physics		
	J: 1p/11pd			J: 1p/9pd												
	I: 1p/10pd															
	★													3. Simulation with Advanced Computer Technology		
	J: 1p/10pd			J: 1p/8pd	J: 1p/8pd	J: 1p/8pd										
	I: 1p/27pd	I: 3p/105pd		I: 1p/15pd												
	★ 4-1								★ 4-2					4-1. Solar Physics 4-2. Observational Study of Solar Physics		
		J: 1p/16pd	J: 2p/21pd	J: 1p/11pd			J: 1p/8pd	J: 1p/16pd	J: 1p/4pd	J: 1p/7pd		J: 1p/7pd				
	I: 1p/10pd	I: 1p/17pd		I: 1p/28pd					I: 1p/14pd	I: 1p/15pd	I: 1p/15pd	I: 1p/18pd				
			★ 5-1						★ 5-2					5-1. X-ray Astrophysics 5-2. X-ray Astronomy		
			J: 1p/7pd	J: 2p/24pd	J: 3p/23pd	J: 2p/19pd	J: 2p/12pd	J: 2p/22pd	J: 2p/13pd	J: 2p/20pd	J: 1p/6pd	J: 3p/28pd				
				I: 1p/33pd		I: 2p/41pd	I: 2p/44pd	I: 2p/40pd	I: 2p/32pd		I: 2p/31pd					
				★ 6-1					★ 6-2					6-1. Balloon-Borne Infrared Astronomy 6-2. Balloon Observation of Infrared Objects		
				J: 2p/16pd	J: 3p/24pd	J: 4p/93pd	J: 3p/63pd	J: 2p/41pd	J: 2p/18pd	J: 3p/55pd	J: 6p/58pd	J: 3p/28pd				
				I: 1p/26pd	I: 1p/11pd	I: 1p/12pd	I: 2p/28pd	I: 1p/15pd	I: 1p/14pd	I: 2p/30pd						
							★ 7-1		★ 7-2					7-1. interplanetary Space Particles 7-2. Observation of Interplantary Dust Particles		
							J: 1p/5pd	J: 1p/9pd	J: 1p/16pd							
							I: 2p/10pd	I: 3p/28pd	I: 1p/15pd	I: 2p/17pd	I: 1p/8pd	I: 2p/16pd				
								★						8. Development of Gravitational Wave Detector		
									J: 1p/7pd							
								I: 1p/8pd	I: 1p/15pd	I: 1p/8pd	I: 1p/15pd	I: 1p/15pd				
									★					9. Optical Observation of Open Clusters		
										J: 1p/9pd	J: 1p/9pd	J: 1p/11pd				
									I: 1p/15pd		I: 1p/9pd	I: 1p/12pd				
											★			10. Principal Components Analysis		
											J: 1p/16pd	J: 1p/12pd				
												I: 1p/16pd				
Seminar		★ Jan. 15-21												1. The 1st India-Japan Seminar on Cooperation in Astronomy and Astrphysics	Daiichiro Sugimoto	University of the Air
		J: 10p/89pd													R. Cowsik	Indian Institute of Astrophysics
			★ Mar. 16-23											2. The 2nd India-Japan Seminar on Cooperation in Astronomy and Astrphysics	Daiichiro Sugimoto	University of the Air
			I: 9p/72pd												R. Cowsik	Indian Institute of Astrophysics
								★ Sep. 26-Oct. 23						3. The 3rd India-Japan Seminar on Cooperation in Astronomy and Astrphysics		
								J: 3p/21pd								
Visiting Scientists																
							I: 2p/27pd									
Total	J: 3p/30pd	J: 11p/105pd	J: 7p/61pd	J: 10p/94pd	J: 8p/65pd	J: 8p/128pd	J: 9p/96pd	J: 9p/97pd	J: 7p/58pd	J: 9p/105pd	J: 9p/83pd	J: 10p/91pd	J: 8p			
	I: 5p/72pd	I: 6p/193pd	I: 10p/99pd	I: 4p/102pd	I: 4p/40pd	I: 5p/95pd	I: 10p/144pd	I: 7p/95pd	I: 8p/119pd	I: 8p/93pd	I: 9p/123pd	I: 9p/108pd	I: 11p			

* "J: 2p/17pd" means that, by using the budget of this programme, two Japanese scientists (2 person) visited India and the total amount of implementation is seventeen person-days (17 pd).

* Each title, the names of Coordinators / Organisers and the places in which seminars were held were added based on the data saved as the reference material of the ninth Japan-India Science Council meeting while other past materials were also referenced.

6. Surface and Interface Science, Including Catalysis

FY	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Title	Coordinators/Organisers	
Research Projects											★			1. Surfaces and Interfaces for Nanostructured Materials	Yasuhiro Iwasawa	The University of Tokyo
															Milan Kumar Sanyal	Saha Institute of Nuclear Physics, Kolkata
											I: 1p/23pd	I: 1p/29pd				
Seminar										★ Mar. 25–27, Tokyo				1. JSPS-DST Symposium on Surfaces and Interfaces for Nanostructured Materials I	Yasuhiro Iwasawa	The University of Tokyo
										I: 8p/64pd					Milan Kumar Sanyal	Saha Institute of Nuclear Physics, Kolkata
											★ Dec. 18–23, India			2. JSPS-DST Symposium on Surfaces and Interfaces for Nanostructured Materials II	Yasuhiro Iwasawa	The University of Tokyo
											J: 9p/45pd				Milan Kumar Sanyal	Saha Institute of Nuclear Physics, Kolkata
													★ Nov. 10–11, Tokyo	3. JSPS-DST Symposium on Surfaces and Interfaces for Nanostructured Materials III	Yasuhiro Iwasawa	The University of Tokyo
													I: 10p		Milan Kumar Sanyal	Saha Institute of Nuclear Physics, Kolkata
Visiting Scientists												J: 3p/19pd				
										I: 9p/85pd		I: 2p/28pd				
Total											J: 9p/45pd	J: 3p/19pd				
										I: 17p/149pd	I: 1p/23pd	I: 3p/57pd	I: 10p			

* "J: 2p/17pd" means that, by using the budget of this programme, two Japanese scientists (2 person) visited India and the total amount of implementation is seventeen person-days (17 pd).
* Each title, the names of Coordinators / Organisers and the places in which seminars were held were added based on the data saved as the reference material of the ninth Japan-India Science Council meeting while other past materials were also referenced.

V. Appendix-6

Application/Adoption Number of Joint Research Projects and Joint Workshops/Seminars (FY2006-FY2019)

FY	[A] Fundamental Sciences: Physical and Chemical Systems					[B] Materials and System Engineering: Man-made Systems					[C] Natural Systems: Life Sciences and Bioengineering					[D] Astronomy, Space, Earth Systems and Sciences					[E] Mathematics and Computational Science			Earth-quake & Tsunami	Total Number of Implementation	
	Joint Research Projects			Joint Workshops/ Seminars		Joint Research Projects			Joint Workshops/ Seminars		Joint Research Projects			Joint Workshops/ Seminars		Joint Research Projects			Joint Workshops/ Seminars		Joint Research Projects			Joint Research Projects	Joint Research Projects	Joint Work-shops/ Seminars
	Applied	Adopted	Ongoing from last years	Applied	Adopted	Applied	Adopted	Ongoing from last years	Applied	Adopted	Applied	Adopted	Ongoing from last years	Applied	Adopted	Applied	Adopted	Ongoing from last years	Applied	Adopted	Applied	Adopted	Ongoing from last years			
2006	13	6	0	2	2	18	5	0	1	1	14	4	0	0	0	10	3	0	1	0	–	–	–	–	18	3
2007	7	4	6	1	1	14	7	5	3	2	13	6	4	0	0	5	3	3	1	1	–	–	–	4	42	4
2008	6	3	4	2	2	11	7	7	0	0	19	12	6	0	0	3	2	3	0	0	–	–	–		48	2
2009	4	3	3	1	1	8	3	7	1	1	19	11	12	2	0	4	3	2	0	0	–	–	–	–	44	2
2010	10	5	3	2	1	14	5	3	1	1	20	8	11	1	1	6	2	3	0	0	–	–	–	–	40	3
2011	14	5	5	2	1	22	6	5	2	1	29	10	8	0	0	4	1	2	0	0	–	–	–	–	42	2
2012	10	3	5	1	1	20	7	6	2	2	27	9	10	0	0	4	2	1	0	0	–	–	–	–	43	3
2013	9	3	3	1	1	14	5	7	2	2	23	8	9	1	1	9	3	2	0	0	2	1	–	–	41	4
2014	16	3	3	3	2	30	7	4	2	2	31	8	9	0	0	11	2	3	0	0	8	2	1	–	42	4
2015	27	4	3	1	1	27	7	7	2	1	33	6	7	0	0	8	3	2	0	0	5	1	2	–	42	2
2016	24	4	4	4	2	31	4	7	4	2	53	8	6	0	0	16	4	3	0	0	9	2	1	–	43	4
2017	14	3	4	4	2	29	7	4	0	0	35	9	8	4	2	10	2	4	1	1	8	2	2	–	45	5
2018	17	5	3	2	1	26	6	6	2	2	27	6	9	0	0	10	2	2	0	0	12	2	2	–	43	3
2019	18	3	5	2	1	35	6	6	3	2	29	5	6	0	0	14	3	2	0	0	14	3	2	–	41	3
Total	189	54		28	19	299	82		25	19	372	110		8	4	114	35		3	2	58	13		4	574	44

V. Appendix-7

List of Joint Research Projects and Joint Workshops/Seminars (FY2006-FY2019)

FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2006	Joint Research Project	AKIMOTO Koichi	Associate Professor, Nagoya University	Satyam Venkata PARLAPALLI	Assistant Professor, Institute of Physics, Bhubaneswar	2006.6.1 – 2008.3.31	The surface and interfaces of nanostructures on silicon:Growth and their modification by energetic ion beams
2006	Joint Research Project	KAWAMATA Jun	Associate Professor, Yamaguchi University	Thavarool Puthiyedath RADHAKRISHNAN	Professor, University of Hyderabad	2006.6.1 – 2008.3.31	Electronic and optical properties of organic supramolecular assemblies
2006	Joint Research Project	KIMURA Keisaku	Professor, University of Hyogo	Thalappil PRADEEP	Professor, Indian Institute of Technology Madras	2006.6.1 – 2008.3.31	Excitonic superlattice
2006	Joint Research Project	KOMORI Fumio	Associate Professor, The University of Tokyo	Milan Kumar SANYAL	Professor, Saha Institute of Nuclear Physics	2006.6.1 – 2008.3.31	Novel interfacial properties in self-assembled meso-structures
2006	Joint Research Project	MIYASHITA Seiji	Professor, The University of Tokyo	Swapan K PATI	Assitant Professor, Jawharlal Nehru Center for Advanced Scientific Research	2006.6.1 – 2008.3.31	Quantum magnetic mixing effects in fully frustrated magnets
2006	Joint Research Project	TAMAOKI Nobuyuki	Group Leader, National Institute of Advanced Industrial Science and Technology	Suresh DAS	Scientist F and Head, Regional Research laboratory, CSIR	2006.6.1 – 2008.3.31	Design and study of butadiene based self-assembled photo- and thermo- responsive luminescent materials
2006	Joint Research Project	YAGAI Shiki	Research Associate, Chiba University	Ayyappanpillai AJAYAGHOSH	Scientist E II, Regional Research Laboratory	2006.6.1 – 2008.3.31	Hydrogen-bond-directed self-assembly of pai-conjugated rigid-rod molecules
2006	Joint Research Project	HAYAKAWA Kunio	Associate Professor, Shizuoka University	Nallagundla Venkata REDDY	Assistant Professor, Indian Institute of Technology Kanpur	2006.6.1 – 2008.3.31	Microforming of Ultra Thin Wire: A Numerical and Experimental Study
2006	Joint Research Project	NOGAMI Masayuki	Professor, Nagoya Institute of Technology	Prasanta Kumar BISWAS	Scientist, Central Glass and Ceramic Research Institute	2006.6.1 – 2008.3.31	Study of magneto-optical properties of sol-gel based transition metal doped nanostructured ITO films on glass
2006	Joint Research Project	WARISAWA Shinichi	Associate Professor, The University of Tokyo	Chakraborty SUMAN	Assistant Professor, Indian Institute of Technology Kharagpur	2006.6.1 – 2008.3.31	Development of an Advanced Micromanufacturing Technology Characterised by Micro Surface Quality Control for Bio-MEMS devices
2006	Joint Research Project	YOKOGAWA Yoshiyuki	Group Leader, Osaka City University	Hari Krishna VARMA	Scientist in charge of bioceramics, Sree Chitra Tirunal Institute for Medical Sciences and Technology	2006.6.1 – 2008.3.31	Biomimetic processing of Inorganic – organic Composites for Biomedical Applications
2006	Joint Research Project	HONDA Ayae	Professor, Hosei University	Shaila M. S.	Professor, Indian Institue of Science	2006.6.1 – 2008.3.31	Expression and Biological role of the Host Cell Protein which influence the influenza virus growth
2006	Joint Research Project	IWATA Takeshi	Laboratory Chief, National Hospital Organization Tokyo Medical Center (National Institute of Sensory Organs)	D BALASUBRAMANIAN	Director of Research, L. V. Prasad Eye Institute	2006.6.1 – 2008.3.31	Proteome analysis of serum from patient with age-related macular degeneration
2006	Joint Research Project	TAKEO Masahiro	Associate Professor, University of Hyogo	Rakesh Kumar JAIN	Scientist F, Institute of Microbial Technology	2006.6.1 – 2008.3.31	Enhanced bioremediation of nitroaromatic pesticides- and herbicides-contaminated soils and waters by mixed bacterial cultures
2006	Joint Research Project	TAKEYASU Kunio	Professor, Kyoto University	Tapas Kumar KUNDU	Associate Professor, J.N.Centre	2006.6.1 – 2008.3.31	structural dynamics of native and reconstituted chromatin studied by atomic force microscopy
2006	Joint Research Project	KUNIEDA Hideyo	Professor, Nagoya University	Kulinderpal SINGH	Professor, Tata Institute of Fundamental Research	2006.6.1 – 2008.3.31	X-ray astronomy with advanced technology
2006	Joint Research Project	NAKAGAWA Takao	Professor, Japan Aerospace Exploration Agency	Swarna Kanti GHOSH	Professor, TATA Institute of Fundamental Research (TIFR)	2006.6.1 – 2008.3.31	Study of Galactic Star Forming Regions Using Balloon-borne Spectroscopic Mapping in Far Infrared Line of [CII]
2006	Joint Research Project	OGURA Katsuo	Professor, Kokugakuin University	Anil Kumar PANDEY	Associate Professor, Aryabhatta Research Institute of Observational Sciences	2006.6.1 – 2008.3.31	Photometric Studies of Very Young Open Clusters
2006	Joint Seminar	IWASAWA Yasuhiro	Professor, The University of Tokyo	Mannepalli Lakshmi KANTAM	Deputy Director, Indian Institute of Chemical Technology	2006.12.3 – 2006.12.5	Principle and Catalysis Application of Nanomaterials Decorated Surfaces
2006	Joint Seminar	TOMINAGA Keisuke	Professor, Kobe University	Kankan BHATTACHARYYA	Professor, Indian Association for the Cultivation of Science	2006.9.24 – 2006.9.27	New Frontiers of Molecular Spectroscopy
2006	Joint Seminar	FUJIMORI Atsushi	Professor, The University of Tokyo	Dipankar Das SARMA	Professor, Indian Institute of Science	2007.2.27 – 2007.3.1	Electronic structure of novel magnetic materials
2007	Joint Research Project	HATTA Hiroshi	Professor, Japan Aerospace Exploration Agency	V.K. SRIVASTAVA	Sr. Reader, Banaras Hindu University	2007.6.1 – 2009.3.31	Micro-Processing and Development of Thermal-Mechanical Properties of Carbon/Carbon Composites.
2007	Joint Research Project	MIYASHITA Kazuo	Professor, Hokkaido University	Bhaskar NARAYAN	Scientist, Central Food Tecnological Reserch Institute	2007.6.1 – 2009.1.31	Protein hydrolysates from marine sources with special reference to their physiological functions
2007	Joint Research Project	SHIRAI Masayuki	Leader, National Institute of Advanced Industrial Science and Technology	Chandrashekhar Vasant RODE	Scientist, National Chemical Laboratory	2007.6.1 – 2009.3.31	Catalytic downsteam processing of biomass using supercritical carbon dioxide for value added chemicals
2007	Joint Research Project	SUGI Yoshihiro	Professor, Gifu University	Komandur V.R. CHARY	Scientist E2, Indian Institute of Chemical Technology	2007.6.1 – 2009.3.31	Studies on Environment Conscious Chemical Processes by Solid Catalysis
2007	Joint Research Project	TERAMAE Norio	Professor, Tohoku University	Anunay SAMANTA	Professor, University of Hyderabad	2007.6.1 – 2009.3.31	Time-resolved total internal reflection fluorescence study of solvation dynamics at the interfaces
2007	Joint Research Project	FUKUNAGA Hirotoshi	Professor, Nagasaki University	Shashi. Prakash NARAYAN	Scientist-F, Regional Research Laboratory, Bhopal (CSIR)	2007.6.1 – 2009.3.31	Development of nano-crystalline nano-composite anisotropy Nd-Fe-B magnets for high energy applications
2007	Joint Research Project	IWAMOTO Mitsumasa	Professor, Tokyo Institute of Technology	Devendra KUMAR	Assistant Professor, Delhi University	2007.6.1 – 2009.3.31	Investigation on conductive helical materials for technological application
2007	Joint Research Project	KAMIHIRA Masamichi	Professor, Kyushu University	Ashok KUMAR	Associate Professor, Indian Institute of Technology, Kanpur	2007.6.1 – 2009.3.31	Application of Smart Polymers and Functional Materials to Tissue Engineering and Regenerative Medicine
2007	Joint Research Project	KANETOU Keiichi	Professor, Kyushu Institute of Technology	Bansi Dhar MALHOTRA	Scientist-F, National Physical Laboratory, New Delhi	2007.6.1 – 2009.3.31	Application of New Functional Conducting Polymers in Biosensors and Nanoelectronics

