Tokyo Tech

PRESS RELEASE

March 22, 2016

Tokyo Institute of Technology launches Institute of Innovative Research to promote international interdisciplinary collaboration

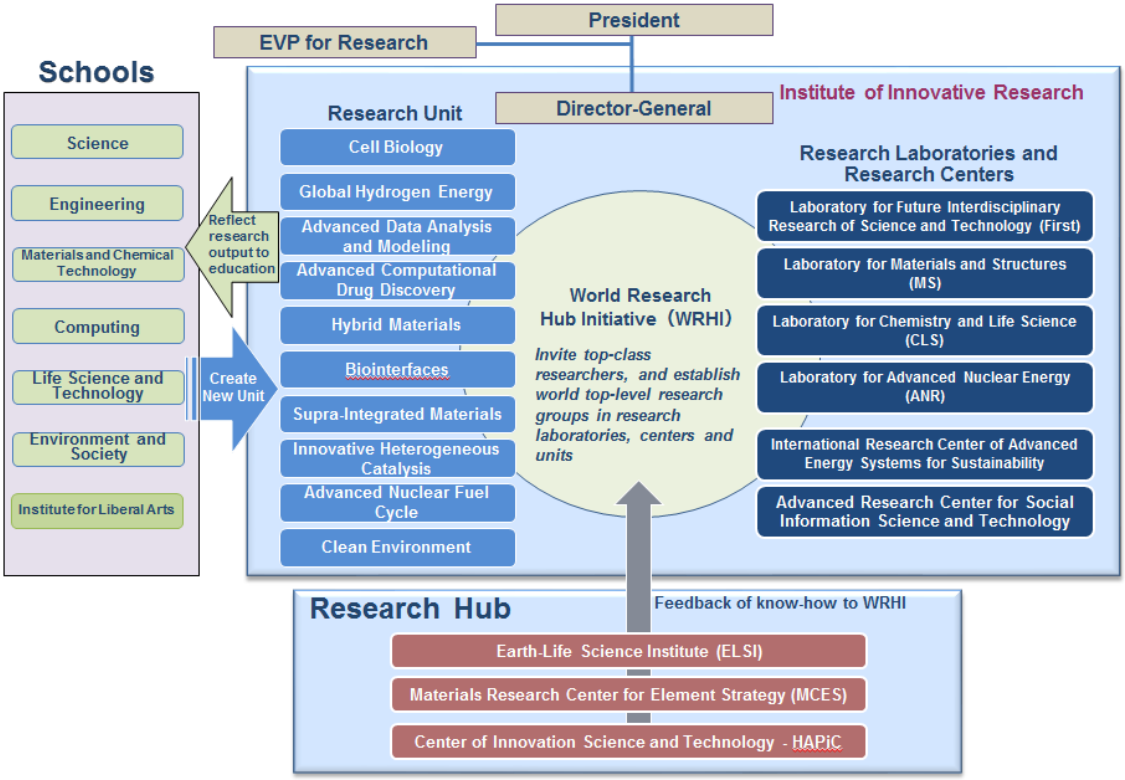
Tokyo Institute of Technology (Tokyo Tech) will launch the Institute of Innovative Research (IIR) on April 1, 2016 to enhance international collaboration in emerging and interdisciplinary research fields. The new institute consists of about 180 researchers affiliated with four research laboratories, two research centers, and ten research units. Research units will conduct cutting-edge research in small teams under the leadership of prominent scientists. Areas covered will include cell biology, global hydrogen energy, nuclear fuel cycle, and clean environment. Tokyo Tech welcomes enquiries for potential collaboration from researchers overseas.

Research at the IIR will build on Tokyo Tech's internationally recognized contributions in areas such as materials science, supercomputing, and life sciences. The IIR underscores Tokyo Tech's commitment to innovation and international collaboration.

The Institute of Innovative Research

The IIR is organized into multiple research laboratories, research centers, and research units. The IIR is led by its director-general who reports directly to the president of Tokyo Tech, thereby enabling efficient and timely decisions about hiring, funding, and launching new projects.

The IIR also includes the Tokyo Tech World Research Hub Initiative (WRHI), inviting world-class scientists, as well as those from overseas, to set up research projects at the institute.



- **Research Laboratories**

Laboratory for Future Interdisciplinary Research of Science and Technology (FIRST)

FIRST is dedicated to fostering future development and prosperity for society by promoting technical progress in industry to meet needs of the era. FIRST creates innovative industrial technologies by fusing mechanical engineering, information science and technology, electrical and electronic engineering, metallurgy, environmental engineering, disaster prevention engineering, social engineering, chemical engineering and materials science. FIRST focuses on not only science and engineering but also on humanities and industrial sociology to promote interdisciplinary research. The ultimate target is to conduct advanced science and engineering that will lead to the creation of innovative industrial technologies and a more prosperous future.

