

2. Summary of Proposal

(Compile in English within 3 pages.)

Host institution	Tohoku University
Head of host institution	Susumu Satomi, President, Tohoku University
Research center	WPI Advanced Institute for Materials Research
Center director	Motoko Kotani
Chief center-project officer (in October 2007)	Yoshinori Yamamoto, Director, WPI Advanced Institute for Materials Research
Project summary	<p>The aims of the WPI Advanced Institute for Materials Research are (1) to create new materials science and develop new functional materials through deep understanding and control at atomic and molecular level, (2) to construct the processes and devices through those materials, and (3) to construct new systems using those devices and materials leading to social welfare. Cooperation and unification of the existing institutes on individual discipline (materials science, physics, chemistry, and engineering) at Tohoku University, whose activities are already at world-top level, together with incorporating world top-class researchers from abroad and from domestic institutes, must organize a dream team for materials science. Through interdisciplinary fusion and incorporating a mathematical viewpoint, we create entirely new materials with innovative functions, contributing the welfare of mankind.</p>
Mission statement and/or center's identity	<p>Since its establishment, AIMR has continuously pursued the creation of new materials science and revolutionary functional materials by gathering researchers from various fields. The main goal is to promote the common understanding of materials based on the knowledge of different size scales from atoms to materials and different materials such as metals, ceramics, polymers and biomaterials. There is no change in this concept. However, based on the results of discussion and collaborative research carried out during the first five years, we crystallized our mission in a more clear form: to discover common elements and universal principles among various materials and create new materials science which can predict new functions. To accomplish this mission, we inject mathematical viewpoints into materials science and accelerate fusion research toward the goal. We have established the three target projects (1) Non-equilibrium Materials based on Mathematical Dynamical Systems, (2) Topological Functional Materials, and (3) Multi-Scale Hierarchical Materials based on Discrete Geometric Analysis.</p> <p>In AIMR, material scientists and mathematicians join hands in explaining new phenomena measured by AIMR's top class equipment and elucidate the mechanism lying behind the structure-function relationship. This challenge to elucidate the mechanism of function manifestation and link it to the creation of new materials is unprecedented anywhere else in the world. Materials scientists from diverse backgrounds and mathematicians are gathered in a single place and challenge ambitious investigations to create new materials with revolutionary functions, and contribute to society—that is the identity of AIMR.</p>
Research fields	<p>"From Atom and Molecule to Materials", New materials science from interdisciplinary research</p> <p>Integration of the six research fields on Material sciences, Physics, Chemistry, Electronics engineering and information sciences, Precision and mechanical engineering, and Mathematics</p>
Research objectives	<p>The main objective of the Center is to promote the creation of new materials science under a world-leading organization for interdisciplinary</p>

	<p>research through deep understanding and control at atomic and molecular level, departing from the traditional approaches and moving towards the next generation. In addition to basic research, the Center will pursue (1) to create new compounds and materials with innovative functions which exceed existing ones, (2) to construct devices based upon a new fundamental paradigm, and (3) to promote applied research projects on materials and system architecture that will generate direct societal impacts. In addition, the Center will establish innovations in understanding diverse material functions through the creation of new basic materials and compounds which brings significant benefits for the future of humanity.</p>
Outline of management	<p>In the bid for a rapid and flexible decision making process, we maintain a top-down command system governed by our Center Director. The Executive Committee composed of the Director, Administrative Director and five Research Group leaders disseminates the Director's message and intensifies exchange of information. Besides PI meeting and Staff meeting are regularly held. Aimed for the support of a Center Director's top-down decision making system, the "International Advisory Board" which includes Nobel Laureate board members, advises the Center Director. We will also prepare strong staff backup functions for accounting, personnel, research support, liaison and public relations works so that the researchers can devote themselves to research. The International Relation Unit will assist foreign researchers in a unified manner.</p> <p>To secure the independence of the center administration, the host institution will limit its authority to extremely important items such as the appointment and dismissal of the Center Director, and leave all other personnel, budget execution and other items effectively under the discretion of the Center Director. Also, the university will activate environmental improvements concerning flexible approaches, revisions and betterment of the university's system upon the center director's request with help of the Executive Vice President in charge of Research as liaison.</p>
Researchers and other center staffs, satellites, partner institutions	<ul style="list-style-type: none"> • 33 PIs (including 12 People from abroad); the number of total researchers is 146 including 73 foreign people; the number of total people of the Center is 220 at the final goal (at the end of FY2016). • Major PIs; Tadafumi Adschiri, Mingwei Chen, Masayoshi Esashi, Alan Lindsay Greer, Yasumasa Nishiura, Hideo Ohno, Takashi Takahashi, Paul S. Weiss, Qi-Kun Xue, Alain Reza Yavari • Satellites; (1) University of Cambridge, (2) Institute of Chemistry, Chinese Academy of Sciences, (3) University of California, Santa Barbara • 15 partner institutions including the three satellites
Administrative director	Masaru Tsukada
Outline of research environment	<p>As to administrative tasks, we will prepare strong staff backup functions for accounting, personnel, research support, liaison and public relations, outreach works so that the researchers can devote themselves to research. Moreover, a Researcher Support Office will be set up where senior mentor will arrange a one-stop-services for the researchers.</p> <p>The performance of center researchers will be strictly evaluated and the researchers' salary assessments will be determined based on the evaluation results. Employment of researchers including PIs will be basically determined by international recruitment. The necessary start-up funds will be provided in cases when the invited researchers require funds to vigorously continue their own research when they are initially transferred to the center.</p> <p>In the recruitment of post-doctoral researchers, we will secure personnel via international recruitment. The researchers will be strictly evaluated at renewal time. We will provide the researchers with research support from senior mentors and otherwise promote the organic development of research.</p> <p>In addition to the existing research space of our university, newly-created WPI main building provides the space for interactions and outreach activities, such as combination room and multi-purpose hall.</p>