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FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2007	Joint Research Project	ONODA Mitsuyoshi	Professor, University of Hyogo	Pramod Kumar BHATNAGAR	Professor, University of Delhi South Campus	2007.6.1 – 2009.3.31	Development and Characterization of DNS based Bio White Polymer Light Emitting Diode by Harvesting Snglet and Triplet Excitons
2007	Joint Research Project	TAURA Toshiharu	Professor, Kobe University	Amaresh CHAKRABARTI	Associate Professor, Indian Institute of Science	2007.6.1 – 2009.3.31	Creative Design System based on Physical Law Knowledge and Biomimetic Database
2007	Joint Research Project	YAMASHITA Hiromi	Professor, Osaka University	Srinivasan NATARAJAN	Associate Professor, Indian Institute of Science	2007.6.1 – 2009.3.31	Development of hydrophobic titanium oxide porous photocatalysts for the decomposition of organic pollutants
2007	Joint Research Project	MUKAI Yasuhiko	Professor, Osaka Kyoiku University	Harinder Kumar CHAUDHARY	Associate Professor, CSK HP Agricultural University	2007.6.1 – 2009.3.31	Dynamics of molecular cytogenetic approach for the resolution of genetic mechanism of chromosome elimination process of haploid induction and mapping of the targeted alien introgressions in wheat
2007	Joint Research Project	NAKAMOTO Hitoshi	Associate Professor, Saitama University	Lal Chand RAI	Professor, Banaras Hindu University	2007.6.1 – 2009.3.31	Role of Dps in abiotic stress management in cyanobacteria
2007	Joint Research Project	SHIMADA Tooru	Professor, The University of Tokyo	Javaregowda NAGARAJU	Staff Scientist and Group leader, Centre for DNA Fingerprinting and Diagnostics	2007.6.1 – 2009.3.31	Comparative genomics of wild silkmoths
2007	Joint Research Project	TAKAFUJI Makoto	Associate Professor, Kumamoto University	Nalam Madhusudhana RAO	Scientist, Deputy Director, Center for Cellular and Molecular Biology	2007.6.1 – 2009.3.31	Self-assembling oligopeptide lipids for nucleic acid delivery
2007	Joint Research Project	YAMAKAWA Kazuhiro	Laboratory Head, RIKEN	Subramaniam GANESH	Associate Professor, Indian Institute of Technology	2007.6.1 – 2009.3.31	Molecular pathology in Lafora's disease: Defining the cellular functions of laforin phosphatase
2007	Joint Research Project	KANDA Nobuyuki	Professor, Osaka City University	Sanjeev Vishnu DHURANDHAR	Professor, Inter University Centre for Astronomy and Astrophysics	2007.6.1 – 2009.3.31	Gravitational Wave Data Analysis for TAMA
2007	Joint Research Project	MUKAI Tadashi	Professor, Kobe University	Ranjan GUPTA	Associate Professor, Inter University Center for Astronomy and Astrophysics	2007.6.1 – 2009.3.31	Light Scattering by Irregular Shaped Particles
2007	Joint Research Project	NOJIRI Shinichi	Professor, Nagoya University	Mohammad SAMI	Reader, Jamia Milia Islamia	2007.6.1 – 2009.3.31	Particle physics models of inflation and dark energy and their observational constraints
2007	Joint Seminar	ENOKI Toshiaki	Professor, Tokyo Institute of Technology	Suresh DAS	Professor, Regional Research Laboratory	2008.1.20 – 2008.1.22	Recent Trends in Molecular Materials Research
2007	Joint Seminar	FUJIMORI Atsushi	Professor, The University of Tokyo	Dipankar Das SARMA	Professor, Indian Association for Cultivation of Science	2008.2.4 – 2008.2.6	New directions in ferroics and multiferroics
2007	Joint Seminar	SUZUKI Atsushi	Professor, Yokohama National University	Chintamani Nagesa Ramachandra RAO	Honorary President, Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)	2007.9.5 – 2007.9.7	Strategy of Sustainable Materials Development to Save Humankind
2007	Joint Seminar	SAKUDA Makoto	Professor, Okayama University	Naba K MONDAL	Professor, Tata Institute of Fundamental Research	2007.8.6 – 2007.8.11	The 9th International Workshop on Neutrino Factories and Super Beams
2007	Joint Research Project	SATAKE Kenji	Deputy Director, National Institute of Advanced Industrial Science and Technology (AIST)	Javed Noormohamed MALIK	Assistant Professor, Indian Institute of Technology Kanpur	2007.6.1 – 2009.3.31	Paleoseismological investigations in Andaman Islands
2007	Joint Research Project	SATO Haruo	Professor, Tohoku University	Jayant Nath TRIPATHI	Reader in Geophysics, University of Allahabad	2007.6.1 – 2009.3.31	Study of lithospheric heterogeneity based on the envelope analysis of short period seismograms
2007	Joint Research Project	SHAW Rajib	Associate Professor, Kyoto University	Ramasamy KRISHNAMOORTHY	Senior Lecturer, UNIVERSITY OF MADRAS	2007.6.1 – 2009.3.31	Community Based Coastal Zone Management:Towards Pro-active Risk Communication Strategy for Effective Tsunami Mitigation in the Coastal Areas of India
2007	Joint Research Project	SUGIYAMA Yuichi	Director of the Active Fault Research Center, AIST	George PHILIP	Scientist-E, Wadia Institute of Himalayan Geology, DST	2007.6.1 – 2009.3.31	Study on detailed active fault information for seismic hazard evaluation in seismic gaps of inland large earthquakes
2008	Joint Research Project	ARAI Masahiko	Professor, Hokkaido University	Bhalchandra Mahadeo BHANAGE	Professor, Mumbai University	2008.6.1 – 2010.3.31	Production of Liquid Fuels by Selective FT Synthesis with Novel Mesoporous Smectite Catalysts
2008	Joint Research Project	IWAOKA Michio	Professor, Tokai University	K Indira PRIYADARSINI	Scientific Officer-G, Bhabha Atomic Research Centre	2008.10.1 – 2010.3.31	Redox reactions of water-soluble selenides, selenoamino acids, and the sugar conjugates: Their applications as GPx mimics
2008	Joint Research Project	OHTA Nobuhiro	Professor, Hokkaido University	Biswanath MALLIK	Professor, Indian Association for the Cultivation of Science	2008.6.1 – 2010.3.31	Electric field effects on optical properties of metal nanoclusters
2008	Joint Research Project	FUJIMORI Atsushi	Professor, The University of Tokyo	Dipankar Das SARMA	Director, Professor, Indian Association for the Cultivation of Science	2008.6.1 – 2010.1.31	Novel magnetic oxide nano-materials investigated by spectroscopy and ab-initio theories
2008	Joint Research Project	HAYAKAWA Kunio	Associate Professor, Shizuoka University	Nallagundla Venkata REDDY	Associate Professor, Indian Institute of Technology Kanpur	2008.6.1 – 2010.3.31	Forming and Fabrication of Ultra Thin Wire using Shape Memory Metal Alloy
2008	Joint Research Project	IWAI Hiroshi	Professor, Tokyo Institute of Technology	Chandan Kumar SARKAR	Professor, Jadavpur University	2008.6.1 – 2010.3.31	NANO SCALE MOSFET's- Scalability Issues and Potential di-electrics
2008	Joint Research Project	KOYAMA Kiyohito	Vice-President, Yamagata University	Kinsuk NASKAR	Assistant Professor, Indian Institute of Technology, Kharagpur	2008.6.1 – 2010.3.31	Rheological behaviour of Nanocomposites based on biodegradable polymer with special referece to Fourier transform rheology
2008	Joint Research Project	MUROMACHI Eiji	Group Leader, National Institute for Materials Science	Veerpal Singh AWANA	SCIENTIST C, National Physical Laboratory	2008.6.1 – 2010.3.31	HPHT synthesis and characterization of new novel physical property materials
2008	Joint Research Project	OKADA Tatsuo	Professor, Kyushu University	Rao Sri Ramachandra MAMIDANNA	Professor, Indian Institute of Technology (IIT) Madras	2008.6.1 – 2010.3.31	Development of light emitting devices based on zinc oxide nanowires and heterostructures
2008	Joint Research Project	TOYODA Shin	Professor, Okayama University of Science	Harish BAHADUR	Scientist F, National Physical Laboratory	2008.6.1 – 2010.3.31	Study of defect centers in nano-piezoelectric materials for applications in sensors

FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2008	Joint Research Project	EZAKI Bunichi	Associate Professor, Okayama University	Bhumi Nath TRIPATHI	Lecturer, Banasthali Vidyapith	2008. 6. 1 – 2010. 3. 31	Isolation and characterization of high tolerant genes from useful plants against metal stresses and oxidative stresses
2008	Joint Research Project	FUKUI Hiroyuki	Professor, University of Tokushima	Pulok Kumar MUKHERJEE	Director, Jadavpur University	2008. 6. 1 – 2010. 3. 31	Development of therapeutics for allergic diseases from Ayurvedic medicines
2008	Joint Research Project	HABARA Yoshiaki	Professor, Hokkaido University	Govindaraju ARCHUNAN	Reader, Bharathidasan University	2008. 6. 1 – 2010. 3. 31	Bioactivity of pheromonal compounds and their effect on cytosolic Ca2+ dynamics in rat olfactory system
2008	Joint Research Project	IBARAKI Yasuomi	Associate Professor, Yamaguchi University	Snehasish DUTTA GUPTA	Associate Professor, Indian Institute of Technology	2008. 6. 1 – 2010. 3. 31	Imaging Photosynthesis of Micropropagated Plants
2008	Joint Research Project	KUMAR Penmetcha	Senior Researcher, National Institute of Advanced Industrial Science and Technology (AIST)	Kailash Chand GUPTA	Director, Institute of Genomics and Integrative Biology	2008. 6. 1 – 2010. 3. 31	Synthesis and immobilization of stable aptamers on the disc surfaces for their applications in medical diagnosis
2008	Joint Research Project	KUSANO Tomonobu	Professor, Tohoku University	Arumugam M PILLAI	Assistant Professor, Tamil Nadu Agricultural University	2008. 6. 1 – 2010. 3. 31	Generation of plants resistant to biotic and abiotic stresses through modulation of the polyamine metabolism: molecular basis and application
2008	Joint Research Project	NAKAJIMA Toshiaki	Associate Professor, University of Tsukuba	N.R. KAMINI	Scientist, Central Leather Research Institute	2008. 6. 1 – 2010. 3. 31	Molecular engineering of Aspergillus niger lipase for hydrolysis of biodegradable plastics
2008	Joint Research Project	OKADA Masaji	General Director, National Hospital Organization Kinki-chuo Chest Medical Center (Clinical Research Center)	Saudan SINGH	Professor, Vardhman Mahavir Medical College, Safdarjung Hospital	2008. 6. 1 – 2010. 3. 31	Study of Mycobacterium tuberculosis using population-based genotyping, novel diagnostic method and therapeutic method
2008	Joint Research Project	SUZUKI Iwane	Assistant professor, University of Tsukuba	Sisinty SHIVAJI	Director-grade scientist, Centre for Cellular and Molecular Biology	2008. 6. 1 – 2010. 3. 31	Identification of molecular mechanisms for signal perception by a multi-stress sensor Hik33 in Synechocystis sp. PCC6803.
2008	Joint Research Project	SUZUKI Takayoshi	Section Chief, National Institute of Health Sciences	Palanisamy RAJAGURU	Assistant Professor, Bharathidasan Institute of Technology, Bharathidasan University	2008. 6. 1 – 2010. 3. 31	Screening and characterization of active constituents from an antidiabetic plant Gymnema montanum and its pharmacological evaluation using genomic and proteomic approach
2008	Joint Research Project	TOMITA Hiroshi	Associate Professor, Tohoku University	Taraprasad DAS	Director, L V Prasad Eye Institute, Bhubaneswar, India.	2008. 6. 1 – 2010. 3. 31	Recovery of vision with photosensitive proton channel gene (Chop2) for retinitis pigmentosa
2008	Joint Research Project	TOMOOKA Norihiko	Senior Researcher, National Institute of Agrobiological Sciences	Pawan JAIWAL	Professor, Maharshi Dayanand University	2008. 6. 1 – 2010. 3. 31	Development of stress resistant legumes for a sustainable agricultural production and nutrition: Use of molecular markers for identification of resistance genes
2008	Joint Research Project	KUNIEDA Hideyo	Professor, Nagoya University	Kulinder Pal SINGH	Professor, Tata Institute of Fundamental Research	2008. 6. 1 – 2010. 3. 31	X-ray astronomy with Indian and Japanese satellites
2008	Joint Research Project	OGURA Katsuo	Professor, Kokugakuin University	Anil Kumar PANDEY	Scientist D, Aryabhatta Research Institute of Observational Sciences	2008. 6. 1 – 2010. 3. 31	Photometric Studies of Very Young Open Clusters Associated with HII Regions
2008	Joint Seminar	HASEGAWA Tetsuya	Professor, The University of Tokyo	Chintamani Nagesa RAO	Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2008. 6. 9 – 2008. 6. 11	Novel magnetic ordering in nanostructured materials
2008	Joint Seminar	TOMINAGA Keisuke	Professor, Kobe University	Kankan BHATTACHARRYA	Professor, Indian Association for the Cultivation of Science	2009. 1. 6 – 2009. 1. 9	Recent Progress in Spectroscopy and Theory in Chemistry
2009	Joint Research Project	FUJIWARA Masahiro	Senior Research Scientist, AIST	Asim BHAUMIK	Associate Professor, Indian Association for the Cultivation of Science	2009. 6. 1 – 2011. 3. 31	Applications of mesoporous zeolitic materials to catalysis
2009	Joint Research Project	HASEGAWA Tetsuya	Professor, The University of Tokyo	Satyaban BHUNIA	Reader Scientist, Saha Institute of Nuclear Physics	2009. 6. 1 – 2011. 3. 31	Novel semiconductor and magnetic properties in nano-structured materials
2009	Joint Research Project	KOMURA Kenichi	Assistant Professor, Gifu University	Mannepalli Lakshmi KANTAM	Scientist F& Head, Indian Institute of Chemical Technology	2009. 6. 1 – 2011. 3. 31	Green Chemical Processes by Using Solid Catalysts
2009	Joint Research Project	DOMEN Kazunori	Professor, The University of Tokyo	Kulamani PARIDA	Scientist- G& Head, Institute of Minerals & Materials Technology	2009. 6. 1 – 2011. 3. 31	Design and development of visible light driven layered materials for photo decomposition of water
2009	Joint Research Project	NOZAKI Shinji	Professor, The University of Electro-Communications	Surendra Nath SAHU	Professor, Institute of Physics	2009. 6. 1 – 2011. 3. 31	ZnO nanorods for glucose and DNA biosensor applications
2009	Joint Research Project	YOKOGAWA Yoshiyuki	Professor, Osaka City University	Hari Krishna P.R. VARMA	Scientist in charge of Bioceramics, Sree Chitra Tirunal Institute for Medical Sciences and Technology	2009. 6. 1 – 2011. 3. 31	Synthesis and Biological evaluation of Inorganic – Organic Composites for Encapsulation of Bioactivity Substances
2009	Joint Research Project	HIGASHIYAMA Tetsuya	Professor, Nagoya University	Baskar RAMAMURTHY	Assistant Professor, Indian Insitute of Technology-Madras	2009. 6. 1 – 2011. 3. 31	Live Cell Analysis of Plant Reproductive Barriers
2009	Joint Research Project	IMAI Hiroshi	Professor, Kyoto University	Sandeep GOEL	Scientist Grade IV (1), Centre for Cellular and Molecular Biology	2009. 6. 1 – 2011. 3. 31	Preservation of endangered species and genetic resources by animal biotechnology
2009	Joint Research Project	ISOBE Sachiko	Senior Research Scientist, Kazusa DNA Research Institute	Sharma TILAK	Associate Professor, CSK Himachal Pradesh Agricultural University,	2009. 6. 1 – 2011. 3. 31	Development of high precision QTL detection approach for outcrossing species using red clover AILs
2009	Joint Research Project	KADONO Keiko	Chief researcher, National Institute of Agrobiological Sciences	Sivaramakurup SREEKUMAR	Scientist C, Central Sericultural Research and Training Institute	2009. 6. 1 – 2011. 3. 31	Identification of cDNA markers linked to genes controlling nonsusceptibility to BmNPV in the mulberry silkworm, Bombyx mori
2009	Joint Research Project	KAWASAKI Takashi	Research Scientist, AIST	Tulasi SATYANARAYANA	Professor, University of Delhi	2009. 6. 1 – 2011. 3. 31	Identification of novel carbohydrate metabolic enzymes from both Japanese and Indian thermal-environment with environmental genomics technique and their application
2009	Joint Research Project	KIMURA Akinori	Professor, Tokyo Medical and Dental University	Narinder K. MEHRA	Professor, All India Institute of Medical Sciences	2009. 6. 1 – 2011. 3. 31	Evolutional Medical Science: Identification of HIV/AIDS-related genes to develop therapeutic and preventive strategies

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FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2009	Joint Research Project	KOYAMA Hiroyuki	Professor, Gifu University	Sanjib Kumar PANDA	Reader, Assam University	2009.6.1 – 2011.3.31	Amino Acid Polymorphisms in Conserved Motifs in HMA Proteins and Heavy Metal Resistance in Plants
2009	Joint Research Project	MIYASHITA Kazuo	Professor, Hokkaido University	Sachindra Manjabhat NAKKARIKE	Scientist, Central Food Technological Research Institute	2009.6.1 – 2011.3.31	Bioactive molecules from seaweeds: Antioxidative, antimicrobial, antihypertensive and anticancerous properties of polyphenols and polysaccharides
2009	Joint Research Project	NISHIMURA Shinichiro	Professor, Hokkaido University	Kanchugarakoppal Subbegowda RANGAPPA	Professor and Director, University of Mysore	2009.6.1 – 2011.3.31	Synthesis, method development and the biological implications for glycoconjugate-based drugs: A new perspective study towards the green chemistry.
2009	Joint Research Project	NUKINA Nobuyuki	Group Director, RIKEN	Nihar Ranjan JANA	Associate Professor, National Brain Research Center	2009.6.1 – 2011.3.31	Understanding the role of ubiquitin proteasome system dysfunction in the pathogenesis of Huntington's disease
2009	Joint Research Project	TANAKA Ayumi	Professor, Hokkaido University	Baishnab C TRIPATHY	Professor, Jawaharlal Nehru University	2009.6.1 – 2011.3.31	Genetic Transformation for Efficient Utilization of Solar Energy at Low Light Intensity
2009	Joint Research Project	KANDA Nobuyuki	Professor, Osaka City University	Sanjeev Vishnu DHURANDHAR	Professor, Inter University Centre for Astronomy and Astrophysics	2009.6.1 – 2011.3.31	Study on gravitational wave detection using LCGT and advanced detectors : radiometric search, coincidence and coherent detection
2009	Joint Research Project	TSUJIKAWA Shinji	Associate Professor, Tokyo University of Science	Mohammad SAMI	Professor, Jamia Millia Islamia	2009.6.1 – 2011.3.31	Towards understanding origins of dark energy, dark matter and inflation
2009	Joint Research Project	YUASA Manabu	Professor, Kindai University	Mrinal Kanti DAS	Reader, University of Delhi	2009.6.1 – 2011.3.31	Numerical Exploration of Orbits in Binary Stellar Systems
2009	Joint Seminar	ANDO Tsuneya	Professor, Tokyo Institute of Technology	Swapan Kumar PATI	Associate Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2009.11.17 – 2009.11.19	DST/JSPS Workshop on Physics and Chemistry of Graphene
2009	Joint Seminar	KANETOU Keiichi	Professor, Kyushu Institute of Technology	Bansi Dhar MALHOTRA	Scientist G and Head, National Physical Laboratory	2009.12.17 – 2009.12.20	India-Japan Workshop on Bioelectronics and Organic Nanotechnology for Environment Preservation
2010	Joint Research Project	MURATA Keizo	Professor, Osaka City University	Arumugam SONACHALAM	Professor, BHARATHIDASAN UNIVERSITY	2010.6.1 – 2012.3.31	Investigation of Organic Conductors under Extreme conditions of High Pressure, Low Temperature and High Magnetic Field
2010	Joint Research Project	SAITO Shinji	Professor, National Institutes of Natural Sciences	Biman BAGCHI	Professor, Indian Institute of Science	2010.6.1 – 2012.3.31	Structure and Dynamics of Water and Aqueous Solutions: Theory and Experiment
2010	Joint Research Project	SHIRAI Masayuki	Team Leader, National Institute of Advanced Industrial Science and Technology	Chandrashekhar Vasant RODE	Scientist, National Chemical Laboratory	2010.6.1 – 2012.3.31	Production of Platform Chemicals from Biomass: Sustainable Processes using Cobalt Containing Mesoporous Catalysts
2010	Joint Research Project	TAKEUCHI Masayuki	Group Leader, National Institute for Materials Science	Ajayaghosh AYYAPPANPILLAI	Scientist F, Photosciences and Photonics Group, National Institute for Interdisciplinary Science and Technology (NIIST)	2010.6.1 – 2012.3.31	Polychromopholic Supuramolecular Assemblies of Conjugated Oligomers and Polymers for the Detection of Gaseous Molecules
2010	Joint Research Project	TOMITORI Masahiko	Professor, Japan Advanced Institute of Science and Technology	Zubaida Mohammed Amin ANSARI	Associate Professor, Jamia Millia Islamia (Central University)	2010.6.1 – 2012.3.31	Surface study of submolecular covered functional materials using atom-molecular tailored AFM tips
2010	Joint Research Project	HATA Satoshi	Associate Professor, Kyushu University	Ulhas D. KULKARNI	Scientific officer, Bhabha Atomic Research Centre	2010.6.1 – 2012.3.31	Development and studies related to ordered alloys and intermetallics for novel applications
2010	Joint Research Project	HAYAKAWA Yasuhiro	Professor, Shizuoka University	Babu Moorthy SRIDHARAN	Professor, Anna University	2010.6.1 – 2012.3.31	Growth of homogeneous Si1-xGex alloy semiconductor for thermoelectric application
2010	Joint Research Project	ICHIKI Takanori	Associate Professor, The University of Tokyo	Ashok KUMAR	Professor, University of Rajasthan	2010.6.1 – 2012.3.31	On-chip cell analysis to study cancer preventive phytochemicals in Indian herbal plant extracts
2010	Joint Research Project	KUROIWA Yoshihiro	Professor, Hiroshima University	Dhananjai PANDEY	Professor, Banaras Hindu University	2010.6.1 – 2012.3.31	Phase Transitions Studies on Multiferroic Solid Solutions and Visualization of Electron Polarization
2010	Joint Research Project	SOGA Tetsuo	Professor, Nagoya Institute of Technology	Avinashi KAPOOR	Professor, University of Delhi	2010.6.1 – 2012.3.31	Quantum-dot sensitized solar cells based on nanostructured zinc oxide
2010	Joint Research Project	WARISAWA Shinichi	Associate Professor, The University of Tokyo	Puneet TANDON	Professor, PDPM- Indian Institute of Information Technology	2010.6.1 – 2012.3.31	Development of a micro pump with NEMS sensing function for an automatic blood collecting and measurement system
2010	Joint Research Project	IGARASHI Kazuhiko	Professor, Tohoku University	Tapas KUNDU	Associate Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2010.6.1 – 2012.3.31	Stem cell differentiation: role of SAM biosynthesis, arginine methylation, and p53
2010	Joint Research Project	KAMIHIRA Masamichi	Professor, Kyushu University	Ashok KUMAR	Associate Professor, Indian Institute of Technology, Kanpur	2010.6.1 – 2012.3.31	Development of a bioartificial liver support system
2010	Joint Research Project	MUKAI Yasuhiko	Professor, Osaka Kyoiku University	Umesh Chandra LAVANIA	Scientist-G, Central Institute of Medicinal and Aromatic Plants, Lucknow	2010.6.1 – 2012.3.31	Molecular basis of autopolyploid stability and its application
2010	Joint Research Project	ONODERA Takeshi	Assistant Professor, Kyushu University	Praveen SINGH	Senior Scientist, Indian Veterinary Research Institute, Izatnagar	2010.6.1 – 2012.3.31	Development of biosensor surfaces for pathogen specific proteins
2010	Joint Research Project	SHIMADA Tooru	Professor, The University of Tokyo	Javare Gowda NAGARAJU	Staff Scientist and Chief, Centre for DNA Fingerprinting and Diagnostics	2010.6.1 – 2012.3.31	Sex chromosomes and sex determination in silkmoths
2010	Joint Research Project	TAKABE Teruhiro	Professor, Meijo University	Vandna RAI	Senior Scientist, Directorate of Rice Research	2010.6.1 – 2012.3.31	Metabolic engineering of choline precursors and its application to construct abiotic stress tolerant plants
2010	Joint Research Project	WAKITA Takaji	Director, National Institute of Infectious Diseases	Shiv Kumar SARIN	Director, Professor and Head, G. B. Pant Hospital	2010.6.1 – 2012.3.31	Detection of Hepatitis B Virus by LAMP method and its application
2010	Joint Research Project	ITO Youichi	Associate Professor, Kobe University	Ranjan GUPTA	Full Professor, Inter University Center for Astronomy and Astrophysics	2010.6.1 – 2012.3.31	Study of Astrophysical Dust in Star Forming Regions, Interstellar Medium, and Planetary Bodies

FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2010	Joint Research Project	NOMOTO Kenichi	Project Professor, The University of Tokyo	Anupama GADIYARA CHAKRAPANI	Associate Professor, Indian Institute of Astrophysics	2010.6.1 – 2012.3.31	Properties of Supernovae in the Nearby Universe
2010	Joint Seminar	TOMINAGA Keisuke	Professor, Kobe University	Kankan BHATTACHA-RYYA	Professor, Indian Association for the Cultivation of Science	2010.9.26 – 2010.9.29	New Frontiers of Molecular Spectroscopy; from Gas Phase to Proteins
2010	Joint Seminar	FUJIMORI Atsushi	Professor, The University of Tokyo	Dipankar Das SARMA	Professor, Indian Institute of Science	2011.1.31 – 2011.2.2	Electronic structure of novel magnetic and superconducting materials
2010	Joint Seminar	SHIMAMOTO Nobuo	Professor, Kyoto Sangyo University	Dipankar CHATTERJI	Professor, Indian Institute of Science	2010.7.1 – 2010.7.2	India-Japan Symposium of Transcription
2011	Joint Research Project	ARATONO Makoto	Professor, Kyushu University	Surinder Kumar MEHTA	Professor, Panjab University	2011.6.1 – 2013.3.31	Structure studies of electric double layer of organized amphiphile films using total reflection XAFS
2011	Joint Research Project	IWATA Kouichi	Professor, Gakushuin University	Siva UMAPATHY	Professor, Indian Institute of Science	2011.6.1 – 2013.3.31	Examination of carrier dynamics in organic materials with advanced spectroscopic methods
2011	Joint Research Project	KAWAI Akio	Associate Professor, Tokyo Institute of Technology	Anunay SAMANTA	Professor, University of Hyderabad	2011.6.1 – 2013.3.31	Gas Phase Electronic Spectroscopic Study of the Ionic Liquids
2011	Joint Research Project	NAKAHARA Akio	Associate Professor, Nihon University	Sujata TARAFDAR	Professor, Jadavpur University	2011.6.1 – 2013.3.31	Effect of competing mechanical and electro-magnetic perturbation on formation of surface cracks
2011	Joint Research Project	WADHWA Renu	Leader Group, National Institute of Advanced Industrial Science and Technology	Kanagaraj SEKAR	Principal Research Scientist, Indian Institute of Science	2011.6.1 – 2013.3.31	Solid state structural studies on withanolides to unravel the molecular mechanism of their anti-cancer and anti-aging activities in human cells
2011	Joint Research Project	AMEKURA Hiroshi	Senior Researcher, National Institute for Materials Science	Devesh Kumar AVASTHI	Scientist 'H' (Leader), Inter University Accelerator Centre	2011.6.1 – 2013.3.31	Engineering the shape and the properties of nanoparticles by swift heavy ions
2011	Joint Research Project	IWAMOTO Mitsumasa	Professor, Tokyo Institute of Technology	Devendra KUMAR	Associate Professor, Delhi Technological University	2011.6.1 – 2013.3.31	Investigation on organic electrode materials for polymer electronics using EFIS HG
2011	Joint Research Project	KANETOU Keiichi	Professor, Kyushu Institute of Technology	Rajiv PRAKASH	Associate Professor and Coodinator, Banaras Hindu University	2011.6.1 – 2013.3.31	Morphology control of organic materials for high performance nanobio and electronics devices
2011	Joint Research Project	TSUJI Nobuhiro	Professor, Kyoto University	Pinaki Prasad BHATTACHARJEE	Assistant Professor, Indian Institute of Technology, Hyderabad	2011.6.1 – 2013.3.31	Effect of static recovery on yielding and work-hardening behavior of bulk nanostruc-tured Al-Mg-Sc/Zr alloys
2011	Joint Research Project	WAKAHARA Akihiro	Professor, Toyohashi University of Technology	Pramor Kumar BHAT-NAGAR	Professor, University of Delhi	2011.6.1 – 2013.3.31	Fabrication and Characterization of Ultraviolet Light Emitting Diodes based on Heterojunctions of Electrochemically grown n-ZnO nanorods and p-type Organic Mate-rials
2011	Joint Research Project	YOSHINO Masahiko	Professor, Tokyo Institute of Technology	Aravindan SIVANAN-DAM	Assistant Professor, Indian Institute of Technology, Delhi	2011.6.1 – 2013.3.31	New nano fabrication process for functional surface/functional material development
2011	Joint Research Project	FUJII Noriko	Professor, Kyoto University	Kumarasamy ANBARASU	Assistant Professor, Bharathidasan University	2011.6.1 – 2013.3.31	Towards to clarify the appearance of the cataract—The study of new method of protein-protein interaction in the lens.
2011	Joint Research Project	HIRATA Takashi	Professor, Kyoto University	V BASKARAN	Scientist, E-II, Central Food Technologi-cal Research Institute	2011.6.1 – 2013.3.31	FOOD AND PHARMACEUTICAL APPLICA-TIONS OF CAROTENOIDS AND THEIR METABOLITES WITH REFERENCE TO THEIR BIOFUNCTIONALITY
2011	Joint Research Project	KUCHITSU Kazuyuki	Professor, Tokyo University of Science	Agepati S. RAGHAVENDRA	Professor, University of Hyderabad	2011.6.1 – 2013.3.31	Cell Type Specificity of Dynamic Signaling Network for Pathogen Recognition in Plants.
2011	Joint Research Project	MIHARA Hisaaki	Associate Professor, Ritsumeikan University	Tejo N. PRAKASH	Associate Professor, Thapar University	2011.6.1 – 2013.3.31	Molecular mechanism of selenate reduction by microorganisms and its application to development of selenium-recovery system
2011	Joint Research Project	NOZAKI Tomoyoshi	Director, National Institute of Infectious Diseases	Vahab ALI	Senior Scientist, Rajendra Memorial Research Institute of Medical Sciences	2011.6.1 – 2013.3.31	Structural and functional analysis of multiple isotypes of iron sulfur cluster-containing proteins
2011	Joint Research Project	OCHIYA Takahiro	Head, National Cancer Center	Vijay KUMAR	Staff Research Scientist, International center for Genetic engineering and Biotechnology	2011.6.1 – 2013.3.31	Studies on the role of liver-secreted exosomes as mediator of Hepatitis B virus-induced hepatocellular carcinoma
2011	Joint Research Project	SHIMADA Masayuki	Associate Professor, Hiroshima University	Parameswara P.S GUPTA	Senior Scientist, National Institute of Animal Nutrition and Physiology	2011.6.1 – 2013.3.31	Growth factors in small oocyte develop-ment: Proteomic and genomic approaches
2011	Joint Research Project	SUZUKI Iwane	Associate Professor, University of Tsukuba	Jogadhenu Syama Sundar PRAKASH	Assistant Professor, University of Hyder-abad	2011.6.1 – 2013.3.31	Prediction and validation of regulatory networks in the cyanobacterium Synechocystis sp. PCC 6803 by comparative genomics approach
2011	Joint Research Project	TAMARU Teruya	Senior Assistant Professor, Toho University	Durga Prasad MISHRA	Scientist and Group leader, CENTRAL DRUG RESEARCH INSTITUTE	2011.6.1 – 2013.3.31	Role of circadian modifications in cancers progression
2011	Joint Research Project	YAMANAKA Koji	Laboratory Head, RIKEN	Amit Kumar MISHRA	Assistant Professor, Indian Institute of Technology Rajasthan	2011.6.1 – 2013.3.31	Identification, Assessment and Character-ization of E3 Ubiquitin Ligases and Molecu-lar Chaperones Implicated in Neurodegen-erative diseases
2011	Joint Research Project	TAGOSHI Hideyuki	Assistant Professor, Osaka University	Archana Arun PAI	Assistant Professor, Indian Institute of Science Education and Research, Trivandrum	2011.6.1 – 2013.3.31	Coherent multi-detector gravitational wave search using LCGT and advanced interfer-ometers
2011	Joint Seminar	ONODA Mitsuyoshi	Professor, University of Hyogo	Bansi Dhar MALHOTRA	Scientist G and Head, National Physical Laboratory	2011.12.7 – 2011.12.10	India-Japan Workshop on Bioelectronics and Organic Nanotechnology for Environment Preservation
2011	Joint Seminar	SAITO Riichiro	Professor, Tohoku University	Swapan K. PATI	Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2012.2.29 – 2012.3.2	JSPS-DST Workshop on Graphene and Related Materials
2012	Joint Research Project	FUKUOKA Atsushi	Professor, Hokkaido University	Paresh Laxmikant DHEPE	Scientist, National Chemical Laboratory	2012.6.1 – 2014.3.31	Catalytic transformation of biomass-derived sugars to renewable chemicals

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FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2012	Joint Research Project	IWAOKA Michio	Professor, Tokai University	K Indira PRIYADARSINI	Scientific Officer H, Head of Radiation Chemistry Section, Bhabha Atomic Research Centre	2012.6.1 – 2014.3.31	Development of New Selenium-Based Antioxidants
2012	Joint Research Project	TERAOKA Yasutake	Professor, Kyushu University	Nitin Kumar LABHSETWAR	Principal Scientist, National Environmental Engineering Research Institute (CSIR-NEERI)	2012.6.1 – 2014.3.31	Catalysing Soot-NOx Reaction without Precious Metals: Mixed Oxide Catalysts for Diesel Exhaust Emission Control
2012	Joint Research Project	HAYAKAWA Yasuhiro	Professor, Shizuoka University	Moorthy Babu SRIDHARAN	Professor, Anna University	2012.6.1 – 2014.3.31	Fabrication of Tandem Structured Thermoelectric Devices using SiGe Related Alloy Semiconductors
2012	Joint Research Project	KAWASAKI Shinji	Professor, Nagoya Institute of Technology	Indrajit MUKHOPADHYAY	Associate Professor, Pandit Deendayal Petroleum University	2012.6.1 – 2014.3.31	Development of new anode materials for next generation Li ion batteries by electrodeposition of Si on the inner-surface of nanospace carbon
2012	Joint Research Project	KUMAR Sakthi	Professor, Toyo University	R. S. JAYASREE	Scientist D, Sree Chitra Tirunal Institute for Medical Sciences and Technology	2012.6.1 – 2014.3.31	Quantum dot conjugated single walled carbon nanotubes for imaging and therapy
2012	Joint Research Project	TAKAHASHI Susumu	Professor, Nihon University	Janakarajan RAMKUMAR	Associate Professor, Indian Institute of Technology Kanpur	2012.6.1 – 2014.3.31	Utilization of wasted groundnut shell for the development of natural polymeric composites and their mechanical properties, drilling and tribological studies
2012	Joint Research Project	TAKEGAI Tsuyoshi	Associate Professor, The University of Tokyo	Satyajit BANERJEE	Associate Professor, Indian Institute of Technology, Kanpur	2012.6.1 – 2014.3.31	Vortex dynamics and enhancement of critical current in iron pnictides and cuprate superconductors by introducing nanopatterned pins
2012	Joint Research Project	TANAKA Hidekazu	Professor, Osaka University	Saket ASTHANA	Assistant Professor, Indian Institute of Technology	2012.6.1 – 2014.3.31	Research on fabrication of self-organized oxide nanostructure for spintoronics device
2012	Joint Research Project	WAKITA Koichi	Professor, Chubu University	Sharon MAHESHWAR	Research Director, SICES Degree College, Ambarnath	2012.6.1 – 2014.3.31	Development of highly efficient solar cells by use of carbon thin film
2012	Joint Research Project	HANDA Hiroshi	Professor, Tokyo Institute of Technology	Shanthy SUNDARAM	Associate Professor, University of Allahabad	2012.6.1 – 2014.3.31	Elucidation of mechanism of action of withaferin A using highly functional affinity beads
2012	Joint Research Project	IMAI Takashi	Director, National Institute of Radiological Sciences	Kapaettu SATYAMOORTHY	Director, Manipal University	2012.6.1 – 2014.3.31	Population Based Human Genetic Variations and Impact on Radiation Effects
2012	Joint Research Project	IMURA Satoshi	Professor, National Institute of Polar Research	Shiv Mohan SINGH	Scientist, National Centre for Antarctic & Ocean Research	2012.6.1 – 2014.3.31	Diversity and bioprospecting of Antarctic mosses
2012	Joint Research Project	KANDORI Hideki	Professor, Nagoya Institute of Technology	Tushar Kanti MAITI	Assistant Professor, UNESCO Regional Institute	2012.6.1 – 2014.3.31	Ligand-induced activation mechanism of Adenosine 2A receptor by ATR-FTIR spectroscopy
2012	Joint Research Project	KOYAMA Hiroyuki	Professor, Gifu University	Sanjib K PANDA	Associate Professor, Assam University	2012.6.1 – 2014.3.31	Characterization of STOP1-transcriptional regulation in legume plants
2012	Joint Research Project	NAKAJIMA Toshiaki	Associate Professor, University of Tsukuba	Numbi Ramudu KAMINI	Scientist, Central Leather Research Institute	2012.6.1 – 2014.3.31	Microbial production of plastic degrading enzymes for polymer monomerization
2012	Joint Research Project	SHIMADA Tooru	Professor, The University of Tokyo	Javare Gowda NAGARAJU	Staff Scientist and Group Leader, Centre for DNA Fingerprinting and Diagnostics	2012.6.1 – 2014.3.31	Genetic and genomic basis of the evolution of bombycid and saturniid silkmoths
2012	Joint Research Project	UEDA Mayumi	Associate Professor, Doshisha University	Chitra KANNABIRAN	Scientist, L.V. Prasad Eye Institute (LVPEI).	2012.6.1 – 2014.3.31	Genetic Studies on Stevens Johnson Syndrome (SJS)
2012	Joint Research Project	YUKAWA Yasushi	Professor, Nagoya City University	Sanjay KAPOOR	Associate Professor, University of Delhi South Campus	2012.6.1 – 2014.3.31	Elucidation of mechanical basis of plant gene regulation for promotion of plant utilization
2012	Joint Research Project	EBIHARA Yusuke	Associate Professor, Kyoto University	Veenadhari BHASAKARA PANTULA	Associate Professor, Indian Institute of Geomagnetism	2012.6.1 – 2014.3.31	Empirical study on magnetospheric convection during magnetic storms and their effects on ionosphere using data from Indian and Japanese magnetic observatories
2012	Joint Research Project	NOMOTO Kenichi	Project Professor, The University of Tokyo	Anupama Chakrapani GADIYARA CHAKRAPANI	Professor, Indian Institute of Astrophysics	2012.6.1 – 2014.3.31	A Study of Supernovae in the Nearby Universe – Building Blocks for the High Redshift Universe
2012	Joint Seminar	TOMINAGA Keisuke	Professor, Kobe University	Anunay SAMANTA	Professor, University of Hyderabad	2012.11.20 – 2012.11.22	Advances in Spectroscopy and Microscopy: Fundamentals and Applications to Materials and Biology
2012	Joint Seminar	BIJU Vasudevan	Senior Researcher, National Institute of Advanced Industrial Science and Technology	Pradeep THALAPPIL	Professor, Indian Institute of Technology Madras	2012.10.15 – 2012.10.16	Japan-India Seminar on Supramolecular Nanomaterials for Energy Innovation
2012	Joint Seminar	FUJIMORI Atsushi	Professor, The University of Tokyo	Dipankar Das SARMA	Professor, Indian Institute of Science	2012.10.17 – 2012.10.19	New functionalities in electronic and magnetic materials
2013	Joint Research Project	KURODA Ryunosuke	Senior Researcher, National Institute of Advanced Industrial Science and Technology	Dipak Kumar PALIT	Scientific Officer (H-PR), Head, Bhabha Atomic Research Centre	2013.6.1 – 2015.3.31	Investigation of Hydration Dynamics of Proteins using Subpicosecond Electron Accelerator Based Time-Domain Terahertz and Femtosecond Laser Based Time-Resolved IR absorption Spectroscopic Techniques
2013	Joint Research Project	MURATA Keizo	Professor, Osaka City University	Sonachalam ARUMUGAM	Professor of Physics & Coordinator, Bharathidasan University	2013.6.1 – 2015.3.31	Pressure effect on the properties of organic conductors and pnictide superconductors
2013	Joint Research Project	SASAKI Takehiko	Associate Professor, The University of Tokyo	Bhalchandra Mahadeo BHANAGE	Professor, Institute of Chemical Technology	2013.6.1 – 2015.3.31	Development of CO or H2 insertion reactions using metal ion-containing immobilized ionic liquid catalysts
2013	Joint Research Project	HATA Satoshi	Associate professor, Kyushu University	Ashok Kumar ARYA	Scientific officer, Bhabha Atomic Research Centre	2013.6.1 – 2015.3.31	Characterization and development of materials for special applications
2013	Joint Research Project	KAWAI Tsuyoshi	Professor, Nara Institute of Science and Technology	George K THOMAS	Professor, Dean, Indian Institute of Science Education and Research-Thiruvananthapuram	2013.6.1 – 2015.3.31	Development of Enhanced CPL-Active Materials for Potential Application in Future Security Technology

FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2013	Joint Research Project	NODA Kei	Lecturer, Keio University	Shivaji Babaso SADALE	Assistant Professor, Shivaji University	2013. 6. 1 – 2015. 3. 31	Ultra fast solar hydrogen production using gas phase photocatalysis based on core-shell semiconductor nanostructures
2013	Joint Research Project	SUGIMURA Hiroyuki	Professor, Kyoto University	Om Prakash KHATRI	Sr. Scientist, Indian Institute of Petroleum	2013. 6. 1 – 2015. 3. 31	Graphene Thin Film Self-Assembled on Silicon: Chemical, Structural and Tribological Evolution
2013	Joint Research Project	IGARASHI Kazuhiko	Professor, Tohoku University	Tapas K KUNDU	Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2013. 6. 1 – 2015. 3. 31	Analysis of nuclear protein networks for the heterochromatin formation in plasma cells
2013	Joint Research Project	ISEKI Sachiko	Professor, Tokyo Medical and Dental University	Rangasamy JAYAKUMAR	Professor, Amrita Vishwa Vidyapeetham University	2013. 6. 1 – 2015. 3. 31	FGF-18 Loaded Chitin-PLGA/Nano Bioglass Ceramic Composite Microgels for Skull Bone Defects
2013	Joint Research Project	MIMURA Tetsuro	Professor, Kobe University	Shanti S. SHARMA	Professor, Himachal Pradesh University	2013. 6. 1 – 2015. 3. 31	The vacuolar dynamics in plant defense systems based on the post-genome analysis.
2013	Joint Research Project	MINAMI Yoshiko	Professor, Okayama University of Science	Bijaya Ketan SARANGI	Principal Scientist, National Environmental Engineering Research Institute	2013. 6. 1 – 2015. 3. 31	Cell engineering and molecular biological investigations on Indigofera tinctoria and Polygonum tinctorium plants for natural indigo dye production
2013	Joint Research Project	NAKANO Yumiko	Senior Research Scientist, National Institute of Infectious Diseases	Sunando DATTA	Assistant Professor, Indian Institute of Science Education and Research	2013. 6. 1 – 2015. 3. 31	Biological and structural analysis of specific membrane traffic in enteric protozoan parasite Entamoeba histolytica
2013	Joint Research Project	SHIMADA Tomohiro	Assistant Professor, Tokyo Institute of Technology	J GOWRISHANKAR	Director, Centre for DNA Fingerprinting & Diagnostics	2013. 6. 1 – 2015. 3. 31	Analysis of tuning regulation between DNA replication activity and amino acid homeostasis by transcription factor IciA
2013	Joint Research Project	TAKAHASHI Yuichiro	Professor, Okayama University	Rajagopal SUBRAMANYAM	Associate Professor, University of Hyderabad	2013. 6. 1 – 2015. 3. 31	Genetic engineering of reducing side of photosystem I protects from high light stress in Chlamydomonas reinhardtii: Evidences from biochemical and functional studies
2013	Joint Research Project	YAMAMOTO Kaneyoshi	Associate Professor, Hosei University	Dipankar CHATTERJI	Professor, Indian Institute of Science	2013. 6. 1 – 2015. 3. 31	Bacterial adaptation to environmental change in host infection.
2013	Joint Research Project	HIROSE Akira	Professor, The University of Tokyo	Gopalan VENKATARAMAN	Professor, Indian Institute of Technology (IIT), Bombay	2013. 6. 1 – 2015. 3. 31	Snow pack parameter estimation and mapping by using multi-frequency SAR polarimetry and interferometry
2013	Joint Research Project	HOKADA Tomokazu	Associate Professor, National Institute of Polar Research	Sajeev KRISHNAN	Assistant Professor, Indian Institute of Science	2013. 6. 1 – 2015. 3. 31	Geological linkage between southern India and Antarctica: A probe on crustal processes from Archaean to Proterozoic
2013	Joint Research Project	KOBAYASHI Naoto	Associate Professor, The University of Tokyo	Anil K. PANDEY	Professor (ARIES Scientific officer/ Scientist E), Aryabhatta Research Institute of Observational Sciences	2013. 6. 1 – 2015. 3. 31	Identifying Essential Mechanism in Star Formation Using Young Clusters in the Galaxy
2013	Joint Research Project	FUJITA Masahiro	Professor, The University of Tokyo	Maneesha V RAMESH	Associate Professor, Amrita Vishwa Vidyapeetham	2013. 6. 1 – 2015. 3. 31	SoC/embedded system design environment and its application to wireless and security area
2013	Joint Seminar	FUJIMORI Atsushi	Professor, The University of Tokyo	Dipankar Das SARMA	Professor, Indian Institute of Science	2014. 3. 24 – 2014. 3. 25	Physics and design of multi-functional correlated materials
2013	Joint Seminar	HAYASE Shuzi	Professor, Kyushu Institute of Technology	Bansi Dhar MALHOTRA	Professor, Delhi Technological University	2013. 12. 13 – 2013. 12. 15	India-Japan Workshop on Bioelectronics and Organic Nanotechnology for Environment Preservation
2013	Joint Seminar	TATAMI Junichi	Professor, Yokohama National University	Bikramjit BASU	Associate Professor, Indian Institute of Science	2013. 12. 16 – 2013. 12. 19	Nanotechnology based innovation on Advanced Materials for Environmental, Energy and Biomedical Applications
2013	Joint Seminar	SUZUKI Iwane	Professor, University of Tsukuba	Agepeti S. RAGHAVENDRA	Professor, University of Hyderabad	2013. 12. 15 – 2013. 12. 19	Signal transduction in photosynthetic organisms -From cyanobacteria to higher plants
2014	Joint Research Project	HORIKE Satoshi	Assistant Professor, Kyoto University	Maheswaran SHANMUGAM	Assistant Professor, Indian Institute of Technology Bombay	2014. 6. 1 – 2016. 3. 31	Activation of O2 molecules by porous coordination polymer and direct observation of its magnetic behavior
2014	Joint Research Project	MATSUSHITA Michio	Associate Professor, Nagoya University	Amlan J. PAL	Senior Professor, Indian Association for the Cultivation of Science	2014. 6. 1 – 2016. 3. 31	Control of assembly structures of spin-polarized organic molecules for molecular electronics and spintronics
2014	Joint Research Project	SHIRAI Masayuki	Team Leader, Iwate University	Chandrashekhar Vasant RODE	Senior Principal Scientist, National Chemical Laboratory	2014. 6. 1 – 2016. 3. 31	Multifunctional heterogeneous catalytic system for the production of GVL from biomass derived C5 molecules
2014	Joint Research Project	AMEYAMA Kei	Professor, Ritsumeikan University	Suhash Ranjan DEY	Assistant Professor, Indian Institute of Technology Hyderabad	2014. 6. 1 – 2016. 3. 31	Development of novel high strength harmonic Ti-Nb-Sn compositions for biomedical applications
2014	Joint Research Project	HIRAYAMA Tomoko	Professor, Doshisha University	Sujeet Kumar SINHA	Associate Professor, Indian Institute of Technology, Kanpur	2014. 6. 1 – 2015. 11. 30	Design of Surface Force Apparatus and Tribological Studies of Soft Boundary Lubricants
2014	Joint Research Project	KIMURA Takashi	Professor, Kyushu University	Rajesh KUMAR	Senior Lecturer, Jaypee University of Information Technology	2014. 6. 1 – 2016. 3. 31	Development of spin-based semiconductor nano-electronic devices using ferromagnetic Silicide nanorods
2014	Joint Research Project	MATSUMI Noriyoshi	Professor, Japan Advanced Institute of Science and Technology	Rajalakshmi NATARAJAN	Senior Scientist, Center for Fuel Cell Technology, Advance Research Center International	2014. 6. 1 – 2016. 3. 31	Observational investigation of PAH and dust features in galactic and extra-galactic environment
2014	Joint Research Project	OKADA Tatsuo	Professor, Kyushu University	Palani Anand IYAMPERUMAL	Assistant Professor, Indian Institute of Technology Indore	2014. 6. 1 – 2016. 3. 31	Development of Eco-Friendly Light Source based on ZnO nanocrystals
2014	Joint Research Project	TSUDA Hiroyuki	Professor, Keio University	Ghanshyam SINGH	Assistant Professor, Malaviya National Institute of Technology Jaipur	2014. 6. 1 – 2016. 3. 31	Design and Development of Micro-structured All Optical Components for Photonic Integrated Circuit (PICs) applications
2014	Joint Research Project	YOKOGAWA Yoshiyuki	Professor, Osaka City University	Harikrishna P.R. VARMA	Scientist in charge, Bioceramic laboratory, Sree Chitra Tirunal Institute for Medical Science and Technology	2014. 6. 1 – 2016. 3. 31	A new drug delivery method by ceramic modified super-paramagnetic nanoparticles incorporated polymeric microspheres
2014	Joint Research Project	HONDA Ayae	Professor, Hosei University	Dhrubajyoti CHATTOPADHYAY	Professor, Calcutta University	2014. 6. 1 – 2016. 3. 31	Assay of virus attachment using optical tweezers
2014	Joint Research Project	ISHIKAWA Syunpei	Professor, Tokyo Medical and Dental University	Binaya PANDA	Head of Bio-IT Centre, IBAB & Faculty Scientist, Institute of Bioinformatics and Applied Biotechnology (IBAB)	2014. 6. 1 – 2016. 3. 31	Cancer drug target discovery by shRNA genome-wide screen against active plant extracts

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FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2014	Joint Research Project	ISOBE Sachiko	Lab Head, Kazusa DNA Research Institute	Chahota K. RAKESH	Associate Professor, CSK HP Agricultural University	2014. 6. 1 – 2016. 3. 31	Development of high resolution linkage map and draft genome sequencing in horsegram (Macrotyloma uniflorum)
2014	Joint Research Project	KADONO-OKUDA Keiko	Senior Researcher, National Institute of Agrobiological Sciences	K. M. PONNUVEL	Scientist-C, Central Silk Board, Ministry of Textiles, Govt. of India	2014. 6. 1 – 2015. 3. 31	Molecular characterization of Indian isolate of Densovirus (DNV) and viral resistance genes in the host, silkworm Bombyx mori.
2014	Joint Research Project	KAMIHIRA Masamichi	Professor, Kyushu University	Ashok KUMAR	Professor, Indian Institute of Technology, Kanpur	2014. 6. 1 – 2016. 3. 31	Construction of a novel bioartificial liver support system
2014	Joint Research Project	OGAS-AWARA Hiroshi	Assistant Professor, Shinshu University	Aswin Sai Narain SESHASAYEE	Young Investigator, National center for biological sciences	2014. 6. 1 – 2016. 3. 31	Complex combinatorial control of the balance between two bacterial lifestyles: planktonic growth and biofilm formation
2014	Joint Research Project	SHIMA-MOTO Nobuo	Professor, Kyoto Sangyo University	Balaji PRAKASH	Senior Principal Scientist, CSIR-Central Food Technological Research Institute	2014. 6. 1 – 2016. 3. 31	Nanobiology to investigate EngA-ribosome and ribosome-ribosome interactions
2014	Joint Research Project	TANABE Kazuhito	Professor, Aoyama Gakuin University	Dalip KUMAR	Professor, Birla Institute of Technology and Science	2014. 6. 1 – 2016. 3. 31	Design and synthesis of Porphyrin-based photosensitizers as anticancer agents
2014	Joint Research Project	HIDAKA Hiroshi	Professor, Hiroshima University	Sankar BOSE	Associate Professor, Presidency University	2014. 6. 1 – 2016. 3. 31	Archean craton-margin orogenic events and SHRIMP age dating: geodynamic significance of India during Ur and Columbia supercontinents
2014	Joint Research Project	SAKON Itsuki	Assistant Professor, The University of Tokyo	Amit PATHAK	Assistant Professor, Tezpur University	2014. 6. 1 – 2016. 3. 31	Observational investigation of PAH and dust features in galactic and extra-galactic environment
2014	Joint Research Project	KAMADA Seiichi	Professor, Osaka City University	Krishnendu GONGOPADHYAY	Professor, Indian Institute of Science Education and Research Mohali	2014. 6. 1 – 2016. 3. 31	Knot invariants and geometric manifolds
2014	Joint Research Project	SAKURAI Kouichi	Professor, Kyushu University	Sushmita RUJ	Assistant Professor, Indian Statistical Institute, Kolkata	2014. 6. 1 – 2016. 3. 31	Computational Aspects of Mathematical Design and Analysis of Secure Communication Systems Based on Cryptographic Primitives
2014	Joint Seminar	TOMINAGA Keisuke	Professor, Kobe University	Anunay SAMANTA	Professor, University of Hyderabad	2014. 11. 16 – 2014. 11. 19	Frontiers in Molecular Spectroscopy: Fundamentals and Applications to Material and Biology
2014	Joint Seminar	WAKA-BAYASHI Katsunori	Independent Scientist, National Institute for Materials Science	Swapan PATI	Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2014. 11. 4 – 2014. 11. 8	Physics and Chemistry of Atomic Films: Fundamental Science and Applications
2014	Joint Seminar	MORIGA Toshihiro	Professor, Tokushima University	Dinesh P AMAL-NERKAR	Executive Director, Center for Materials for Electronics Technology	2014. 10. 14 – 2014. 10. 18	Nano-scale Materials Challenges for Sustainable Energy and Electronic technologies
2014	Joint Seminar	TAKANASHI Koki	Professor, Tohoku University	Subhankar BEDANTA	Reader F, National Institute of Science Education and Research	2015. 1. 9 – 2015. 1. 12	Magnetism at the nanoscale
2015	Joint Research Project	IRIE Ryo	Professor, Kumamoto University	Tharmalingam PUNNIYAMURTHY	Professor, Indian Institute of Technology Guwahati	2015. 6. 1 – 2017. 3. 31	Construction of Helically Self-assembled Chiral Metal Complexes and Their Applications as Asymmetric Catalysts
2015	Joint Research Project	SETTAI Rikio	Professor, Niigata University	Arumugam THAMIZHAVEL	Associate Professor, Tata Institute of Fundamental Research	2015. 6. 1 – 2017. 3. 31	Pressure induced quantum critical point in Ce-based intermetallic compounds and the Fermi surface properties by de Haas Van Alphen (dHvA) effect experiments.
2015	Joint Research Project	TERASAKI Akira	Professor, Kyushu University	Naresh Patwari GANPATHI	Professor, Indian Institute of Technology Bombay	2015. 6. 1 – 2017. 3. 31	Spectroscopy and reactivity of MOCVD intermediates
2015	Joint Research Project	YAGI Shigeyuki	Associate Professor, Osaka Prefecture University	Ayyappanpillai AJAYAGHOSH	CSIR Outstanding Scientist, National Institute for Interdisciplinary Science and Technology	2015. 6. 1 – 2017. 3. 31	Development of New Functional Dyes for Solar Light Harvesting through Manipulation of Exciton Interaction
2015	Joint Research Project	IWAMOTO Mitsumasa	Professor, Tokyo Institute of Technology	Shiv Kumar GUPTA	Distinguished Scientist and Head, Bhabha Atomic Research Centre	2015. 6. 1 – 2017. 3. 31	Development of organic materials for sensors, solar cells and high mobility films and characterization by optical second harmonic generation
2015	Joint Research Project	MORIKAWA Hideaki	Professor, Shinshu University	Behera Kumar BIJOYA	Professor, Indian Institute of Technology, Delhi	2015. 6. 1 – 2017. 3. 31	Three-dimensional Woven Scaffolds for Load-bearing Limbs
2015	Joint Research Project	NAKAJIMA Takahito	Team Leader, RIKEN	R. Gadre SHRIDHAR	Professor, Indian Institute of Technology, Kanpur	2015. 6. 1 – 2017. 3. 31	Structures, Energetics and Vibrational Spectra of Large Molecular Assemblies : Combined Experimental and Theoretical Studies Using Molecular Tailoring Approach on K computer
2015	Joint Research Project	NISHIGUCHI Hajime	Assistant Professor, High Energy Accelerator Research Organization	Pradeep SARIN	Assistant Professor, Indian Institutes of Technology (IIT), Bombay	2015. 6. 1 – 2017. 3. 31	Diamond-development for high intensity radiation detector to explore the Grand-Unification of particle physics
2015	Joint Research Project	SUGIYAMA Masakazu	Associate Professor, The University of Tokyo	Manish MATHEW	Scientist "C", Central Electronics Engineering Research Institute (CEERI)	2015. 6. 1 – 2017. 3. 31	Monolithic white LED with nano-InGaN broadband emitter
2015	Joint Research Project	YAMAGU-CHI Masahiro	Professor, Tohoku University	Navakanta BHAT	Professor, Indian Institute of Science (IISc)	2015. 6. 1 – 2017. 3. 31	Development of low temperature processing of ferrite thin films for on-chip integrated device applications in beyond-4G (X-band) cellular phone systems
2015	Joint Research Project	YOKOZEKI Tomohiro	Associate Professor, The University of Tokyo	Sanjay R. DHAKATE	Senior Principal Scientist, National Physical Laboratory	2015. 6. 1 – 2017. 3. 31	Development of light weight high performance carbon fiber fabric-carbon nanofibers hybrid polymer nanocomposites
2015	Joint Research Project	KOYAMA Hiroyuki	Professor, Gifu University	Lingaraj SAHOO	Professor, Indian Institute of Technology, Guwahati	2015. 6. 1 – 2017. 3. 31	Translational research of plant probiotics for successful growth in infertile soil in northeastern India
2015	Joint Research Project	SHIMADA Toru	Professor, The University of Tokyo	Kallare P. ARUN KUMAR	Scientist and Group Leader, Centre for DNA Fingerprinting and Diagnostics, India	2015. 6. 1 – 2017. 3. 31	Collaborative studies on genomic diversity among bombycoid silkmoths in Asia
2015	Joint Research Project	SUZUKI Iwane	Professor, University of Tsukuba	Jogadhenu Syama Sundar PRAKASH	Associate Professor, University of Hyderabad	2015. 6. 1 – 2017. 3. 31	Metabolic pathway engineering of Synechocystis for effective production of scytonemin, a potential anti-proliferative and UV protecting compound

FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2015	Joint Research Project	TABATA Yasuhiko	Professor, Kyoto University	Manitha NAIR	Assistant Professor, Amrita Institute of Medical Sciences	2015.6.1 – 2017.3.31	Electrospun fiber reinforced gelatin-hydroxyapatite scaffolds for co-delivery of dual growth factors for bone regeneration
2015	Joint Research Project	TAKATA Minoru	Professor, Kyoto University	Babu Rao VUNDINTI	Scientist D, National Institute of Immunohaematology (ICMR)	2015.6.1 – 2017.3.31	Collaborative effort to understanding and characterization of novel molecular changes in FA
2015	Joint Research Project	UENO Yutaka	Assistant Professor, Shinshu University	Raghavendra BHATTA	Director, National Institute of Animal Nutrition and Physiology	2015.6.1 – 2017.3.31	Methane mitigation using unexplored phyto sources in ruminants and their effect on rumen microbial diversity
2015	Joint Research Project	KIMURA Akinori	Professor, Tokyo Medical and Dental University	Gurvinder KAUR	Senior Scientist, All India Institute of Medical Science	2015.6.1 – 2017.3.31	Comparative study of HIV/AIDS-associated genome/epigenome diversities in India and Japan
2015	Joint Research Project	NOMOTO Kenichi	Project Professor, The University of Tokyo	Anupama GADIYARA CHAKRAPANI	Professor, Indian Institute of Astrophysics	2015.6.1 – 2017.3.31	Studies of low redshift supernovae-steps towards understanding the universe at high redshift
2015	Joint Research Project	OMURA Yoshiharu	Professor, Kyoto University	Pandharirao Amarkumar KAKAD	Reader, Indian Institute of Geomagnetism	2015.6.1 – 2017.3.31	Comprehensive study of particle acceleration processes in Earth's magnetosphere during extreme space weather events
2015	Joint Research Project	KUROHASHI Sadao	Professor, Kyoto University	Pushpak BHATTACHARYYA	Professor, Indian Institute of Technology Bombay	2015.6.1 – 2017.3.31	Machine Translation between Japanese and Hindi using Pivots
2015	Joint Seminar	FUJIMORI Atsushi	Professor, The University of Tokyo	Dipankar Das SARMA	Professor, Indian Institute of Science	2016.3.27 – 2016.3.30	Emergent phenomena in transition-metal compounds and related materials
2015	Joint Seminar	ONODA Mitsuyoshi	Professor, University of Hyogo	Bansi Dhar MALHOTRA	Professor, Delhi Technological University	2015.12.23 – 2015.12.24	India-Japan Workshop on Bioelectronics & Organic Nanotechnology for Environment Preservation
2016	Joint Research Project	KAWAI Akio	Associate Professor, Tokyo Institute of Technology	Anunay SAMANTA	Professor, University of Hyderabad	2016.6.1 – 2018.3.31	Near IR Spectroscopy of Singlet Oxygen as a Probe for Dynamic heterogeneity of Ionic Liquids
2016	Joint Research Project	NAKANISHI Takashi	Independent Scientist, National Institute for Materials Science	Archita PATNAIK	Professor, Indian Institute of Technology Madras	2016.6.1 – 2018.3.31	2D/3D Molecular Patterns over Broad Length Scales: Versatility in Molecular Synthesis, Chemistry at Interfaces, and Applications
2016	Joint Research Project	SASAKI Takehiko	Associate Professor, The University of Tokyo	Bhalchandra Mahadeo BHANAGE	Professor, Institute of Chemical Technology	2016.6.1 – 2018.3.31	Refinement of immobilized ionic liquid catalysts for carbonylation and CO2 conversion
2016	Joint Research Project	SHIINA Takashi	Associate Professor, Tokai University	Uma KANGA	Scientist II (Senior Research Scientist), All India Institute of Medical Science	2016.6.1 – 2018.3.31	In phase polymorphism analysis of the HLA minigenome and its application in medical research: advantage of Next Generation Sequencing
2016	Joint Research Project	YOSHINO Masahiko	Professor, Tokyo Institute of Technology	Aravindan SIVANANDAM	Associate Professor, Indian Institute of Technology, Delhi	2016.6.1 – 2018.3.31	Efficient manufacturing process of optical meta-materials by utilizing nano plastic forming
2016	Joint Research Project	HANAWA Takao	Professor, Tokyo Medical and Dental University	Balasubramanian SUBRAMANIAN	Senior Scientist, CSIR- Central Electrochemical Research Institute	2016.6.1 – 2018.3.31	Surface modification for the inhibition of assimilation of titanium alloys with bone marrow
2016	Joint Research Project	HARADA Atsushi	Professor, Osaka Prefecture University	Uma Maheswari KRISHNAN	Professor, SASTRA University	2016.6.1 – 2018.3.31	Development of thermoresponsive multifunctional liposomes for imaging and treatment of brain disorders.
2016	Joint Research Project	MATSUMURA Kazuaki	Associate Professor, Japan Advanced Institute of Science and Technology	Diwan RAWAT	Professor, University of Delhi	2016.6.1 – 2018.3.31	Development of nanocatalysts for the sustainable synthesis of novel C5-curcuminoid-indolizine/quinoline/benzofurans hybrids as anticancer agents
2016	Joint Research Project	SEKI Shu	Professor, Kyoto University	Suhrit GHOSH	Associate Professor and Head of the Department, Indian Association for the Cultivation of Science	2016.6.1 – 2018.3.31	Semiconducting Nanotubes from Custom Designed Polyurethanes: Design and Charge Transport Studies
2016	Joint Research Project	ASO Yoshio	Professor, Osaka University	Surajit GHOSH	Principal Scientist and Associate Professor of AcSIR, CSIR-Indian Institute of Chemical Biology	2016.6.1 – 2018.3.31	Development of novel extended pi-conjugated small molecules for generation of reactive oxygen species (ROS) inside the cancer cell
2016	Joint Research Project	FUJII Junichi	Professor, Yamagata University	Manisha Rajan MADKAIKAR	Director-in-Charge, National Institute of Immunohaematology (ICMR)	2016.6.1 – 2018.3.31	Japan-India collaborative research aspiring for prevention and diagnosis of erythrocyte-associated diseases
2016	Joint Research Project	FURUMAI Hiroaki	Professor, The University of Tokyo	Manish KUMAR	Assistant Professor, Tezpur University	2016.6.1 – 2018.3.31	Development of new water supply strategies for Brahmaputra watersheds of India under climate change regime
2016	Joint Research Project	HARIGAE Hideo	Professor, Tohoku University	Prabhakar KEDAR	Assistant Director, National Institute of Immunohaematology	2016.6.1 – 2018.3.31	Collaborative effort to study of pathophysiology and molecular characterization of congenital anemia in India
2016	Joint Research Project	KOBAYASHI Kappei	Associate Professor, Ehime University	Bikash MANDAL	Principal Scientist, Indian Agricultural Research Institute	2016.6.1 – 2018.3.31	Molecular mechanisms underlying the plant virus symptom expression by viral suppressor of RNA silencing
2016	Joint Research Project	SHIRASAWA Kenta	Senior Scientist, Kazusa DNA Research Institute	Ramesh S. BHAT	Professor, University of Agricultural Sciences, Dharwad	2016.6.1 – 2018.3.31	Genome-wide analysis of mutations governing resistance to late leaf spot and rust in groundnut
2016	Joint Research Project	SUGAWARA Tatsuya	Professor, Kyoto University	V BASKARAN	Senior Principal Scientist, Central Food Technological Research Institute	2016.6.1 – 2018.3.31	Process scale-up for preparation of hydrocolloid-lipid hybrid nano-capsules loaded with eye protective carotenoid lutein and its efficacy in diabetes induced molecular regulators of angiogenesis
2016	Joint Research Project	ASANO Kimiyuki	Assistant Professor, Kyoto University	Prantik MANDAL	Senior Principal Scientist, National Geophysical Research Institute	2016.6.1 – 2018.3.31	Ground motion modeling of the Kachchh rift basin, Gujarat, India, using available seismological data and information
2016	Joint Research Project	ITOH Yoichi	Professor, University of Hyogo	Asoke Kumar SEN	Professor, Assam University	2016.6.1 – 2018.3.31	Polarimetric Study of Astrophysical Dust Using Light Scattering Tools and Observations with Optical Telescope
2016	Joint Research Project	KOBAYASHI Naoto	Associate Professor, The University of Tokyo	Anil K PANDEY	Professor (ARIES Scientific officer/ Scientist F), Aryabhatta Research Institute of Observational Sciences	2016.6.1 – 2018.3.31	Identifying Essential Mechanisms of Star Cluster Formation with Wide-field Optical Observations