Laboratory for Materials and Structures (MSL)

MSL aims to create innovative materials with unique properties and functions via interdisciplinary materials science based on inorganic materials extending to metals

and organic materials. The ultimate goals of our lab include (a) development of innovative materials based on novel concepts; (b) design of innovative materials in pursuit of novel guiding principles based on underlying materials science and theories in different scientific fields; and (c) contribution to the solution of social problems, including safety and environmental problems, through the application of innovative structures and materials.

Laboratory for Chemistry and Life Science (CLS)

CLS consists of four major divisions, molecular synthesis, molecular materials design, molecular functions, and molecular bioscience, and carries out a wide range of research on molecular science and engineering, covering not only fundamental and applied chemistry but also life science. By bringing domestic and international research activities together, CLS aims to create new principles of molecular-based chemistry and bioscience and thereby achieving breakthroughs for the next generation in science and technology. The final goal of CLS is to contribute to the realization of sustainable development of human society through front-line chemical research.

Laboratory for Advanced Nuclear Energy (LANE)

As one of the top laboratories leading the applied research as well as pursuing the scientific principles related to nuclear energy, LANE aims to contribute to the sustainable development of the world. The fundamental research of peaceful use of nuclear energy is of great significance to solve the global energy shortage and carbon dioxide emission problems. Innovative nuclear energy systems research, actinide management research, global nuclear security research, advanced radiation medical research are promoted as mission-driven researches. The laboratory also studies some important issues Japanese society has to cope with — reactor decommissioning toward recovery from the Fukushima Daiichi nuclear power plant accident and environmental pollution recovery.

- **Research Centers**

International Research Center of Advanced Energy Systems for Sustainability

We aim to establish advanced energy systems to realize stable and

environment-friendly energy utilization by taking advantage of existing social infrastructures related to energy. Furthermore, we promote and create research projects to find solutions to problems faced by communities and industries through open innovation with industries, government, local municipalities, etc.

Advanced Research Center for Social Information Science and Technology (ASIST)

ASIST aims at solving social problems by utilizing Information and Communication Technology (ICT). ASIST conducts research and reports the findings to the government, targeting the establishment of safe and secure logistical information platforms, by which each individual is able to access his/her own personal data managed by governmental organizations, medical facilities, and other institutions.

- **Research Units**

These units will conduct basic, cutting-edge research in small teams under the leadership of prominent scientists. Specifically, research conducted at the units will have specific missions and have an initial term of 5 years to deliver research results. During the first phase of the mission, Tokyo Tech will provide support in securing research funding, hiring researchers, and providing laboratory space.

(*Featured units)

*Cell Biology Unit (Leader: Yoshinori Ohsumi)

This unit aims to investigate the structure and function of cells through the observation and hands-on manipulation of cells, and to use this improved understanding in the creation of cells with unique functions. The unit will elucidate the fundamental principles of cells through world-class research employing state-of-the-art techniques and ultimately will contribute to next-generation cell engineering, human health, and the treatment of diseases.

*Global Hydrogen Energy Unit (Leader: Ken Okazaki)

Implementation and technological development of a global-scale CO2-free hydrogen supply chain combined with the domestic hydrogen network will be investigated, with collaboration between academia, industry, and government, aiming to realize a “best

mix" of global and diverse energy resources.

Advanced Data Analysis and Modeling Unit (Leader: Misako Takayasu)

Our society is facing multifaceted problems that we expect to be able to solve by utilizing big data. In this research unit, we will establish solutions for wide ranging problems by following three scientific steps and applying concepts and methods based on physics: advanced analysis of synthesized big data, multilayered space-time modeling, and large-scale numerical simulations.

Advanced Computational Drug Discovery Unit (Leader: Masakazu Sekijima)

We aim to establish an academic and open innovation drug discovery platform by taking advantage of complementary capabilities of biochemical experiments and computer-aided drug discovery, including molecular simulation, bioinformatics, ultra-high-performance computing using the TSUBAME supercomputer, machine learning, mathematical modeling and optimization, and technology and innovation management.

Hybrid Materials Unit (Leader: Kimihisa Yamamoto)

In this unit, we create sub-nanosized alloy particles with a fractional atomicity by making full use of the precision metal assembling method. The precision sub-nanosized alloy particles are classified as a new substance that will open up new frontiers in the field of chemistry.

