

# Institute for Integrated Cell-Material Sciences

Director  
Norio Nakatsuji



## Established at Kyoto University as a WPI center



World Premier International  
Research Center Initiative



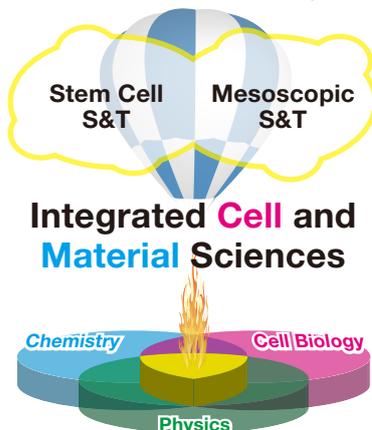
Launched in 2007 by the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) in order to establish globally visible research centers, the WPI program seeks to 1) advance leading edge research, 2) create new interdisciplinary domains, 3) establish truly international research environments, and 4) reform existing research organizations. The MEXT grants average ¥1.4 billion (approximately US\$14 million) annually per center over 10–15 years, and interim evaluations are conducted at 5-year intervals. Each center is required to have: 1) 10–20 world-class principal investigators (PIs), 2) over 30% overseas researchers, and 3) a staff of over 200 total.

Kyoto University's Institute for Integrated Cell-Material Sciences (iCeMS) is one of six centers established under the WPI program. Its founding director is Prof. **Norio Nakatsuji**, Japan's pioneer in the establishment and distribution of human ES cell lines, and a leader in ES/iPS cell-based drug discovery.

## Research areas and objectives

The iCeMS aims to create new cross-disciplinary fields through integration of the cell and material sciences.

Innovations in medicine, pharmaceuticals, the environment, and industry



Investigating the control mechanisms of multimolecular structures within cells and artificial materials, the iCeMS pioneers the development of stem cell science and technology, and mesoscopic science and technology. These are anticipated to lead to innovations in medicine, pharmaceuticals, the environment, and industry.

**Stem cell science and technology** include:

1) reprogramming with chemical compounds for iPS cell derivation, 2) chemical probes for stem cell research, 3) control of **ES/iPS cell** growth and differentiation with chemicals and materials, and 4) creation and applications of stem cell-derived model cells in medicine and drug discovery.

**Mesoscopic science and technology** include:

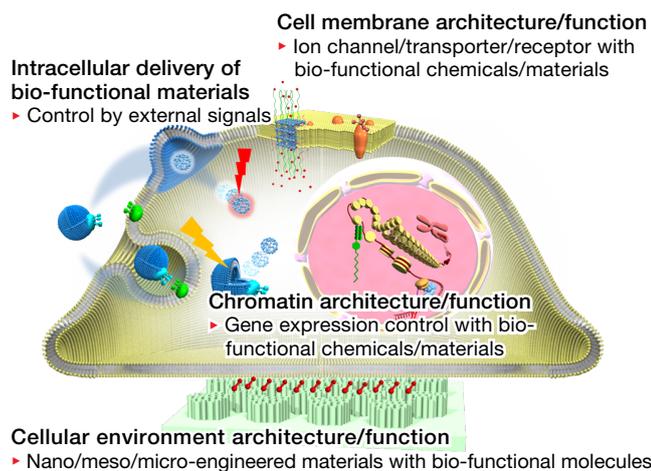
1) imaging and probing mesoscopic complexes in living cells, 2) production of functional mesoscopic materials (e.g., **porous coordination polymers: PCPs**), 3) integration of mesoscopic materials and living cells, and 4) modeling, simulation, and physics theories of mesoscopic events in materials and living cells.