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FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2016	Joint Research Project	YOSHIDA Kohki	Associate Professor, Shinshu University	Das Kumar SUPRIYO	Assistant Professor, Presidency University	2016.6.1 – 2017.12.31	Paleoceanographic and biogeochemical response of the northern Indian Ocean to the Himalayan uplift and denudation
2016	Joint Research Project	ISHII Idaku	Professor, Hiroshima University	Solomon Raju KOTA	Principal Scientist, CSIR – Central Electronics Engineering Research Institute	2016.6.1 – 2018.3.31	Dynamic Reconfigurable High-speed Vision Architecture
2016	Joint Research Project	MATSUURA Kanta	Professor, The University of Tokyo	Sugata GANGOPADHYAY	Associate Professor, Indian Institute of Technology Roorkee	2016.6.1 – 2018.3.31	Lightweight Encryption Techniques for Cyber Security Applications
2016	Joint Seminar	TOMINAGA Keisuke	Professor, Kobe University	Amalendu CHANDRA	Professor, Indian Institute of Technology Kanpur	2016.11.13 – 2016.11.16	Frontiers in Molecular Spectroscopy: from Fundamentals to Applications on Material Science and Biology
2016	Joint Seminar	KOSAKA Hidenori	Professor, Tokyo Institute of Technology	Pramod MEHTA	Professor, Indian Institute of Technology Madras	2016.8.29 – 2016.9.2	Modeling and Diagnostics in Combustion
2016	Joint Seminar	SAKURAI Shinichi	Professor, Kyoto Institute of Technology	Vimal KATIYAR	Associate Professor, Indian Institute of Technology, Guwahati	2016.8.4 – 2016.8.6	Symposium on Advances in Sustainable Polymers (ASP-16)
2016	Joint Seminar	TAKANASHI Koki	Professor, Tohoku University	Subhankar BEDANTA	Reader F, National Institute of Science Education and Research	2016.12.1 – 2016.12.2	Magnetism at the nanoscale
2017	Joint Research Project	AHSAN Nazmul	Project Associate Professor, The University of Tokyo	Kalainathan SIVAPERUMAN	Professor, Deputy Director (Centre for Crystal Growth), VIT University	2017.6.1 – 2019.3.31	Fabrication and characterization of magnetic impurity doped CuGaS2 thin films for high efficiency intermediate band solar cell application
2017	Joint Research Project	KOSHIHARA Shin-Ya	Professor, Tokyo Institute of Technology	Pratik SEN	Associate Professor, Indian Institute of Technology, Kanpur	2017.6.1 – 2019.3.31	Development of ultrafast photo-functional materials by nano-scale and femtosecond structural dynamics
2017	Joint Research Project	TAKEUCHI Masayuki	Group Leader, National Institute for Materials Science	Subi Jacob GEORGE	Associate Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2017.6.1 – 2019.3.31	Temporal Control over Supramolecular Polymerization
2017	Joint Research Project	INABA Kazuaki	Associate Professor, Tokyo Institute of Technology	Amit KARMAKAR	Associate Professor, Jadavpur University	2017.6.1 – 2019.3.31	Dynamic behavior and low velocity transverse impact response of fluid-conveying functionally graded shells under mechanical and thermal loads
2017	Joint Research Project	ISHIHAMA Masao	Professor, Kanagawa Institute of Technology	Puneet TANDON	Professor, PDPM Indian Institute of Information Technology, Design & Manufacturing, Jabalpur	2017.6.1 – 2018.3.31	In-Process Monitoring of Stamping Process of a Thin Plate
2017	Joint Research Project	ISHIKAWA Kunio	Professor, Kyushu University	Than Ganapathy Pandian SAKTHINA	Associate Professor, Anna University	2017.6.1 – 2019.3.31	Fabrication of carbonate apatite coated titanium implant
2017	Joint Research Project	NAKAMURA Daisuke	Associate Professor, Kyushu University	Nilesh Jayantilal VASA	Professor, Indian Institute of Technology Madras	2017.6.1 – 2019.3.31	Development of Micro-Nano Zinc Oxide Based Functional Devices
2017	Joint Research Project	SAKODA Kazuaki	Managing Researcher, National Institute for Materials Science	Shailendra Kumar VARSHNEY	Associate Professor, Indian Institute of Technology, Kharagpur	2017.6.1 – 2019.3.31	Dynamics of Nonlinear Optical Microcavities for On-Chip Quantum Photonic Applications
2017	Joint Research Project	TAKAO Hidekuni	Professor, Kagawa University	Konandur RAJANNA	Professor, Indian Institute of Science	2017.6.1 – 2019.3.31	Development of Graphene-Metal/Semiconductor Nanocomposite based Smart Torque and Shear Sensors and their Applications
2017	Joint Research Project	VENTURE Gentiane	Associate Professor, Tokyo University of Agriculture and Technology	Anup NANDY	Assistant Professor, National Institute of Technology, Rourkela	2017.6.1 – 2019.3.31	Development of a pathological healthcare system for early detection of neurological gait abnormalities
2017	Joint Research Project	WASHIO Masakazu	Professor, Waseda University	Subhendu GHOSH	Scientist – G, Inter University Accelerator Centre	2017.6.1 – 2019.3.31	Production and measurement of THz radiation at LUCX and DLS for promoting researches in Materials Science, Nanotechnologies, Molecular Physics
2017	Joint Research Project	FUKAGAWA Tatsuo	Professor, Osaka University	Kaustuv SANYAL	Associate Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2017.6.1 – 2019.3.31	In search of a missing piece: Understanding the kinetochore architecture of a human fungal pathogen that lost most evolutionarily conserved inner kinetochore proteins
2017	Joint Research Project	HIMENO Hyouta	Professor, Hirosaki University	Balaji PRAKASH	Professor, Indian Institute of Technology Kanpur	2017.6.1 – 2019.3.31	Investigating catalytic mechanism and regulation in Era and EngA; and their role in ribosome biogenesis
2017	Joint Research Project	INOUE Ituro	Professor, National Institute of Polar Research	Moinak BANERJEE	Scientist F, Rajiv Gandhi Centre for Biotechnology	2017.6.1 – 2019.1.31	Genomic and epigenomic characterization of 9p21 in intracranial aneurysm patients from two distinct ethnic population of the world.
2017	Joint Research Project	ISEKI Sachiko	Professor, Tokyo Medical and Dental University	Rangasamy JAYAKUMAR	Professor, Amrita Vishwa Vidyapeetham University	2017.6.1 – 2019.3.31	Development and In Vivo Evaluation of Multiscale Fibrous Scaffolds Having Controlled Molecular Mobility For Directed Bone Regeneration.
2017	Joint Research Project	KITAMURA Shumpei	Associate Professor, Ishikawa Prefectural University	Soumya PRASAD	Assistant Professor, Jawaharlal Nehru University	2017.6.1 – 2019.3.31	Characterizing role of large frugivores in seed dispersal networks: macaques and hornbills in Asia
2017	Joint Research Project	MORIYASU Yuji	Professor, Saitama University	Maumita BANDYOPADHYAY	Assistant Professor, University of Calcutta	2017.6.1 – 2019.3.31	Elucidation of the mechanisms of programmed cell death induced by fungal toxin and hydrogen peroxide in tobacco BY-2 cells and Physcomitrella protonemal cells
2017	Joint Research Project	NAGATA Yuji	Associate Professor, Tohoku University	Dayananda SIDDAVATTAM	Professor, University of Hyderabad	2017.6.1 – 2019.3.31	Comprehensive omics studies on a versatile sphingomonad strain to establish theoretical basis for in situ bioremediation of recalcitrant environmental pollutants
2017	Joint Research Project	TAGUCHI Hideki	Professor, Tokyo Institute of Technology	Deepak Kumar SHARMA	Senior Scientist, Institute of Microbial Technology	2017.6.1 – 2019.3.31	Comprehensive understanding of cellular response to amyloid toxicity at molecular level
2017	Joint Research Project	TATSUMI Kazuya	Associate Professor, Kyoto University	Indranil Saha DALAL	Assistant Professor, Indian Institute of Technology Kanpur	2017.6.1 – 2019.3.31	Estimation of transport properties of blood modeled as a fluid-particulate mixture from experimental and theoretical approaches
2017	Joint Research Project	HIROSE Akira	Professor, The University of Tokyo	Dharmendra SINGH	Professor & Head, Indian Institute of Technology Roorkee	2017.6.1 – 2019.3.31	Adaptive snowpack parameters estimation and mapping by using SAR polarimetry and interferometry

FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2017	Joint Research Project	SAKON Itsuki	Assistant Professor, The University of Tokyo	Amit PATHAK	Assistant Professor, Tezpur University	2017.6.1 – 2019.3.31	Investigation of Interstellar Polycyclic Aromatic Hydrocarbons (PAHs), pure and substituted: a combined approach
2017	Joint Research Project	YAMASHITA Shigeru	Professor, Ritsumeikan University	Sudip ROY	Assistant Professor, Indian Institute of Technology Roorkee	2017.6.1 – 2019.3.31	Design Methodology for Programmable Microfluidic Devices by Integrating Architectural and Logic Synthesis Techniques
2017	Joint Seminar	KUSUNOKI Michiko	Professor, Nagoya University	Swapan Kumar PATI	Professor, Jawaharlal Nehru Center for Advanced Scientific Research	2017.11.7 – 2017.11.9	Applications of Layered Materials: Advances and Perspectives
2017	Joint Seminar	SHIRAI Masayuki	Professor, Iwate University	Chandrashekhar Vasant RODE	Chief Scientist, National Chemical Laboratory	2018.1.18 – 2018.1.19	New Insights into Multifunctional Catalysis for Biomass Transformations
2017	Joint Seminar	EBIHARA Akio	Associate Professor, Gifu University	Katiyar Vimal	Professor, Indian Institute of Technology Guwahati	2018.2.1 – 2018.2.4	Indo-Japan Bilateral Symposium on Future Perspective of Bioresource Utilization in North-Eastern Region
2017	Joint Seminar	KENMOCHI Naoya	Professor, University of Miyazaki	Anirban CHAKRABORTY	Associate Professor, Nitte University	2017.10.5 – 2017.10.6	International meeting on non-mammalian models in biomedical research: Current status and future perspectives
2017	Joint Seminar	TANIGUCHI Makoto	Professor, National Institutes for the Humanities	Sudhindra Nath PANDA	Director, National Institute of Technical Teachers Training and Research	2017.9.5 – 2017.9.9	Knowledge sharing workshop on adopting Water-Energy-Food Nexus Approach
2018	Joint Research Project	FUKUMA Yasuhiro	Associate Professor, Kyushu Institute of Technology	Pranaba Kishor MUDULI	Assistant Professor, Indian Institute of Technology, Delhi	2018.6.1 – 2020.3.31	Spin Hall nano-oscillator using ferromagnet/antiferromagnet heterostructures
2018	Joint Research Project	SAITO Shinji	Professor, National Institutes of Natural Sciences	Biman BAGCHI	Professor, Indian Institute of Science	2018.6.1 – 2020.3.31	Local structure and dynamics of hydrogen bonds in water: Supercooled water and binary mixtures
2018	Joint Research Project	SEKINE Chihiro	Professor, Muroran Institute of Technology	Sonachalam ARUMUGAM	Professor, Bharathidasan University	2018.6.1 – 2020.3.31	Synthesis and physical properties of new superconductors using high-pressure technique
2018	Joint Research Project	YAGI Shigeyuki	Professor, Osaka Prefecture University	Ayyappanpillai AJAYAGHOSH	Director, CSIR-National Institute for Interdisciplinary Science and Technology	2018.6.1 – 2020.3.31	Construction of p/n Heterojunction through the Self-assembly of Functional Dyes
2018	Joint Research Project	YASUOKA Kenji	Professor, Keio University	Subrata MAJUMDER	Assistant Professor, National Institute of Technology Patna	2018.6.1 – 2020.3.31	Nanoscale Studies of Chemisorption and Physisorption of DNA molecule at the Titanium dioxide/Water Interface
2018	Joint Research Project	SAWAE Yoshinori	Professor, Kyushu University	Sujeet Kumar SINHA	Professor, Indian Institute of Technology Delhi	2018.6.1 – 2020.3.31	Novel lipid-filled high strength polymer composite for highly functional joint prosthesis application
2018	Joint Research Project	SUGIMURA Hiroyuki	Professor, Kyoto University	Om Prakash KHATRI	Sr. Scientist, Indian Institute of Petroleum	2018.6.1 – 2020.3.31	Integrated thin films of graphene-ionic liquids for lubrication in MEMS application
2018	Joint Research Project	TAKEMURA Yasushi	Professor, Yokohama National University	Selvamani PALANISAMY	Assistant Professor, Anna University	2018.6.1 – 2020.3.31	Development of peptide conjugated nano-magnetic probes as cancer theranostics
2018	Joint Research Project	TOMAI Takaaki	Associate Professor, Tohoku University	Dinesh RANGAPPA	Professor, Visvesvaraya Technological University	2018.6.1 – 2020.3.31	Supercritical Fluid Process Development for Next Generation (Magnesium/Sodium Ion) Battery Electrode Materials
2018	Joint Research Project	YAMANAKA Junpei	Professor, Nagoya City University	Priti Sundar MOHANTY	Associate Professor, Kalinga Institute of Industrial Technology (KIIT university)	2018.6.1 – 2020.3.31	Synthesis of soft-ionic microgels and their directed self-assembly using an external electric and chemical fields
2018	Joint Research Project	YOKOZEKI Tomohiro	Associate Professor, The University of Tokyo	Mira MITRA	Associate Professor, Indian Institute of Technology, Kharagpur	2018.6.1 – 2020.3.31	Development of light-weight lattice structure with superior shock attenuation properties
2018	Joint Research Project	DOHNO Chikara	Associate Professor, Osaka University	Sudhir KRISHNA	Professor, National Centre for Biological Science, Tata Institute of Fundamental Research	2018.6.1 – 2020.3.31	Exploring the therapeutic potential of cyclic mismatch binding ligands (CMBLs) in cervical cancer sub-sets
2018	Joint Research Project	FUJII Junichi	Professor, Yamagata University	Manisha Rajan MADKAIKAR	Director-In -Charge, National Institute of Immunohaematology (ICMR)	2018.6.1 – 2020.3.31	Japan-India collaborative research aspiring for conquering sickle cell disease by elucidating the developmental mechanism
2018	Joint Research Project	KOBAYASHI Nobumichi	Professor, Sapporo Medical University	Balasubramanian GANESH	Scientist-D, National Institute of Epidemiology	2018.6.1 – 2020.3.31	Molecular epidemiological study on drug resistance of diarrheagenic Gram-negative bacteria in India
2018	Joint Research Project	NAKAYAMA Koichi	Professor, Saga University	Subha Narayan RATH	Assistant Professor, Indian Institute of Technology, Hyderabad.	2018.6.1 – 2020.3.31	Bio-inspired nano-hierarchical architecture of fabrication and maturation of spheroid based tendon-ligament tissues
2018	Joint Research Project	SHIMADA Toru	Professor, The University of Tokyo	Rajesh KUMAR	Scientist-C, Central Muga Eri Research and Training Institute, Central Silk Board, Ministry of Textiles	2018.6.1 – 2020.3.31	Genome Engineering of the Bombycid and Saturniid Silkmoths in Asia
2018	Joint Research Project	WAGATSUMA Hiroaki	Associate Professor, Kyushu Institute of Technology	Bishakh BHATTACHARYA	Professor, Indian Institute of Technology Kanpur	2018.6.1 – 2020.3.31	Neuro-cognitive instrumentation of validated human-robot interactions to enhance learning and developmental processes in children
2018	Joint Research Project	KAWABATA Koji	Professor, Hiroshima University	Devendra Kumar SAHU	Associate Professor, Indian Institute of Astrophysics	2018.6.1 – 2020.3.31	Theoretical studies in explosion physics of nearby supernovae based on high-quality optical and near-infrared observational data
2018	Joint Research Project	TOYOSHIMA Tsuyoshi	Professor, Niigata University	Sajeev KRISHNAN	Associate Professor, Indian Institute of Science	2018.6.1 – 2020.3.31	Arc accretion in the past and present and its bearing on Metallogeny
2018	Joint Research Project	CHAKRABORTY Basabi	Professor, Iwate Prefectural University	Amlan CHAKRABARTI	Professor, Calcutta University	2018.6.1 – 2020.3.31	Developing open source tool using quantum based feature selection for high dimensional datasets
2018	Joint Research Project	ITO Masaki	Research Associate, The University of Tokyo	Mohan C. KRISHNA	Associate Professor, Indian Institute of Technology Hyderabad	2018.6.1 – 2020.3.31	Design and Development of Real-Time Transportation Safety Monitoring System for Smart Cities
2018	Joint Seminar	MATSUNO Jobu	Senior Research Scientist, RIKEN	Priya MAHADEVAN	Professor, S.N.Bose National Centre for Basic Sciences	2019.2.7 – 2019.2.9	Designing emergent materials
2018	Joint Seminar	AOKI Takahira	Professor, The University of Tokyo	Sanjay DHAKATE	Senior Principal Scientist, National Physical Laboratory	2018.11.26 – 2018.11.30	Highly conductive CFRP using conductive polymers and nanomaterials for structural applications
2018	Joint Seminar	KISHIDA Hideo	Professor, Nagoya University	Gajjala SUMANA	Principal Scientist, National Physical Laboratory	2018.12.6 – 2018.12.9	India-Japan Workshop on Biomolecular Electronics and Organic Nanotechnology for Environment Preservation