	<p>The International Advisory Board, including Nobel Prize laureates as members, which will report directly to the Center Director to support top-down type decision making by the Center Director.</p> <p>We also hold international research conferences assembling top-level researchers from over the world on a regular basis.</p>											
Outline of indicators for evaluating a center's global standing	<p>Researcher ID is continuously used for thorough evaluations of research activities. Moreover, to evaluate our global standing in the field in a transparent manner, international and visible criteria such as the number of international prizes, and number of citation of papers and top 1 % paper are also used. ISI Highly Cited Researcher List is also checked. For research projects that take longer to generate outcomes, a comprehensive approach to evaluation will be taken with peer reviews of distinguished researchers inside and out side Japan.</p>											
Securing research funding	<p>Tohoku University supports the fund for research, setting up instruments and equipment necessary for research at the Center. Besides, Principal Investigators annually obtain from subsidies the outside sources totaling US\$ 28,500,000 on average. We expect to receive similar (or even higher) amounts of research funding years to come. In addition, the University keeps paying salaries of Principal Investigators who were affiliated with the host institution prior to joining AIMR.</p>											
Appropriations plan (Exchange Rate: JPY/USD=80)	FY	2012	2013	2014	2015	2016	Total					
	Cost (\$ millions)	16.68	16.68	16.68	16.68	16.68	83.40					
Summary of host institution's commitment	<p>Tohoku University clearly stipulates the strengthening and support for AIMR as a priority in its interim plan. The Tohoku University action plan "Inoue Plan 2007 (Revised for 2011)" released in June 2011 also clearly stipulates that the university will reinforce the organization of AIMR as a measure for playing a leading role as part of a top-class international network. The support for the Center is a shared determination of the university and the policy will be passed to the next president.</p> <p>The host institution already provided the laboratory for the Mathematics Unit and a library in the WPI-AIMR main building constructed with the subsidies of MEXT. Additionally, the host institution will pay the personnel expenses, other required items as research expenses and other researcher support, the installation of apparatus required for research at the center, the refurbishing of research space.</p> <p>To secure the independence of the center administration, the host institution will limit its authority to extremely important items such as the appointment and dismissal of the Center Director, and leave all other personnel, budget execution and other items effectively under the discretion of the Center Director.</p> <p>The host institution will support the In-house Council of AIMR comprising heads of related departments and research institutes and coordinate with the departments by taking their educational activities into consideration.</p> <p>We have already established the International Advisory Board which advises the Center Director to support top-down type decision making.</p> <p>Also, so that work at the center can be conducted smoothly in English, we will assign staff with superior English skills, in addition to expertise in such fields as accounting, personnel and research assistance, as administrative staff on a priority basis.</p> <p>A standing task team will also be established with the Executive Vice President in charge of Research as its lead for rapid examinations and responses in cases when the Center Director requests the flexible administration, revision, improvement or adjustment of the host institution's systems, and the host institution will otherwise prepare an environment for the smooth conduct of top management by the Center Director.</p> <p>After the completion of the program, the cooperation among the related departments and research institutes achieved by AIMR will serve as a base for developing new integrated organization for materials research.</p>											