Biointerfaces Unit (Leader: Yasuharu Koike)

This research unit will build a flexible organizational structure to carry out leading-edge medical and health technology research. Researchers in different fields based in Japan and abroad will work together to find solutions in pursuit of a healthier and more prosperous society.

Supra-Integrated Materials Unit (Leader: Tomokazu Iyoda)

We are working to create "supra-integrated materials" fabricated in nano/micro scale by integrating various molecules and/or nanomaterials with their programmed interactions, going beyond conventional hybrid materials achieved by simply combining

component properties. Mixing with nanoscaled regular structures would endow materials with new properties based on the specific programmed interactions.

Innovative Heterogeneous Catalysis Unit (Leader: Michikazu Hara)

Various catalysts have been developed resulting in the production of chemicals that are essential for modern society. However, environmental problems that have not been solved by such catalysts remain. The aim of this unit is to solve these problems by creating new heterogeneous catalysts.

*Advanced Nuclear Fuel Cycle Unit (Leader: Kenji Takeshita)

In the Nuclear Fuel Cycle Research Unit, we are developing safe, low-emission, and eco-friendly nuclear fuel cycle and nuclear waste disposal technologies. These technologies will contribute to the early suppression of global warming, future energy security, and decommissioning of the Fukushima Daiichi Nuclear Reactors.

Clean Environment Unit (Leader: Masaaki Fujii)

We are developing various methods to evaluate environmental risk which are indispensable to establishing a safe and secure society. Advanced methods include real-time monitoring of chemical components in exhaust gases from vehicles and incinerators and analysis of origin and migration of environmental particles (SPM).

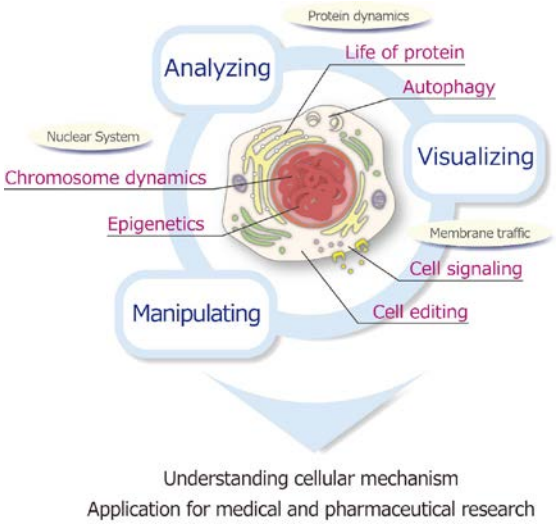
**Featured units*

◆ *Cell Biology Unit*

Yoshinori Ohsumi, molecular cell biologist

http://www.titech.ac.jp/english/research/stories/ohsumi.html

Yoshinori Ohsumi, recipient of the 2015 Gairdner International Award and 2016 Wiley Prize, is the head of this unit. The goal of the research at this unit is to “observe”, “understand”, and “manipulate” cells.

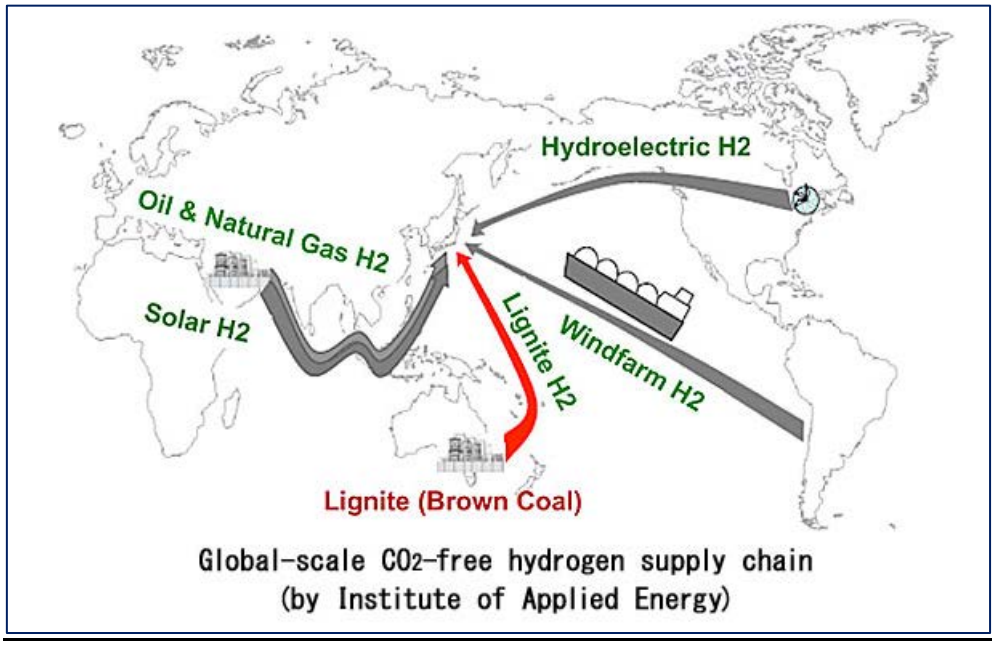


◆ *Global Hydrogen Energy Unit*

Ken Okazaki, Institute Professor

(http://www.ssr.titech.ac.jp/english/research/project_32.html)

