Circulating the World's Best Brains

Recently, global competition in recruiting the best and the brightest researchers has intensified, accelerating the global flow of top scientific minds. Six WPI research centers, each led by a brilliant scientist, are taking on the formidable challenge of establishing highly visible research hubs that attract top-notch researchers from all over the world, while making quantum leaps in advancing science and technology.

wpi World Premier International Research Center Initiative

Dr. Yoshinori Yamamoto

Director
Advanced Institute for Materials Research (AIMR)
Tohoku University

AIMR's mission is to establish a Premier Research Center for materials science, to reform the conventional Japanese research and management systems, and to construct a "visible center" through tie-up research with overseas researchers in international networks and satellite centers. To achieve this goal, research that fuses physics, chemistry, materials science, bioengineering and electronic/mechanical engineering is proceeding actively.

Dr. Hitoshi Murayama

Director
Institute for the Physics and Mathematics of the Universe (IPMU)
The University of Tokyo

Gazing up at the stars, we all wonder. What is the universe made of? How did it begin? What is its fate? What fundamental laws govern it? Why do we exist at all? The aim of IPMU is to address these rather naive but most basic and profound questions about the Universe using the power of forefront science. We do so by integrating the traditionally separate disciplines of mathematics, physics, and astronomy.

Dr. Norio Nakatsuji

Director
Institute for Integrated Cell-Material Sciences (iCeMS)
Kyoto University

The iCeMS at Kyoto University aims to create a new cross-disciplinary field fusing cell and material sciences, supported by an advanced research environment unprecedented for Japan. All of this takes place in an open, collaborative, and internationally-minded setting with an eye toward active science communication and strong principles of scientific integrity.

Dr. Shizuo Akira

Director
Immunology Frontier Research Center(IFReC)
Osaka University

The imaging techniques for visualizing the immune system are still in the early stage of development. To extend our understanding of functions of the immune system in vivo, in addition to new imaging technologies, interdisciplinary efforts in physics, computer science and immunology are required. I believe that fusion of all research fields gathered in IFReC will surely bring innovation to immunology.

Dr. Masakazu Aono

Director
International Center for Materials Nanoarchitectonics (MANA)
National Institute for Materials Science

Many of future technologies necessary for the sustainable development of our society in the 21st century cannot be realized without the development of novel materials. To meet the demand, MANA is attempting to open a new paradigm of materials development based on a new technology system named "nanoarchitectonics". In this realm we also regard the fostering of young research leaders to be important.

Dr. Petros Sofronis

Director
International Institute for Carbon-Neutral Energy Research (I²CNER)
Kyushu University

The mission of I²CNER is to contribute to the creation of a sustainable and environmentally friendly society by advancing fundamental science to remove the barriers to a hydrogen-based economy, enable the technological breakthroughs required for efficient CO_2 capture and sequestration (CCS) in both the ocean and the earth, and establish a non-fossil based energy carrier system.

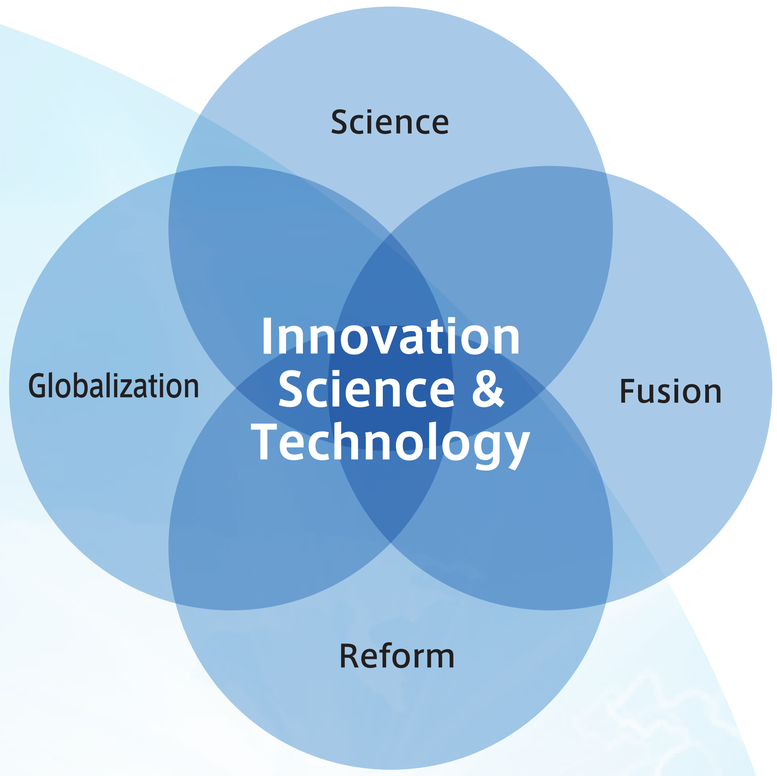
MEXT MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY-JAPAN