## A truly international organization

A total staff of **274**: 174 researchers (31% overseas, 27% female), research support staff of 70, administrative staff of 30 (as of May 2011) • **PIs**: Konstantin Agladze, Yong Chen, Yoshie Harada, Mitsuru Hashida, John Heuser, Takashi Hiiragi, Hiroshi Imahori, Mineko Kengaku, Makoto Kiso, Susumu Kitagawa, Akihiro Kusumi, Norio Nakatsuji, Hiroshi Sugiyama, Mikio Takano, Koichiro Tanaka, Kazumitsu Ueda, Motonari Uesugi, Shinya Yamanaka • **iCeMS Kyoto Fellows**: Peter Carlton, Ziya Kalay, Franklin Kim, Tatsuya Murakami, Takuya Yamamoto • **Other research groups**: Kenichi Suzuki (NCBS-inStem Satellite Lab), Shintaro Sengoku (innovation management), Kazuto Kato (science communication)

**Management**: 1) rapid, institute director-centered decision-making process, 2) use of English as the official language, 3) open offices and shared labs, 4) strong support for non-Japanese/female researchers, 5) iCeMS Kyoto Fellow (junior PI) positions, 6) young researcher overseas visit program, and more. The iCeMS also seeks to have its researchers acquire the abilities to effectively relay the latest advances in science and technology to society at large, while maintaining their own scientific integrity. These efforts to strengthen science communication skills and social literacy illustrate the iCeMS' dedication to future generations of scientists.

## Bridging cell and material sciences



## Satellite and partner institutions for global collaboration

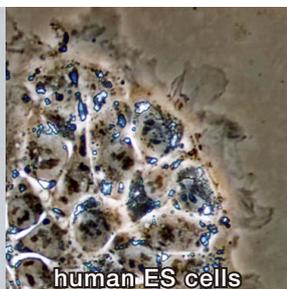
- ▶ Satellite at Gifu University
- ▶ Institute for Stem Cell Biology and Regenerative Medicine (inStem), India
- ▶ Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)
- ▶ Max Planck Institute of Molecular Cell Biology and Genetics (MPI CBG)
- ▶ Moscow Institute of Physics and Technology (MIPT)
- ▶ National Centre for Biological Sciences (NCBS), India
- ▶ NIH Center for Regenerative Medicine (NIH CRM)
- ▶ Pohang Univ. of Science & Technology Division of Advanced Materials Science (POSTECH AMS)
- ▶ Purdue University Center for Basic and Applied Membrane Sciences (PUBAMS)
- ▶ Riken Center for Developmental Biology (CDB)
- ▶ Seoul National University Medicinal Bioconvergence Research Center
- ▶ The University of Edinburgh MRC Centre for Regenerative Medicine (MRC CRM)
- ▶ UCLA California Nanosystems Institute (CNSI)
- ▶ University of Cambridge Wellcome Trust Centre for Stem Cell Research (CSCR)

## CiRA, CeMI: centers launched and evolving

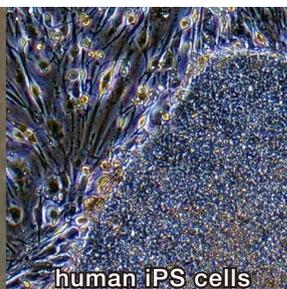
Following iCeMS Prof. **Shinya Yamanaka**'s successful generation of human iPS cells in 2007, the **Center for iPS Cell Research and Application (CiRA)** was established in 2008 under the auspices of the iCeMS. In April 2010 Kyoto University reestablished the CiRA as a fully fledged institute. Prof. Yamanaka serves both as CiRA Director while continuing in his iCeMS professorship. Basic research into iPS cells continues to be conducted mainly at the iCeMS, with the two sister institutes closely tied. The **Center for Meso-Bio Single-Molecule Imaging (CeMI)**, established in March 2009 and led by Prof. **Akihiro Kusumi**, aims to develop new single-molecule and terahertz technologies for imaging biomolecular complexes in living cells, and make these technologies available quickly to the scientific community worldwide for the further advancement of cellular meso-science.



Deputy Director  
Susumu Kitagawa



human-ES cells



human iPS cells



CiRA Director and iCeMS Professor  
Shinya Yamanaka