Hydrogen is increasingly viewed as a practical source of energy. Here, Ken Okazaki and his team are going to establish a new global hydrogen supply chain.

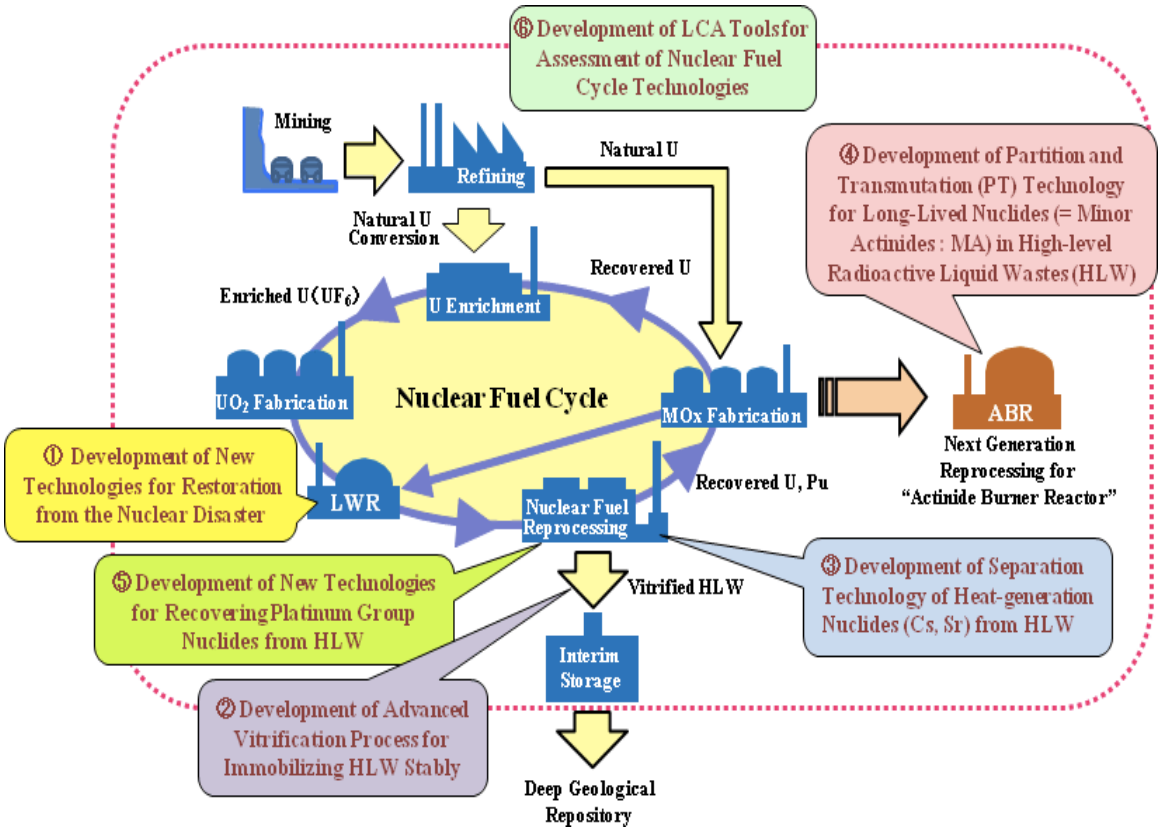


◆ *Advanced Nuclear Fuel Cycle Unit*

Kenji Takeshita, Professor

(http://www.ssr.titech.ac.jp/english/research/project_03.html)

Our research unit focuses on vitrification of high-level radioactive waste from spent nuclear fuel. This research is expected to contribute to treatment of polluted land in Fukushima Prefecture following the Great East Japan earthquake in 2011.



Further information

Center for Public Affairs and Communications, Tokyo Institute of Technology

2-12-1, Ookayama, Meguro-ku, Tokyo 152-8550, Japan

E-mail: media@jim.titech.ac.jp

URL: http://www.titech.ac.jp/english/

Tel: +81-3-5734-2975 Fax: +81-3-5734-3661