JSPS 日本学術振興会 JAPAN SOCIETY FOR THE PROMOTION OF SCIENCE

World Premier International Research Center Initiative

Concept

The WPI has four basic objectives: advancing leading edge research, creating interdisciplinary domains, establishing international research environments, and reforming research organizations. At the same time, the program aims to establish "highly visible research centers" that are positioned within the flow of global brain circulation. While making innovative advances in science and technology, these WPI research centers are expected to provide a model for other Japanese research institutions to emulate.



Basic features

Critical mass of outstanding researchers

- Bringing together top-level researchers from around the world
- 10-20 world-class principal investigators
- About 200 researchers and staffs
- At least 30% overseas researchers

Attractive research environment of top international standard

- Strong leadership by center director
- Establish English as the primary language
- Rigorous system for evaluating research and system of merit-based compensation
- Strong support functions for researchers
- Facilities and equipment appropriate for a top world-level research center

Long-term financial support from the government

- Around ¥1.3 billion annually per center
- 10-15 years of financial support

Robust follow-up system

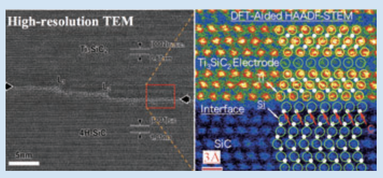
- Ongoing follow-up activities by Program Committee conducted together with program director and program officers
- Interim evaluation at 5-year intervals

Establishment of Highly Visible Research Centers

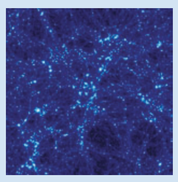
6 WPI research centers

WPI-AIMR
東北大学原子分子材料科学高等研究機構

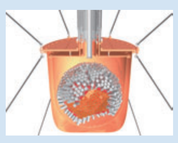
The main objective of AIMR is to advance the development of new materials via a world-leading organization in interdisciplinary research on functional materials, and by using an innovative method of atomic and molecular control, departing from the typical approaches and moving towards the next generation. While dynamically advancing such basic research, the Center is pursuing (1) the creation of new compounds and materials with innovative functions that exceed existing ones, (2) the development of devices based upon new fundamental paradigms, and (3) the advancement of applied research on materials and system architectures that generate direct societal impacts. Especially, we focus on the development of functional materials for green innovation, that is to say, those for energy harvesting, energy saving, and environmental clean-up.

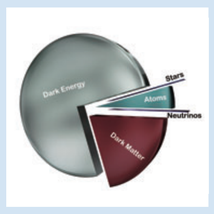


IPMU INSTITUTE FOR THE PHYSICS AND MATHEMATICS OF THE UNIVERSE



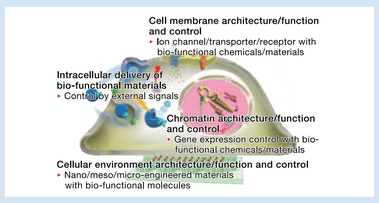
Until recently, it was believed that the whole universe is made of atoms. We now know that the galaxies contain invisible "Dark Matter." Otherwise the stars will fly away and galaxies could not be formed. The universe is filled with mysterious "Dark Energy" that pushes the Universe to expand ever faster. But we do not know what they are. Many now speculate that there are many more hidden dimensions beyond the three we see. Origin of the Universe and its evolution are closely related to their geometry. At IPMU, researchers of mathematics, astronomy, and physics work together to address deep mysteries of the Universe. We look for Dark Matter underground using XMASS. We study Dark Energy using Subaru telescope, by building a new camera. We exploit Large Hadron Collider data to look for Dark Matter and Black Hole. We develop new mathematics, to resolve the Big Bang singularity and for formulating ultimate theory of the Universe.