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FY	Type of Project	Japanese PI		Indian PI		Duration	Project Title
		Name	Position/Affiliation	Name	Position/Affiliation		
2019	Joint Research Project	ITO Yoshihiro	Chief Scientist, RIKEN	Jayasree S RAMAPURATH	Scientist F, Sree Chitra Tirunal Institute for Medical Sciences and Technology	2019.6.1 – 2021.3.31	MAGNETO-OPTIC SENSOR FOR CARDIAC BIOMARKER DETECTION
2019	Joint Research Project	KITAGAWA Hiroshi	Professor, Kyoto University	Sukhendu MANDAL	Associate Professor, Indian Institute of Science Education and Research Thiruvananthapuram	2019.6.1 – 2021.5.31	Tailoring the catalytic properties of atom-precise metal nanoclusters
2019	Joint Research Project	TANIYAMA Tomoyasu	Professor, Nagoya University	Venkataiah GORIGE	Assistant Professor, University of Hyderabad	2019.7.1 – 2021.6.30	Interfacial multiferroic magnonics : understanding of cross-correlation towards magnonic logic circuit applications
2019	Joint Research Project	MAEZONO Ryo	Professor, Japan Advanced Institute of Science and Technology	Ravi KUMAR, N V	Professor, Indian Institute of Technology-Madras	2019.6.1 – 2021.5.31	Understanding the phase stability of oxides and nitrides in the context of fine tuning their functional properties – a combinatorial approach based on computations and experiments
2019	Joint Research Project	NAGATA Takahiro	Group leader, National Institute for Materials Science	Somu KUMARAGURUBARAN	Associate Professor, Indian Institutes of Science Education and Research	2019.6.1 – 2021.3.31	Combinatorial exploration and property control of oxide based power semiconductors
2019	Joint Research Project	SATO Yukio	Associate Professor, Kyushu University	Viswanath BALAKRISHNAN	Assistant Professor, Indian Institute of Technology, Mandi	2019.6.1 – 2021.5.31	Engineering photoluminescence of tungsten sulfide through doping and electrical biasing
2019	Joint Research Project	SEKI Shu	Professor, Kyoto University	Suhrit GHOSH	Professor, Indian Association for the Cultivation of Science	2019.6.1 – 2021.3.31	Design of Two-Dimensionally Self-Assembled Organic Semiconductors
2019	Joint Research Project	WATANABE Toru	Professor, Yamagata University	Arun KUMAR	Assistant Professor, Indian Institute of Technology Delhi	2019.6.1 – 2021.3.31	Understanding toxicity and uptake of nanomaterials to edible plants during reuse of treated municipal wastewater as irrigation water
2019	Joint Research Project	YAMAGUCHI Masahiro	Professor, Tohoku University	Navakanta BHAT	Professor, Indian Institute of Science (IISc)	2019.6.1 – 2021.3.31	Development of an integrated magnetic sensor featuring a microwave-assisted nanoferrite-film for high-sensitivity magnetocardiographic measurement
2019	Joint Research Project	INOUE Shinichi	Lecturer, Nagasaki University	Sehgal RAKESH	Professor and Head, Postgraduate Institute of Medical Education & Research	2019.6.30 – 2021.5.31	Role of gamma-delta T cells in patients with complicated malaria due to Plasmodium vivax
2019	Joint Research Project	OYANE Ayako	Senior Researcher, National Institute of Advanced Industrial Science and Technology	Mohanan PARAYANTHARA V.	Scientist-G & Head, Toxicology Division, Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) [Govt. of India]	2019.7.1 – 2021.6.30	Anti-microbial peptide (LL37) loaded multifunctional 3D collagen scaffold for vascularized bone tissue regeneration
2019	Joint Research Project	SUZUKI Michiyo	Principal Researcher, National Institutes for Quantum and Radiological Science and Technology	J. PONMOZHI	Associate Professor, Institute of Engineering & Science IPSA	2019.6.1 – 2021.3.31	Development of a biocompatible vehicle for sustained delivery of lactobacillus spores as a treatment modalities for Bacterial Vaginosis
2019	Joint Research Project	TAMAGAWA Masaaki	Professor, Kyushu Institute of Technology	Raghuvir PAI	Professor, Manipal Academy of Higher Education	2019.6.1 – 2021.3.31	FUNDAMENTAL STUDY ON CAROTID ARTERY STENTING USING NUMERICAL SIMULATION
2019	Joint Research Project	TSUJIMURA Seiya	Associate Professor, University of Tsukuba	Santosh Ranjan MOHANTY	Principal Scientist, ICAR Indian Institute of Soil Science	2019.6.1 – 2021.5.31	Methanogenic bioelectrode driven conversion of CO2 to CH4 to enhance methanogenesis and mitigation of greenhouse gas from agrowaste based bioenergy systems
2019	Joint Research Project	ANDO Junichi	Professor, Hiroshima University	Gautam GHOSH	Professor, Presidency University	2019.6.1 – 2021.5.31	Study of fault architecture, deformation mechanisms and evolution of fault zone rocks with implications for seismicity in the upper and lower crust
2019	Joint Research Project	ASAI Ayumi	Associate Professor, Kyoto University	Dipankar BANERJEE	Professor, Indian Institute of Astrophysics	2019.6.1 – 2021.3.31	Long term variation of solar ultraviolet radiation investigated from the Japan-Indian integrated database of solar chromospheric images
2019	Joint Research Project	KANEDA Hidehiro	Professor, Nagoya University	Devendra K OJHA	Professor, Tata Institute of Fundamental Research (TIFR)	2019.9.1 – 2021.8.31	Large-scale mapping of massive star-forming regions in the far-infrared [CII] emission with a balloon-borne telescope
2019	Joint Research Project	FUJITA Masahiro	Professor, The University of Tokyo	Majumdar Shubhankar	Assistant Professor, National Institute of Technology Meghalaya	2019.6.1 – 2021.5.31	Prediction, Detection and Monitoring System for Landslide in Hilly Regions
2019	Joint Research Project	ISOBE Takanori	Associate Professor, University of Hyogo	Santanu SARKAR	Associate Professor, Indian Institutes of Technology Madras	2019.6.1 – 2021.5.31	Cryptanalytic study on Stream ciphers
2019	Joint Research Project	OKAMOTO Yoshio	Professor, The University of Electro-Communications	Saket SAURABH	Professor, The Institute of Mathematical Sciences	2019.6.1 – 2021.5.31	Geometric Approximation Algorithms in Fixed Parameterised Time
2019	Joint Seminar	TOMINAGA Keisuke	Professor, Kobe University	Amalendue CHANDRA	Professor, Indian Institute of Technology, Kanpur	2019.10.29 – 2019.11.1	Frontiers in Molecular Spectroscopy: From Fundamentals to Applications in Chemistry and Biology
2019	Joint Seminar	NAKAMURA Kazuho	Associate Professor, Yokohama National University	Mohan DORAISWAMY	Dean Science and Humanities, Rajalakshmi Engineering College	2019.12.1 – 2019.12.5	Development of Sustainable Environment/ Energy Technologies in South India
2019	Joint Seminar	OKAZAKI Masakazu	Professor, Nagaoka University of Technology	Rajappa GNANAMOORTHY	Professor, Indian Institute of Technology Madras	2020.3.2 – 2020.3.3	Materials and Manufacturing for Next Generation Electric and High Speed Railway

V. Appendix-8

List of Asian Academic Seminar/Japan-India Forum for Advanced Study (FY1994-FY2019)

	Seminar Title	Main Organiser	Period	Place	Number	
					Lecturers	Participants
FY1994	Asian Academy Seminar on Molecular Science and Molecular Materials	ITO Mitsuo, Professor, Institute for Molecular Science C.N.R.Rao, Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Indian Institute of Science	1994.11.22 – 12.2	Bangalore	26	36
FY1997	Asian Academic Seminar on Supramolecular Organization in Chemistry, Material Science, and Biology	ITO Mitsuo, Professor, Institute for Molecular Science C.N.R.Rao, Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Indian Institute of Science	1997.12.8 – 12.14	Bangalore	23	36
FY2000	Asian Academic Seminar on Advanced Manufacturing System	KIUCHI Manabu, Professor, Institute of Industrial Science, The University of Tokyo Amitabha Ghosh, Director, Indian Institute of Technology	2000.12.3 – 12.12	Hyderabad	30	50
FY2001	Characterization of Materials and Applications to New Materials	DOYAMA Masao, Professor, Teikyo University of Science and Technology ODA Katsuro, Associate Professor, Institute of Industrial Science, The University of Tokyo P. Rama Rao, Vice-Chancellor, University of Hyderabad	2001.12.12 – 12.21	Hyderabad	25	45
FY2003	International Workshop on Single-molecule Biophysics	SHIMAMOTO Nobuo, Professor, National Institute of Genetics G.V. Shivashankar, Associate Professor, National Centre for Biological Sciences	2004.1.4 – 1.5, 1.9 – 1.15	Bangalore	26	66
FY2006	Molecular and Supramolecular Materials with Designed Functions	ENOKI Toshiaki, Professor, Tokyo Institute of Technology Krishna N. Ganesh, Professor, Organic Chemistry Division, National Chemical Laboratory	2007.2.23 – 2.28	Pune	40	76
FY2008	Genome Regulation: From Nanobiology to Pathogenesis	ISHIHAMA Akira, Professor, Hosei University Dipankar Chatterji, Professor, Molecular Biophysics Unit, Indian Institute of Science, Bangalore, India	2008.12.26 – 12.30	Bangalore	25	80
FY2009	Advanced Materials for Sustainable Development	SUZUKI Atsushi, Professor, Yokohama National University G. Sundararajan, Director, International Advanced Research Centre	2009.12.8 – 12.14	Yokohama	22	43
FY2010	Recent Advances in the Study of Clusters, Nanomaterials and Surfaces with New Properties and Functions	IWASAWA Yasuhiro, Professor, The University of Electro-Communications Milan K. Sanyal, Professor, Saha Institute of Nuclear Physics	2010.11.29 – 12.4	Kolkata	29	94
FY2011	Challenges in Astronomy: Observational Advances	SHIBAI Hiroshi, Professor, Osaka University Rajaram Nityananda, Professor, Tata Institute of Fundamental Research	2011.9.26 – 10.1	Hyogo	29	41
FY2012	Manufacturing, Design and Innovation	MITSUISHI Mamoru, Professor, The University of Tokyo Sanjay G. Dhande, Director, Indian Institute of Technology, Kanpur	2012.12.3 – 12.8	Mumbai	21	39
FY2013	Discrete Mathematics and its application	KOTANI Motoko, Director AIMR, Tohoku University Bimal K. Roy, Director, Indian Statistical Institute	2013.11.3 – 11.10	Tokyo	34	40
FY2014	Structure, dynamics, and functionality of molecules and materials	OHMINE Iwao, Director-General, Institute for Molecular Science Rabi Mukherjee, Director, Indian Institute of Science Education and Research	2015.3.6 – 3.10	Kolkata	35	98
FY2016	Advanced Materials, Processes and Systems for Sustainable Development	MITSUISHI Mamoru, Professor, The University of Tokyo T. Pradeep , Professor , Indian Institute of Technology Madras	2016.12.14 – 12.21	Tokyo	25	30
FY2017	Epigenetics and Human Disease	IGARASHI Kazuhiko, Professor, Tohoku University Ikuro Kawagishi, Professor, Hosei University Siddhartha Roy, Professor, Bose Institute	2018.2.6 – 2.10	Kolkata	34	38
FY2018	Progress and perspective of the studies on the crustal evolution of the Indian Peninsula from Archean to the present by geochemical, chronological and geological approaches	HIDAKA Hiroshi, Professor, Nagoya University Sankar Bose, Professor, Presidency University Partha Pratim Chakraborty, Professor, University of Delhi	2019.3.7 – 3.16	Nagoya, Tokyo and Niigata	34	43
FY2019	Quantum Computation and Quantum Information	KOTANI Motoko, Professor, Tohoku University Bimal Roy, Professor, ISI, Kolkata	2020.1.1 – 1.9	Kolkata	–	–

V. Appendix-9

List of Mizushima-Raman Lecture Series (FY1997-FY2019)

	Title	Lecturer		Date	Place
		Japanese	Indian		
FY1997	A Random Walk in Laser Molecular Spectroscopy	ITO Mitsuo Director General, Institute for Molecular Science Okazaki National Research Institutes	–	1997.12	Bangalore
FY1999	Raman and Brillouin Spectroscopic Studies of Transitions in Solids	NAGAKURA Saburo Chairman, Kanagawa Academy of Science and Technology	C.N.R. Rao President, Jawaharlal Nehru Centre for Advanced Scientific Research	2000.5.16	Tokyo
FY2001	Ultrafast Spectroscopy: From Photosynthetic to Transcriptional Protein	YOSHIHARA Keitaro Vice-President, Japan Advanced Institute of Science and Technology	–	2002.1.5	Bangalore
FY2003	Spectra and structure of some floppy molecules cooled in seeded jet	–	Mihir Chowdhury Professor, India Association for the Cultivation of Science	2003.9.25	Kyoto
FY2005	The Present State and Future of Raman Spectroscopy	TASUMI Mitsuo President, Saitama University	–	2006.2.4	Mumbai
FY2006	In Search of Simple Dynamical Models in Complex System: From Binary Mixture to Electrolyte Conduction and Biological Water	–	Biman Bagchi Professor, Indian Institute of Science, Bangalore	2006.9.23	Shizuoka
FY2007	Theoretical Studies of Chemical Reaction - From Gas Phase Reactions to Nano Structures, Catalysts, and Enzymatic Reactions	MOROKUMA Keiji Resercher Leader, Fukui Institute for the Fundamental Chemistry, Kyoto University	–	2008.2.2	Bangalore
FY2008	Dynamics in Nano-Confined Systems: From Biological Assemblies to Ionic Liquids	–	Kankan Bhattachryya Professor, Physical Chemistry Department Indian Association for the cultivation of Science (IACS), Kolkata, India	2008.9.25	Fukuoka
FY2009	Laser and Organic Nanoparticles	MASUHARA Hiroshi Professor, Nara Institute of Science and Technology	–	2010.2.7	Hyderabad
FY2010	Spectroscopy, Fluorescence and OLED	–	Nallagounder Periasamy Professor, Tata Institute of Fundamental Research, Mumbai, India	2010.9.16	Osaka
FY2011	What Has Raman Spectroscopy Elucidated on Structure-Function Relations of Heme Proteins?	KITAGAWA Teizo Professor, University of Hyogo	–	2012.2.5 – 2.6	Thiruvananthapuram
FY2012	Raman spectroscopic applications: from physics to biology and medicine	–	Siva Umapathy Professor, Indian Institute of Science	2012.9.18	Tokyo
FY2013	Raman Spectroscopy: Past and Future	HAMAGUCHI Hiro-o Professor, National Chiao Tung University	–	2014.2.8	Mumbai
FY2014	Probing the Organized Environments of the Ionic Liquids by Fluorescence Correlation Spectroscopy and Conventional Steady State and Time-resolved Fluorescence Techniques	–	Anunay Samanta Professor, University of Hyderabad	2014.9.23	Hiroshima
FY2015	Unconventional Electronic and Magnetic Properties of Nanographene	ENOKI Toshiaki Emeritus Professor, Tokyo Institute of Technology	–	2016.2.5	Chandigarh
FY2016	Table top x-ray and terahertz radiation sources for molecular science	–	G. Ravindra Kumar Professor, Tata Institute of Fundamental Research	2017.9.17	Sendai
FY2017	Electron Dynamics in Chemical Reactions	TAKATSUKA Kazuo Professor, Kyoto University	–	2018.2.3	Raipur
FY2018	Application of Raman Spectroscopy from MOFs to Drug Discovery	–	Chandrabhas Narayana Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2018.9.12	Fukuoka
FY2019	Advance and Application of Time-Domain Raman Spectroscopy	TAHARA Tahei Chief Scientist, RIKEN	–	2020.2.8	Vellore

V. Appendix-10

List of Exploratory Exchange/Special Lecture Tour <From India to Japan>

* Note that cancellations and changes regarding the dispatched and accepted researchers may be included as the list was compiled in reference to the Activity Report prepared for the council meeting of the subject year.

Indian Researcher <Dispatched>		Japanese Researcher <Host>		Duration
Mohammad SAMI	Reader, Jamia Millia Islamia	TSUJIKAWA Shinji	Lecturer, Gunma National College of Technology	2006. 10. 2 – 10. 15
Parmatma Chandra MATHUR	Emeritus Professor, University of Delhi, South Campus	ONODA Mitsuyoshi	Professor, University of Hyogo	2006. 10. 4 – 10. 15
Pramod Kumar BHATNAGAR	Professor, University of Delhi, South Campus	ONODA Mitsuyoshi	Professor, University of Hyogo	2006. 10. 4 – 10. 15
Mrinal.K. DAS	Lecturer, University of Delhi South Campus	YUASA Manabu	Professor, Kindai University	2006. 10. 4 – 10. 18
Jatinder Vir YAKHMI	Associate Director, Bhabha Atomic Research Centre	EINAGA Yasuaki	Associate Professor, Keio University	2006. 10. 15 – 10. 28
Biswanath MALLIK	Professor, Indian Association for the Cultivation of Science	OHTA Nobuhiro	Professor, Hokkaido University	2007. 1. 11 – 2. 8
Shivaji, SISINTY	Scientist F (Deputy Director), Centre for Cellular and Molecular Biology	SUZUKI Iwane	Assistant Professor, Tsukuba University	2007. 2. 6 – 2. 21
J.G. NAGARAJU	Staff Scientist and Group Reader, Center for DNA Fingerprinting and Diagnostics	SHIMADA Toru	Professor, The University of Tokyo	2007. 2. 15 – 2. 24
Chatterji DISPANKAR	Professor, Indian Institute of Science	ISHIHAMA Akira	Professor and Department Head, Hosei University	2007. 3. 11 – 3. 18
Sanjeev. V. DHURANDHAR	Professor, Inter University Centre for Astronomy & Astrophysics	KANDA Nobuyuki	Professor, Osaka City University	2007. 3. 18 – 3. 24
Rajmal JAIN	Associate Professor, Physical Research Laboratory	SAKURAI Takashi	Professor, National Astronomical Observatory	2007. 4. 22 – 5. 5
Lal M SAHA	Professor, Zakir Hussain College, University of Delhi	YUASA Manabu	Professor, Kindai University	2007. 7. 1 – 7. 15
Milan Kumar SANYAL	Professor, Surface Physics Division, Saha Institute of Nuclear Physics	IWASAWA Yasuhiro	Professor, The University of Tokyo	2007. 7. 18 – 7. 25
Jyotsna DHAWAN	Associate Professor, Cell Biology and Development Center for Cellular and Molecular Biology	KONDO Toru	Team Leader, Center for Development Biology RIKEN	2007. 10. 21 – 10. 25
S. SAMPATH	Associate Professor, Indian Institute of Science	UOSAKI Kohei	Professor, Hokkaido University	2007. 10. 21 – 10. 30
M.M. PANICKER	Professor, Neurobiology National Centre for Biological Sciences	KONDO Toru	Team Leader, Center for Development Biology RIKEN	2007. 10. 22 – 10. 25
Nibedita LENKA	Scientist D, Cell and Developmental Biology National Centre For Cell Science	KONDO Toru	Team Leader, Center for Development Biology RIKEN	2007. 10. 22 – 10. 25
Sanjeev KHOSLA	PI, Laboratory of Mammalian Genetics Centre for DNA Fingerprinting and Diagnostics	KONDO Toru	Team Leader, Center for Development Biology RIKEN	2007. 10. 22 – 10. 25
Geeta K. VEMUGANTI	Head, L V Prasad Eye Institute	KONDO Toru	Team Leader, Center for Development Biology RIKEN	2007. 10. 22 – 10. 26
Maneesha S. INAMDAR	Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	KONDO Toru	Team Leader, Center for Development Biology RIKEN	2007. 10. 22 – 10. 28
Mittal Jai PAL	Professor, Pune University, National Center for Free Radical Research	TAGAWA Seiichi	Professor, Osaka University	2007. 10. 22 – 11. 4
Sanjay G. DHANDE	Professor, Director of IIT Kanpur Indian Institute of Technology Kanpur	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	2008. 3. 9 – 3. 13
Atam D. KAUL	Chief Researcher, Central Scientific Instrument Organization Sector 30-C	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	2008. 3. 9 – 3. 15
Bodhibrata NAG	Professor, Operations Management Group	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	2008. 3. 9 – 3. 15
Peeyush MEHTA	Professor, Indian Institute of Technology kanpur	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	2008. 3. 9 – 3. 15
Rudra PRATAP	Professor, Cranes Sci MEMS Lab, Mechanical Engineering	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	2008. 3. 9 – 3. 15
Suhas S. JOSHI	Professor, Indian Institute of Technology, Bombay	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	2008. 3. 9 – 3. 15
Indranil SARKAR	PhD Student, Surface Physics Division, Saha Institute of Nuclear Physics	FUJIMORI Atsushi	Professor, The University of Tokyo	2008. 5. 28 – 6. 11
Periakaruppan T. MANOHARAN	Ramanna Fellow, SAIF, IIT/Madras	UTSUMI Hideo	Professor, Kyushu University	2008. 9. 27 – 10. 8

