World Premier International Research Center (WPI) Initiative
Comments on FY2007 WPI Project Progress by Program Committee

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1. Status of overall progress

Research Organization, Management, Training System

The International Center for Materials Nanoarchitectonics (MANA) has gotten off to a good start against a background of previous activities under NIMS's Nanotechnology Support Network and International Center for Young Scientists (ICYS) project. The Network has served to form the infrastructure for the center's R&D activities by providing support systems such as nanotechnology foundry with world-class research instruments and facilities and a well-established international administrative support system. ICYS has provided the foundations for recruiting and employing overseas researchers, particularly young scientists, through a 3D (double-mentor, double-affiliation, double-discipline) system. Many senior and young researchers from abroad have joined MANA (60 foreigners out of 170 members), reflecting its excellent international support system. As of March 31, MANA has 22 PIs (15 Japanese and 7 foreigners): 15 from NIMS (12 Japanese and 3 foreigners) and 7 from satellites, comprising two Japanese universities and three universities and one institute in the US and Europe. It also has 11 young scientists (9 Japanese and 2 foreigners) and 37 postdoctoral fellows, 81% of whom are foreigners. As a whole, MANA has an excellent framework of international collaboration. Furthermore, MANA is well organized under the governance and management of the Center Director and Host Institution Head.

MANA should continue experimenting with innovative organizational reforms while exploring future-oriented ideas and long-term possibilities and focusing on research milestones that will add a time dimension to its research agenda. Such will be essential for it to maintain the excellent structure of its organization and become a genuinely original WPI research center, capable of attracting researchers from around the world. The key to achieving this will be to recruit international and world-class PIs and young researchers as well as to focus on integrated research based on the new concept "nanoarchitectonics."

2. Points that need improvement

WPI Laboratory

MANA has modified its initial plan and made a decision to integrate the offices of its PIs into one building. This is a major step forward to realizing a "visible" research center, and MANA's decision to do is praiseworthy. Therefore, when the facility will be completed should be clearly stated. It is desirable that it be introduced at an early stage as a place for continually renewing the WPI organization, generating new ideas on future innovation, integrating the five MANA research groups, and facilitating interaction and collaboration.

Research organization

In advancing nanoarchitectonics, the establishment and operation of the four technical groups is desirable. However, if each group conducts investigations in only its own field, it will be difficult to make breakthroughs in nanotechnology. The integration of both researchers and research contents will be essential. For MANA to become a world-leading nanoscience research center, each of its groups should recruit top world researchers, while considering the possibility of rotating members among the groups. In this respect, some fields should be strengthened, particularly the fields of *ab initio* and multi-scale computational simulations, computational nano-materials and device design, and mesoscopic theoretical chemistry, which complement the research in MANA's four technical groups. Unifying or integrating the key technologies should be aggressively challenged. Exchange of researchers also needs to be promoted between MANA and universities.

Research Satellites

Collaboration with satellites by merely providing research funding does not constitute an effective cooperative relationship. MANA should develop concrete joint projects or other mechanisms that involve the satellites in its activities. **1) Overseas:** The abilities of excellent foreign PIs should be effectively used by designing attractive programs for them. Since MANA is located in the Tsukuba area, which is not easily accessible for young students, it will be important to hold international workshops on nanoarchitectonics at universities and institutions in Japan, through which MANA can be advertised and excellent young researchers recruited. **2) Domestic:** The Nano-Science and Technology Project is being carried out in the Nanotechnology Research Institute of the National Institute of Advanced Industrial Science and Technology (AIST) in Tsukuba with a staffing scale comparable to MANA's. Though AIST has a competitive relationship with MANA, it will be important to build a cooperative partnership with it to advance R&D in this field. Both organizations are supported by the Japanese government, but have different missions within the

nanotechnology domain. Nevertheless, greater prospects for future outcomes can be expected through collaboration, rather than competition. Interchange among researchers of the two organizations should be encouraged through joint seminars and other activities.

3. Others

In addition, the following are some opinions expressed by the program committee members.

1. An aggressive challenge should be made to unify and integrate the key technologies with an eye to pioneering the next generation of innovative nano-materials and nano-sciences. To make the institute a globally attractive WPI center, it will be essential to set original research goals with impactful ripple effects and to seek highly creative research results, even if the number of researchers is limited. It would be desirable to have a committee to discuss the future prospects and directions of nanotech devices and systems.

2. For a research institute that is not a university, it is particularly important to develop channels through which to bring in new, fresh ideas and points of view. The existing young scientist program is good, but it is not clear whether it provides young scientists with sufficient freedom to try new things. The research agenda may be set too much from a top-down perspective.

3. The relationship between MANA and NIMS is a bit unclear. A clear differentiation should be made between the two organizations. If MANA does not maintain a distinct identity, it is feared that its project will be seen as buried among NIMS's other projects. It is not clear how MANA's approach to facilitate collaboration differs from what is already being used in NIMS. MANA needs to declare how it intends to deliver on its goals and ambitions with respect to management style, autonomy and freedom, and other operational aspects.

4. MANA people should be aware that they are paving a new way for other independent administration research institutions. They should take the lead in making changes and addressing challenges relative to other governmental research organizations as well.