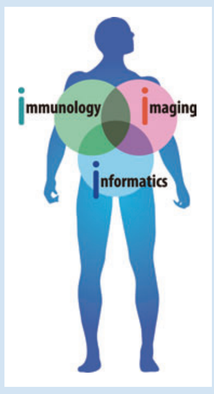
iCeMS KYOTO UNIVERSITY WPI Research Center

Living cells create and manipulate soft, dynamic structures, including chromatin and cell membranes. One aim of the iCeMS is to investigate the intracellular workings of these soft functional architectures. Another is to impart "smart" functionality to porous and other artificially created materials, designed to be controlled via external stimuli such as light or magnetic fields, so that materials will interact with existing cell structures. The unique properties of stem (ES/iPS) cells are of particular interest. Knowing these will enhance control of reprogramming, differentiation, and morphogenesis of stem cells. By integrating the study of both cellular and artificial soft functional architectures, the iCeMS advances the frontiers of stem cell research and material sciences, creating a novel cross-disciplinary research field. Contributions to medicine, drug discovery, environmental technology, and industry are anticipated.



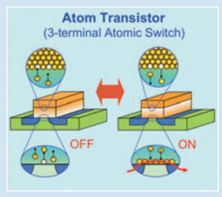
WPI Osaka University iFReC

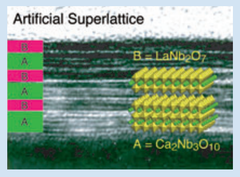
Research on immunology is one of the fields in which Japan has taken a lead. In particular, Osaka University leads the world with many top-level achievements in the field of immunology.
The aim of this center is to unveil the whole picture of a dynamic immune system by employing a variety of imaging technologies developed by Prof. Toshio Yanagida, a pioneer in the biotechnology field, that will allow us to track the dynamic behavior of immune cells and their communications more directly and understand how immune cells respond to that which is identified as non-self such as pathogens and cancers in vivo. Studies performed at this center will lead to the generation of novel concepts for understanding the dynamics of immunology.



MANA

MANA is focusing on "nanoarchitectonics", a new technology for materials development, where nanoscale structural units are arranged in a desired configuration to create new functionality by manipulating the interaction between the units. This challenge is tackled with the innovative development and integration of five key technologies: 1) novel atom/molecule manipulation, 2) controlled self-organization, 3) chemical nanostructure manipulation, 4) field-induced materials control, and 5) theoretical modeling and designing. By advancing research in this new realm, the Center is attempting to open a new paradigm of materials development that can assure significant contributions to the society in such forms as environmental and energy sustainability, next-generation computation and communication, and regenerative medicine. The advanced research in the Center is performed in four fields: A) Nano-Materials, B) Nano-System, C) Nano-Green, and D) Nano-Bio.





I²CNER

The objective of I²CNER is to develop the science required to eliminate the barriers and enable the technological breakthroughs necessary for achieving a hydrogen-based society and efficient CO_2 capture and sequestration. Our research agenda covers areas of hydrogen production and storage, hydrogen tolerant materials, fuel cells, "greening" chemical reactions and catalysts, CO_2 capture and sequestration (CCS) in both the ocean and the earth. This broad-based approach cuts across the boundaries of chemistry, physics, materials science, mechanics, geoscience, oceanic science, and biomimetics, bridging multi-dimensional spatial and temporal scales of phenomena occurring at the interface between materials and hydrogen, oxygen, and CO_2. Launched by Kyushu University in collaboration with the University of Illinois, I²CNER seeks to provide the resources, facilities and environment needed to attract top scientists from a wide range of disciplines.