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Indian Researcher <Dispatched>		Japanese Researcher <Host>		Duration
Mrinal K. DAS	Associate Professor, University of Delhi	YUASA Manabu	Professor, Kindai University	2008. 10. 1 – 10. 14
Jogadhenu PRAKASH	Lecturer, University of Hyderabad	SUZUKI Iwane	Associate Professor, University of Tsukuba	2009. 1. 18 – 1. 31
Ajay K. SOOD	Professor, Indian Institute of Science	ENOKI Toshiaki	Professor, Tokyo Institute of Technology	2009. 2. 20 – 2. 24
Bhaskar THALLADA	Scientist, Catalytic Conversion Process Division, Indian Institute of Petroleum	WADA Yuji	Professor, Tokyo Institute of Technology	2009. 2. 20 – 3. 5
Dipankar CHATTERJI	Professor, Indian Institute of Science	ISHIHAMA Akira	Professor, Hosei University	2009. 2. 22 – 2. 28
Dhrubajyoti CHATTPADHYAY	Professor, Microbiology and Biochemistry University of Calcutta	KURODA Kazumichi	Associate Professor, Nihon University	2009. 2. 26 – 3. 3
Vidya ARANKALLE	Senior Deputy Director and Group Head, Hepatitis and Chikungunya Group, Indian Institute of Virology	HONDA Ayae	Professor, Hosei University	2009. 2. 27 – 3. 3
Vijaya SATCHIDANANDAM	Professor, Microbiology and Cell Biology, Indian Institute of Science	HONDA Ayae	Professor, Hosei University	2009. 2. 27 – 3. 5
Murugesan VELAYUTHAM	Professor, Anna University	OGURA Masaru	Associate Professor, The University of Tokyo	2009. 7. 31 – 8. 14
Paramatma Chandra MATHUR	Emeritus Fellow, Dept. of Electronic Science, University of Delhi South Campus	ONODA Mitsuyoshi	Professor, University of Hyogo	2009. 11. 2 – 11. 13
Pramod Kumar BHATNAGAR	Professor, Dept. of Electronic Science, University of Delhi South Campus	ONODA Mitsuyoshi	Professor, University of Hyogo	2009. 11. 2 – 11. 13
Jatinder Vir YAKHMI	Associate Director, Bhabha Atomic Research Centre	INOUE Katsuya	Professor, Hiroshima University	2009. 11. 8 – 11. 22
Reji PHILIP	Associate Professor, Optical Group, Raman Research Institute	ENDO Tamio	Professor, Mie University	2009. 12. 6 – 12. 6
Reddy Sanapa LAKSHMI	Reader in Physics, S.V.D. College	ENDO Tamio	Professor, Mie University	2009. 12. 6 – 12. 11
Sivanandam ARAVINDAN	Assistant Professor, Dept. of Mechanical Engineering, IIT Delhi	YOSHINO Masahiko	Professor, Tokyo Institute of Technology	2009. 12. 13 – 12. 24
Venkateswara Rao PARUCHURI	Professor, Dept. of Mechanical Engineering, IIT Delhi	YOSHINO Masahiko	Professor, Tokyo Institute of Technology	2009. 12. 13 – 12. 24
Karuna Kar NANDA	Assistant Professor, Indian Institute of Science	NAGAO Tadaaki	MANA Independent Scientist, WPI, National Institute for Material Science	2009. 12. 14 – 12. 23
Poonam TANDON	Professor, Physics Department, University of Lucknow	KUNIMOTO Ko-Ki	Professor, Kanazawa University	2009. 12. 16 – 12. 27
Vasantha M. S. GANGAVARAM	Scientist F, IICT	NARUTA Yoshinori	Distinguished Professor, Kyushu University	2010. 1. 6 – 1. 9
Gour Prasad DAS	Professor, Dept. of Materials Science, Indian Association for the Cultivation of Science	KAWAZOE Yoshiyuki	Professor, Tohoku University	2010. 1. 7 – 1. 16
Shyamaprosad GOSWAMI	Professor, Bengal Engineering and Science University, Shibpur	NARUTA Yoshinori	Distinguished Professor, Kyushu University	2010. 1. 13 – 1. 17
Zubaida Mohammed Amin ANSARI	Associate Professor, Jamia Millia Islamia (Central University)	TOMITORI Masahiko	Professor, Japan Advanced Institute of Science and Technology	2010. 1. 17 – 1. 30
Arvind AGARWAL	Professor, M.N. National Institute of Technology	FUJIKAWA Takashi	Professor, Chiba University	2010. 1. 24 – 2. 6
Bharatkumar Bhagatraj AHUJA	Professor, College of Engineering, Pune	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	2010. 3. 14 – 3. 20
NAGAHANUMAIAH	Scientist, Head, Central Mechanical Engineering Research Institute	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	2010. 3. 14 – 3. 20
Nallagundla Venkata REDDY	Professor, Indian Institute of Technology Kanpur	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	2010. 3. 14 – 3. 20
Ramesh Kumar SINGH	Professor, Indian Institute of Technology Bombay	KIUCHI Manabu	Professor Emeritus, The University of Tokyo	2010. 3. 14 – 3. 20
Murugesan VELAYUTHAM	Professor, Anna University	OGURA Masaru	Associate Professor, The University of Tokyo	2010. 9. 20 – 10. 2
Devendra K. OJHA	Associate Professor, Tata Institute of Fundamental Research	SATO Shuji	Professor, Nagoya University	2010. 11. 15 – 11. 19
Biswajit CHOWDHURY	Assistant Professor, Indian School of Mines	BANDO Kyoko	Senior Research Scientist, National Institute of Advanced Industrial Science and Technology	2010. 11. 24 – 12. 5
Raghu N. BERA	Assistant Professor, Basirhat College	AZUMI Reiko	Group Leader, Senior Researcher, National Institute of Advanced Industrial Science and Technology	2010. 12. 16 – 12. 29

Indian Researcher <Dispatched>		Japanese Researcher <Host>		Duration
Muthukonda Venkatakrishnan SHANKAR	Associate Professor & Head, Yogi Vemana University	IKUMA Yasuro	Professor, Kanagawa Institute of Technology	2011. 3. 9 – 3. 19
RAMASESHA, Suryanarayana	Professor, Indian Institute of Science	OKUMURA Mitsutaka	Professor, Osaka University	2011. 9. 17 – 9. 30
BISHT, Madho Singh	Professor, North-Eastern Hill University	MUKAI Yasuhiko	Professor, Osaka Kyoiku University	2011. 11. 2 – 11. 16
MURUGESAN, Velayutham	Professor, Anna University	OGURA Masaru	Associate Professor, The University of Tokyo	2012. 1. 22 – 2. 5
SATCHIDANANDAM, Vijaya	Professor, Indian Institute of Science	HONDA Ayae	Professor, Hosei University	2012. 2. 1 – 2. 9
MANNEPALLI, Lakshmi Kantam	Chief Scientist and Head, Indian Institute of Chemical Technology	KURODA Yasushige	Professor, Okayama University	2012. 2. 1 – 2. 14
ASWAL, Dinesh Kumar	Professor, Bhabha Atomic Research Center	KOMIYAMA Masaharu	Professor, University of Yamanashi	2012. 2. 1 – 2. 15
CHATTERJI, Dipankar	Professor, Indian Institute of Science	YAMAMOTO Kaneyoshi	Associate Professor, Hosei University	2012. 2. 26 – 3. 4
NAIR, Nisanth N.	Assistant Professor, Indian Institute of Technology Kanpur	SHIGA Motoyuki	Research Scientist, Japan Atomic Energy Agency	2012. 3. 1 – 3. 11
Dipankar DAS SARMA	Professor, Indian Institute of Science	SUZUKI Atsushi	Professor, Yokohama National University	2012. 9. 23 – 9. 29
Jai Pal MITTAL	MN SAHA Distinguished Professor, The National Academy of Sciences	MIYASAKA Hiroshi	Professor, Osaka University	2012. 11. 11 – 11. 24
S. K. GUPTA	Outstanding scientist and Head, Bhabha Atomic Research Center	KOMIYAMA Masaharu	Professor, University of Yamanashi	2013. 1. 6 – 1. 17
Bhaskaran MURALIDHARAN	Assistant Professor, IIT Bombay	WAKABAYASHI Katsunori	Independent Scientist, WPI Center for Materials Nanoarchitectonics National Institute for Materials Science	2013. 1. 20 – 1. 27
Sarkar PARAMITA	Graduate Student, Indian Institute of Science	YAMAMOTO Kaneyoshi	Associate Professor, Hosei University	2013. 2. 10 – 2. 17
Anuranjan ANAND	Professor and Chair, awaharlal Nehru Centre for Advanced Scientific Research (JNCASR)	YOKOTA Motihide	Director of Global Relations Office RIKEN	2013. 3. 14 – 3. 20
Gopalan RAGHAVAN	Scientist G, International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI)	HONO Kazuhiro	Director, National Institute for Materials Science	2013. 3. 16 – 3. 24
Butchi Venkata Rao TATA	Scientific Officer-H, Professor and Dean, Indira Gandhi Center for Atomic Research	YAMANAKA Junpei	Professor, Nagoya City University	2013. 3. 18 – 3. 30
Asoke Kumar SEN	Professor, Assam University	ITO Yoichi	Professor and Director, University of Hyogo	2013. 3. 24 – 3. 30
Ranjan GUPTA	Professor, Inter-University Centre for Astronomy and Astrophysics	ITO Yoichi	Professor and Director, University of Hyogo	2013. 3. 24 – 3. 30
Sudip BHATTACHARYYA	Reader-F, Tata Institute of Fundamental Research	DOTANI Tadayasu	Professor, Japan Aerospace Exploration Agency	2013. 12. 15 – 12. 22
Amlan J. PAL	Professor, Indian Association for the Cultivation of Science	MATSUSHITA Michio	Associate Professor, Nagoya University	2014. 1. 23 – 1. 26
Aswin S.N. SESHASAYEE	Young Investigator, Tata Institute of Fundamental Research GKVK	OGASAWARA Hiroshi	Assistant Professor, Shinshu University	2014. 1. 24 – 1. 30
Aaditya MANJANATH	Ph.D Student, Indian Institute of Science (IISc)	OHNO Kaoru	Professor, Yokohama National University	2014. 2. 2 – 2. 15
Punit PARMANANDA	Associate Professor, Indian Institute of Technology Bombay	NAKABAYASHI Seiichiro	Professor, Saitama University	2014. 2. 16 – 2. 26
Amiya Kumar PANDA	Associate Professor, University of North Bengal	MAKINO Kimiko	Professor, Tokyo University of Science	2014. 3. 3 – 3. 14
Naresh Patwari GANPATHI	Professor, Indian Institute of Technology Bombay	TERASAKI Akira	Professor, Kyushu University	2014. 3. 4 – 3. 11
Nilesh J. VASA	Professor, Indian Institute of Technology Madras	SHIRATANI Masaharu	Professor, Kyushu University	2014. 3. 11 – 3. 25
Nishant Koodali THAZATH	Assistant Professor, Indian Institute of Science Education and Research Thiruvananthapuram	SHINOHARA Akira	Professor, Osaka University	2014. 3. 15 – 3. 22
Butchi Venkata Rao TATA	Scientific Officer-H, Professor and Dean, Indira Gandhi Center for Atomic Research	SOGAMI Ikuo	Professor Emeritus, Kyoto Sangyo University	2014. 3. 18 – 3. 30
Dipankar Das SARMA	Professor, Indian Institute of Science	TABATA Hitoshi	Professor, The University of Tokyo	2014. 8. 23 – 8. 30
Arasambattu Kannan MUNIRAJAN	Professor, University of Madras	INOUE Ituro	Professor, National Institute of Genetics	2014. 10. 1 – 10. 15
Alokmay DATTA	Senior Professor & Head, Saha Institute of Nuclear Physics	YOSHIKAWA Kenichi	Professor, Doshisha University	2014. 12. 9 – 12. 18
Madhukar O. GARG	Director, CSIR-Indian Institute of Petroleum	SHIRAI Masayuki	Professor, Iwate University	2015. 1. 7 – 1. 14
Arnab SEN	Assistant Professor, Indian Association for the Cultivation of Science	SUWA Hidemaro	Research Associate, The University of Tokyo	2015. 1. 14 – 1. 25

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Indian Researcher <Dispatched>		Japanese Researcher <Host>		Duration
Surya Prakash SINGH	Scientist, CSIR-Indian Institute of Chemical Technology	OTSUKI Joe	Professor, Nihon University	2015. 1. 28 – 2. 8
Tapas K. KUNDU	Professor, Jawaharlal Nehru Center for Advanced Scientific Research	IGARASHI Kazuhiko	Professor, Tohoku University Graduate School of Medicine	2015. 2. 25 – 3. 7
Satyam SUWAS	Associate Professor, Indian Institute of Science	SHINGH Alok	Chief Researcher, National Institute for Material Science	2015. 3. 22 – 3. 31
Harinder P. SHINGH	Professor, University of Delhi	MATSUNAGA Noriyuki	Professor, The University of Tokyo	2015. 3. 25 – 4. 7
Ranjan GUPTA	Professor, The Inter-University Centre for Astronomy and Astrophysics (IUCAA)	MATSUNAGA Noriyuki	Professor, The University of Tokyo	2015. 3. 25 – 4. 7
Sonachalam ARUMUGAM	Professor, Bharathidasan University	UWATOKO Yoshiya	Professor, The University of Tokyo	2015. 10. 10 – 10. 25
Bhagavatula L. V. PRASAD	Scientist, National Chemical Laboratory	TERANISHI Toshiharu	Professor, Kyoto University	2015. 11. 17 – 11. 30
Tejwant Kang SINGH	Assistant Professor, Guru Nanak Dev University	KIMIZUKA Nobuo	Professor, Kyushu University	2015. 11. 29 – 12. 12
Goutam Kumar LAHIRI	Professor, Indian Institute of Technology, Bombay	HAGA Masa-aki	Professor, Chuo University	2016. 1. 15 – 1. 24
Samit CHATTOPADHYAY	Director, Indian Institute of Chemical Biology	MURAYAMA Kazutaka	Associate Professor, Tohoku University	2016. 2. 9 – 2. 21
Ramesh Chandra DEKA	Professor, Tezpur University	HIRAO Kimihiko	Director, RIKEN	2016. 2. 21 – 3. 5
Butchi Venkata Rao TATA	Outstanding Scientist, Indira Gandhi Center for Atomic Research	YAMANAKA Junpei	Professor, Nagoya City University	2016. 3. 7 – 3. 19
V.K. RATTAN	Professor, Panjab University	KAMINOYAMA Meguru	Professor, Yokohama National University	2016. 3. 8 – 3. 17
Madumbai Seshachalu NARASIMHAN	Professor, Distinguished Associate Indian Institute of Science, Bengaluru	KOTANI Motoko	Director and Professor, Tohoku University	2016. 12. 4 – 12. 17
Nirmal K. VISWANATHAN	Professor, University of Hyderabad	MIYAMOTO Yoko	Associate Professor, The University of Electro-Communications	2016. 12. 4 – 12. 17
Shyamal Kumar SAHA	Professor, Indian Association for the Cultivation of Science	KUSAKABE Koichi	Associate Professor, Osaka University	2017. 3. 1 – 3. 10
Ashutosh GUPTA	Associate Professor, Udai Pratap (Autonomous) College, Varanasi	SAKAKI Shigeyoshi	Senior Research Fellow, Kyoto University	2017. 3. 6 – 3. 19

List of Exploratory Exchange/Special Lecture Tour <From Japan to India>

* Note that cancellations and changes regarding the dispatched and accepted researchers may be included as the list was compiled in reference to the Activity Report prepared for the council meeting of the subject year.

Japanese Researcher <Dispatched>		Indian Researcher <Host>		Duration
KANDA Nobuyuki	Professor, Osaka City University	Sanjeev Vishnu DHURANDHAR	Professor, Inter University Center for Astronomy and Astrophysics	2006. 11. 12 – 11. 18
ENDO Tamio	Professor, Mie University	Kalyan CHATTOPADHYAY	Reader, Jadavpur University	2006. 12. 2 – 12. 10
YAMASAKI Hirofumi	Group Reader, National Institute of Advanced Industrial Science and Technology	Kalyan CHATTOPADHYAY	Reader, Jadavpur University	2006. 12. 2 – 12. 10
ENDO Kazuhiro	Professor, Kanazawa Institute of Technology	Kalyan CHATTOPADHYAY	Reader, Jadavpur University	2006. 12. 6 – 12. 10
ISHIHAMA Akira	Professor and Department Head, Hosei University	T. K. KUNDU & D. DASGUPTA	Professor, JNCASR Professor, SINP	2006. 12. 10 – 12. 17
YOSHIDA Akira	Emeritus Professor, Toyohashi University of Technology	R. M. MEHRA	R. M. Mehra Professor, University of Delhi South Campus	2006. 12. 15 – 12. 25
UMENO Masayoshi	Professor, Chubu University	R. M. MEHRA	Professor, University of Delhi South Campus	2006. 12. 16 – 12. 20
OHTAKE Naoto	Associate Professor, Nagoya University	S. G. DHANDE	Professor/ Director, IIT Kanpur	2006. 12. 16 – 12. 23
SAOTOME Yasunori	Professor, Gunma University	S. G. DHANDE	Professor/ Director, IIT Kanpur	2006. 12. 16 – 12. 23
MINOURA Hideki	Professor, Gifu University	R. M. MEHRA	Professor, University of Delhi South Campus	2006. 12. 16 – 12. 24
JIMBO Takashi	Professor, Nagoya Institute of Technology	R. M. MEHRA	Professor, University of Delhi South Campus	2006. 12. 17 – 12. 22
KIUCHI Manabu	Professor Emeritus, The University of Tokyo	S. G. DHANDE	Professor/ Director, IIT Kanpur	2006. 12. 17 – 12. 23
YANG Ming	Associate Professor, Tokyo Metropolitan University	S. G. DHANDE	Professor/ Director, IIT Kanpur	2006. 12. 17 – 12. 23
ONODA Mitsuyoshi	Professor, University of Hyogo	Pramod Kumar BHATNAGAR	Professor, University of Delhi, South Campus	2006. 12. 21 – 12. 27
MUKAI Yasuhiko	Professor, Osaka Kyoiku University	H. K. CHAUDHARY	Associate Professor, CSK HP Agricultural University	2007. 2. 18 – 3. 4
YUASA Manabu	Professor, Kindai University	Mrinal K. DAS	Lecturer, University of Delhi South Campus	2007. 2. 23 – 3. 7
DOYAMA Masao	Professor Emeritus, Teikyo University of Science and Technology	G. SUNDARARAJAN & S.B. KRUPANIDHI	Director, ARCI, Hyderabad Professor, IUMRS-ICAM, Indian Institute of Science.	2007. 10. 6 – 10. 14
YAMAMOTO Hiroshi	Professor, Nihon University	G. SUNDARARAJAN & S.B. KRUPANIDHI	Director ARCI, Hyderabad Professor, IUMRS-ICAM, Indian Institute of Science.	2007. 10. 6 – 10. 14
TAKAI Osamu	Professor, Nagoya University	G. SUNDARARAJAN & S.B. KRUPANIDHI	Director, ARCI, Hyderabad Professor IUMRS-ICAM, Indian Institute of Science.	2007. 10. 6 – 10. 15
ISHIHAMA Akira	Professor and Department Head, Hosei University	Dipankar CHATTERJI	Professor, Indian Institute of Science	2008. 1. 12 – 1. 17
SAKAI Mototsugu	Professor, Toyohashi University of Technology	G. SUNDARARAJAN	Director, International Advanced Research Center for Powder Metallurgy & New Materials	2008. 2. 3 – 2. 11
YUASA Manabu	Professor, Kindai University	Lal M. SAHA	Professor, University of Delhi	2008. 2. 20 – 3. 2
ENOKI Toshiaki	Professor, Tokyo Institute of Technology	Baldev RAJ	Distinguished Scientist & Director, Indira Gandhi Centre for Atomic Research	2008. 2. 26 – 2. 29
YUASA Manabu	Professor, Kindai University	Mrinal K. DAS	Associate Professor, University of Delhi	2008. 12. 21 – 1. 3
EBITANI Kohki	Professor, Japan Advanced Institute of Science and Technology	M. Lakshmi KANTAM	Head, Indian Institute of Chemical Technology	2009. 1. 7 – 1. 12
DOYAMA Masao	Professor Emeritus, Teikyo University of Science and Technology	G. SUNDARARAJAN	Director, ARCI	2009. 1. 16 – 1. 27
YOSHIIE Toshimasa	Professor, Kyoto University	G. SUNDARARAJAN	Director, ARCI	2009. 1. 18 – 1. 23
ICHIMURA Masaya	Professor, Nagoya Institute of Technology	Perumalsamy RAMASAMY	Dean, Sri Sivasubramaniya Nadar (SSN) College of Engineering	2009. 1. 21 – 1. 30
OGURA Masaru	Associate Professor, The University of Tokyo	Velayutham MURUGESAN	Professor of Chemistry, Anna University	2009. 2. 15 – 2. 22

V. Appendix-10

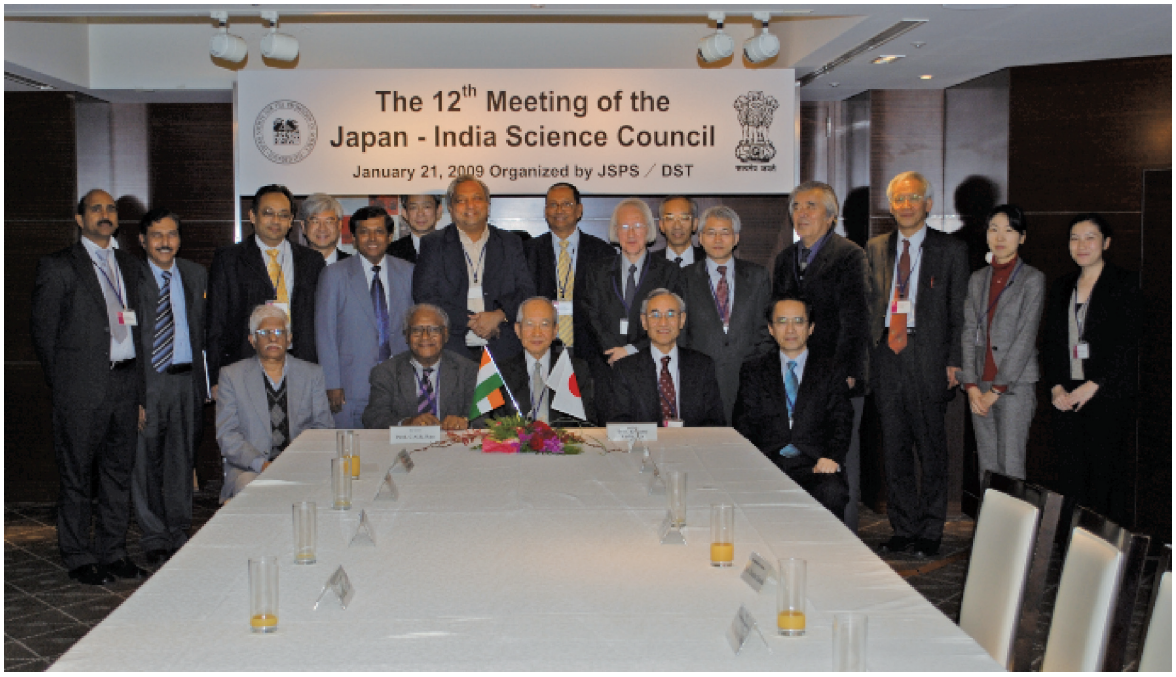
Japanese Researcher <Dispatched>		Indian Researcher <Host>		Duration
KOMORI Fumio	Professor, The University of Tokyo	Parlapalli V. SATYAM	Assistant Professor, Institute of Physics	2009. 2. 21 – 3. 1
ISHIHAMA Akira	Professor and Department Head, Hosei University	Dipankar CHATTERJI	Professor, Indian Institute of Science	2009. 2. 28 – 3. 5
TAKAHASHI Susumu	Professor, Nihon University	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2009. 3. 8 – 3. 13
AKIYAMA Masayoshi	Professor, Kyoto Institute of Technology	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2009. 3. 8 – 3. 15
KIUCHI Manabu	Emeritus Professor, The University of Tokyo	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2009. 3. 8 – 3. 15
KUBOKI Takashi	Associate Professor, University of Electro-communications	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2009. 3. 8 – 3. 15
MING Yang	Professor, Tokyo Metropolitan University	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2009. 3. 8 – 3. 15
SAOTOME Yasunori	Professor, Tohoku University	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2009. 3. 8 – 3. 15
KANEDA Hidehiro	Associate Professor, Nagoya University	Devendra Kumar OJHA	Associate Professor, Tata Institute of Fundamental Research	2009. 10. 3 – 10. 7
ONAKA Takashi	Professor, The University of Tokyo	Devendra Kumar OJHA	Associate Professor, Tata Institute of Fundamental Research	2009. 10. 3 – 10. 10
SAKON Itsuki	Assistant Professor, The University of Tokyo	Devendra Kumar OJHA	Associate Professor, Tata Institute of Fundamental Research	2009. 10. 3 – 10. 10
NAKAGAWA Takao	Professor, Japan Aerospace Exploration Agency, JAXA	Devendra Kumar OJHA	Associate Professor, Tata Institute of Fundamental Research	2009. 10. 4 – 10. 8
NAKAJIMA Yasushi	Post-Doctoral Researcher, Nagoya University	Devendra Kumar OJHA	Associate Professor, Tata Institute of Fundamental Research	2009. 10. 4 – 10. 8
TOMINAGA Keisuke	Professor, Kobe University	Biman Bagchi	Professor, Indian Institute of Science	2009. 11. 1 – 11. 6
NARUTA Yoshinori	Distinguished Professor, Kyushu University	G. V. M. SHARMA	Scientist F, IICT	2009. 11. 3 – 11. 11
SAITO Riichiro	Professor, Tohoku University	Swapan PATI	Associate Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2009. 11. 16 – 11. 19
SATO Bun'ei	Assistant Professor, Tokyo Institute of Technology	Abhijit CHAKRABORTY	Reader, Physical Research Laboratory	2009. 12. 3 – 12. 7
SHIBAI Hiroshi	Professor, Osaka University	Abhijit CHAKRABORTY	Reader, Physical Research Laboratory	2009. 12. 3 – 12. 7
SHIRAI Koun	Associate Professor, Osaka University	Ravi Kant SONI	Professor, Indian Institute of Technology, Dehli	2009. 12. 14 – 12. 17
SUZUKI Atsushi	Professor, Yokohama National University	Bhuvanesh GUPTA	Professor, Textile Technology, Indian Institute of Technology	2009. 12. 16 – 12. 20
Lok Kumar SHRESTHA	Post-doctoral Fellow, Yokohama National University	Bhuvanesh GUPTA	Professor, Textile Technology, Indian Institute of Technology	2009. 12. 16 – 12. 24
KAWAI Jun	Professor, Kyoto University	Nand Lal MISRA	Scientific Officer-F and Associate Professor, Bhabha Atomic Research Centre	2009. 12. 20 – 12. 25
TOMITORI Masahiko	Professor, Japan Advanced Institute of Science and Tehcnology	Zubaida Mohammed Amin ANSARI	Associate Professor, Jamia Millia Islamia(Central University)	2009. 12. 21 – 12. 26
OGURA Masaru	Associate Professor, The University of Tokyo	Velayutham MURUGESAN	Professor, Anna University	2010. 2. 18 – 2. 24
YAMANAKA Akinori	Assistant Professor, Tokyo Institute of Technology	Sivanandam ARAVINDAN	Assistant Professor, IIT Delhi	2010. 2. 25 – 3. 2
YOSHINO Masahiko	Professor, Tokyo Institute of Technology	Sivanandam ARAVINDAN	Assistant Professor, IIT Delhi	2010. 2. 25 – 3. 2
NAGAO Tadaaki	MANA Independent Scientist, WPI Research Center for Materials Nanoarchitectonics, National Institute for Materials Science	K. K. NANDA	Assistant Professor, Indian Institute of Science	2010. 3. 9 – 3. 13
ASADA Toshio	Associate Professor, Osaka Prefecture University	Pradipta BANDYOPADHYAY	Associate Professor, Jawaharlal Nehru University	2011. 1. 15 – 1. 26
AKIYAMA Masayoshi	Professor, Kyoto Institute of Technology	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2011. 3. 20 – 3. 25
KIUCHI Manabu	Emeritus Professor, The University of Tokyo	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2011. 3. 20 – 3. 25
SAOTOME Yasunori	Professor, Tohoku University	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2011. 3. 20 – 3. 25
ENDO Jun-ichi	Professor, Kanagawa Technological University	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2011. 3. 21 – 3. 25
KUBOKI Takashi	Associate Professor, University of Electro-Communications	Sanjay D. DHANDE	Director, Professor, IIT Kanpur	2011. 3. 21 – 3. 25

Japanese Researcher <Dispatched>		Indian Researcher <Host>		Duration
OGURA Masaru	Associate Professor, The University of Tokyo	Velayutham MURUGESAN	Professor, Anna University	2011. 12. 19 – 12. 23
HOSHINO Yoichiro	Assistant Professor, Hokkaido University	Thuruthiyil Dennis THOMAS	Lecturer, St. Thomas College	2012. 3. 3 – 3. 10
YASE Kiyoshi	Director, National Institute of Advanced Industrial Science and Technology	Punit PARMANANDA	Associate Professor, Indian Institute of Technology Bombay	2012. 3. 11 – 3. 15
TATAMI Junichi	Associate Professor, Yokohama National University	G. SUNDARARAJAN	Director, International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)	2012. 3. 11 – 3. 17
ENDO Tamio	Professor, Mie University	Rita JOHN	Associate Professor, University of Madras	2012. 9. 29 – 10. 3
ARISAWA Shunichi	Senior Researcher, National Institute for Materials Science	Rita JOHN	Associate Professor, University of Madras	2012. 9. 29 – 10. 6
KANEKO Satoru	Senior Researcher, Kanagawa Industrial Technology Center	Rita JOHN	Associate Professor, University of Madras	2012. 9. 29 – 10. 6
SHIMADA Tomohiro	Assistant Professor, Tokyo Institute of Technology	J. GOWRISHANKAR	Director, Centre for DNA Fingerprinting and Diagnostics	2012. 11. 19 – 11. 25
IWATA Nobuyuki	Lecturer, Nihon University	M.K. JAYARAJ	Professor, Cochin University of Science and Technology	2013. 1. 2 – 1. 7
NISHIKAWA Hiroaki	Associate Professor, Kindai University	M.K. JAYARAJ	Professor, Cochin University of Science and Technology	2013. 1. 2 – 1. 7
ICHIMURA Masaya	Professor, Nagoya Institute of Technology	M.K. JAYARAJ	Professor, Cochin University of Science and Technology	2013. 1. 2 – 1. 8
SASAKI Takehiko	Associate Professor, The University of Tokyo	Bhalchandra M. BHANAGE	Institute of Chemical Technology	2013. 2. 9 – 2. 17
OYABU Shinki	Assistant Professor, Nagoya University	Devendra OJHA	Professor, Tata Institute of Fundamental Research	2013. 2. 14 – 2. 17
MURATA Keizo	Professor, Osaka City University	Sonachalam ARUMUGAM	Professor, Bharathidasan University	2013. 2. 14 – 2. 24
MATSUSHITA Michio	Associate Professor, Nagoya University	Amlan J. PAL	Professor, Indian Association for the Cultivation of Science	2013. 11. 5 – 11. 8
NAKABAYASHI Seiichiro	Professor, Saitama University	Punit PARMANANDA	Associate Professor, Indian Institute of Technology Bombay	2013. 11. 18 – 11. 25
ARAKAWA Masashi	Assistant Professor, Kyushu University	Naresh Patwari GANPATHI	Professor, Indian Institute of Technology Bombay	2014. 1. 5 – 1. 12
TERASAKI Akira	Professor, Kyushu University	Naresh Patwari GANPATHI	Professor, Indian Institute of Technology Bombay	2014. 1. 5 – 1. 12
FUJITA Shinichiro	Lecturer, Hokkaido University	Bhalchandra M. BHANAGE	Professor, Institute of Chemical Technology Mumbai	2014. 1. 13 – 1. 22
ABE Hideki	Principal Researcher, National Institute for Materials Science	Nitin Kumar LABHASETWAR	Principal Scientist, CSIR-National Environmental Engineering Research Institute	2014. 1. 14 – 1. 20
SHIOHAMA Katsuhiro	Research fellow, Fukuoka University	Bankteshwar TIWARI	Associate Professor, Banaras Hindu University Varanasi	2014. 2. 15 – 2. 28
KOSHIHARA Shinya	Professor, Tokyo Institute of Technology	Kankan BHATTACHARYYA	Professor, Indian Association for the Cultivation of Science	2014. 2. 20 – 3. 2
NAKAYAMA Akira	Associate Professor, Hokkaido University	Nisanth N. NAIR	Assistant Professor, Indian Institute of Technology Kanpur	2014. 3. 2 – 3. 12
YAMASHITA Makoto	Assistant Professor, Ochanomizu University	Debashish GOSWAMI	Professor, Statistics and Mathematics Unit Kolkata, Indian Statistical Institute	2014. 3. 9 – 3. 15
IWAOKA Michio	Professor, Tokai University	Govindasamy MUGESH	Professor, Indian Institute of Science	2014. 12. 13 – 12. 25
SHIMOI Yukihiro	Chief Senior Researcher, National Institute of Advanced Industrial Science and Technology	Parameswar K., IYER	Professor, Indian Institute of Technology Guwahati	2015. 1. 11 – 1. 22
HAYANO Hitoshi	Professor, High Energy Accelerator Research Organization (KEK)	Rohini M. GODBOLE	Professor, Indian Institute of Science	2015. 2. 5 – 2. 12
IKEDA Susumu	Professor Emeritus, High Energy Accelerator Research Organization (KEK)	Rohini M. GODBOLE	Professor, Indian Institute of Science	2015. 2. 5 – 2. 12
URAKAWA Junji	Professor Emeritus, High Energy Accelerator Research Organization (KEK)	Rohini M. GODBOLE	Professor, Indian Institute of Science	2015. 2. 5 – 2. 12
HOSOYAMA Kenji	Professor Emeritus, High Energy Accelerator Research Organization (KEK)	Rohini M. GODBOLE	Professor, Indian Institute of Science	2015. 2. 8 – 2. 12
KAWAZOE Yoshiyuki	Professor Emeritus, Tohoku University	Gour Prasad DAS	Senior Professor, Indian Association for the Cultivation of Science	2015. 2. 15 – 2. 25

V. Appendix-10

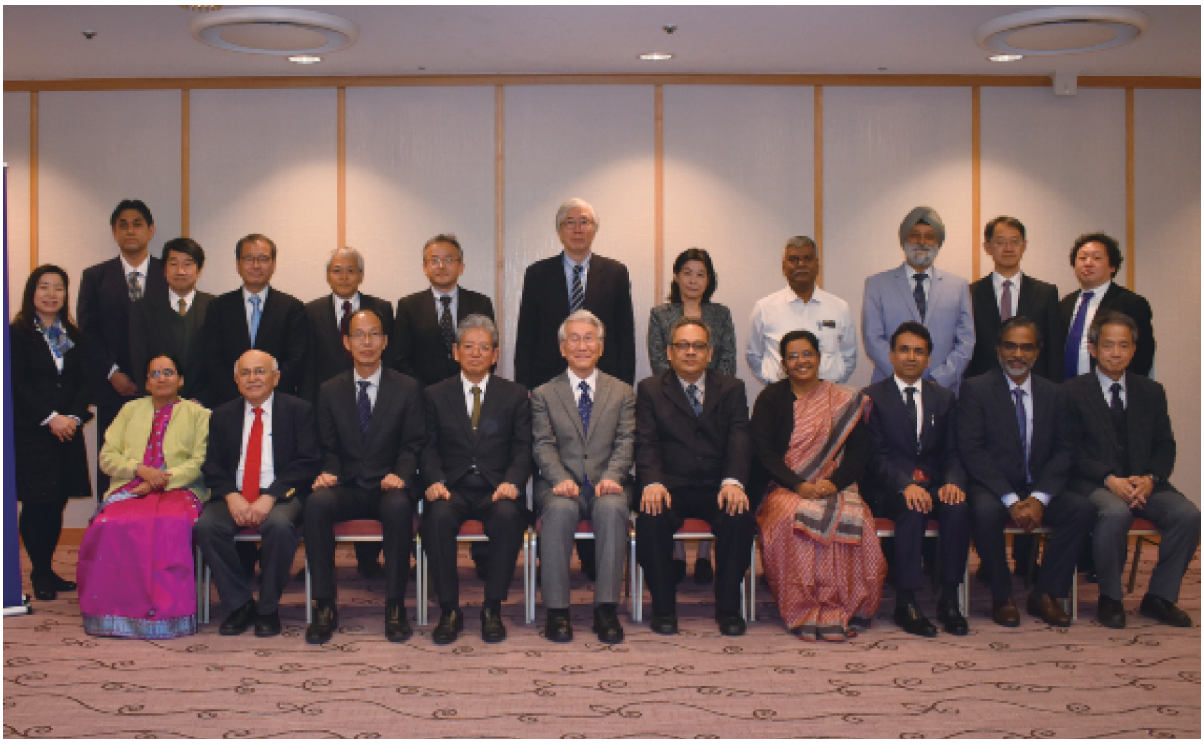
Japanese Researcher <Dispatched>		Indian Researcher <Host>		Duration
NAITO Masanobu	Principal Researcher, National Institute for Material Science	Ajayaghosh AYYAPPANPILLAI	CSIR-Outstanding Scientist CSIR-National Institute for Interdisciplinary Science and Technology (CSIR-NIIST)	2015. 2. 28 – 3. 8
YAMASHITA Makoto	Professor, Ochanomizu University	V. S. SUNDER	Professor, The Institute of Mathematical Sciences	2015. 3. 8 – 3. 20
NAGAI Keiji	Associate Professor, Tokyo Institute of Technology	Ramaraj RAMASAMI	Professor, Madrai Kamaraj University	2015. 12. 2 – 12. 15
AKITSU Takashiro	Associate Professor, Tokyo University of Science	Rakesh K. SONI	Head of Department Chaudhary Charan Singh University	2015. 12. 4 – 12. 12
KOBAYASHI Ichizo	Professor, The University of Tokyo	Desirazu N. RAO	Professor and Chairman, Indian Institute of Science	2015. 12. 7 – 12. 18
KANEKO Satoru	Senior Researcher, Kanagawa Industrial Technology Center	Subindu KUMAR	Assistant Professor, Indian School of Mines	2015. 12. 10 – 12. 20
ENDO Tamio	Professor, Gifu University	Subindu KUMAR	Assistant Professor, Indian School of Mines	2015. 12. 10 – 12. 21
KAWAZOE Yoshiyuki	Professor, Tohoku University	Kumar VIJAY	Senior Professor, Shiv Nadar University	2016. 1. 5 – 1. 14
ONODA Mitsuyoshi	Professor, University of Hyogo	Tinku BASU	Professor & Dy. Director, Amity University Uttar Pradesh	2016. 1. 24 – 1. 30
SHIOHAMA Katsuhiro	Research fellow, Fukuoka Institute of Technology	Ravi KULKAMI	Chair Professor, Indian Institute of Technology, Bombay	2016. 1. 31 – 2. 13
NAKANISHI Takashi	Professor, WPI-MANA, National Institute for Materials Science	Subi J. GEORGE	Associate Professor, Jawaharlal Nehru Centre for Advanced Scientific Research	2016. 2. 25 – 3. 4
HAGA Masa-aki	Professor, Chuo University	Goutam Kumar LAHIRI	Professor, Indian Institute of Technology, Bombay	2016. 2. 28 – 3. 11
ENDO Tamio	Professor, Gifu University	Ram ANDON	Professor, University of Delhi	2016. 11. 3 – 11. 12
KANEKO Satoru	Senior Researcher, Kanagawa Industrial Technology Center	Ram ANDON	Professor, University of Delhi	2016. 11. 3 – 11. 12
UCHIYAMA Kiyoshi	Professor, Tsuruoka College	Ram ANDON	Professor, University of Delhi	2016. 11. 3 – 11. 12
OKIMOTO Yoichi	Associate Professor, Tokyo Institute of Technology	Pratik SEN	Associate Professor, Indian Institute of Technology Kanpur	2016. 11. 16 – 11. 25
Lok Kumar SHRESTHA	Senior Researcher, WPI-MANA, National Institute for Materials Science	Somobrata ACHARYA	Associate Professor, Indian Association for the Cultivation of Science	2017. 1. 1 – 1. 19

8th Council Meeting



12th Council Meeting

18th Council Meeting



20th Council Meeting