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纪念中日邦交正常化40周年暨中日国民交流友好年

中国科学院和日本理化学研究所合作30周年纪念演讲会

Ceremony, lectures and reception to celebrate the 30th anniversary of research cooperation between RIKEN and the Chinese Academy of Sciences

予稿集

Proceedings

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中国科学院、理化学研究所
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Professor,
Chief scientist of Nishina Center for Accelerator-Based Science, RIKEN

Progress in Nuclear Physics by Large Jumps at RIBF

I would introduce research activities and future plans at the “Radioactive Isotope Beam Factory (RIBF)”, RIKEN, and discuss possible collaboration programs with CAS. The RIBF is a world-leading heavy-ion accelerator facility where powerful radioactive-isotope beams are delivered to drastically promote nuclear physics. Special emphasis is given to selected programs that highlight activities at RIBF.

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Education background:
1989 ~ 1993 University of Tokyo , Japan (Ph.D in physics)

Professional positions:

2011-present	Professor, Department of Physics, University of Tokyo
2005-present	Chief Scientist, Radioactive Isotope Physics Laboratory, RIKEN
2006-2009	Director, Nuclear Physics Research Division, RIKEN Nishina Center for Accelerator-Based Science

Awards:
2008 JPSJ Papers of Editors' Choice
2009 Membership Award of the GSI Exotic Nuclei Community (GENCO)

Synergistic Activities:
2006- Member-at-Large, Science Council of Japan
2009- Member of Program Advisory Committee at GANIL
2009- Member of Scientific Advisory Committee at FRIB, MSU
2011- Member of the Steering Committee of Research Center for Nuclear Science and Technology, Beihang University, China

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Professional positions:

3/2008-present	Director, Institute of Modern Physics, the Chinese Academy of Sciences
8/2003-2/2008	Vice director, Institute of Modern Physics, the Chinese Academy of Sciences
2004-present	Vice director, National Laboratory of Heavy Ion Accelerator, Lanzhou, China
5/2000-present	Professor, Institute of Modern Physics, the Chinese Academy of Sciences
1/1998-5/2000	Associate Professor, Institute of Modern Physics, the Chinese Academy of Sciences
7/1989-1/1998	Research Assistant, Institute of Modern Physics, the Chinese Academy of Sciences

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2. Editorial Board of Science in China Series G: Physics, Mechanics & Astronomy
3. Editorial Board of Nuclear Physics Review
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5. Standing Commission Member of Society of Chinese Nuclear Physics
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7. Commission Member of China Isotope and Radiation Association
8. Standing Commission Member of Chinese Nuclear Technology in Industry Application Society
9. Chairman of Physics Society in Gansu, China

Awards:
Award for progress in science and technology at the Chinese Academy of Sciences, 1999
Award for progress in science and technology at Gansu province, 2008

A review of Collaboration between IMP and RIKEN

In the first part of my talk, I will give a historical review of the collaboration between IMP and RIKEN. The cooperation started since 1979, the fields of cooperation have been extended to accelerator physics, heavy ion physics, theoretical physics, and applied physics. Milestones of the collaboration will be highlighted. In the second part of my talk, I will summarize the present activities in the basic research, applied fields, accelerator development, and instrumentation. And some examples of important progresses will be described. Then I will introduce the future large-scale facilities that IMP will construct in next 10 years.

Yoshinori Tokura

Professor, Director of Emergent Materials Department, Advanced Science Institute, RIKEN

Emergent magnetoelectric phenomena in correlated materials

Towards the invention of new functional electronic materials with high efficiency and low energy consumption, the emergence in materials science is the key concept, which focuses on the strong space-time correlations of interacting degrees of freedom. The correlated electron materials occasionally undergo a transition between critically competing electronic phases. Such a phase competition produces surprising emergent phenomena, such as high-temperature superconductivity, colossal magnetoresistance, gigantic magenetoelectric effect, and Mott transitions. Here, I would overview the strategic exploration for gigantic magneto-electronic responses of a collective state of matter against minimal external stimuli.

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1981 University of Tokyo, (Ph.D. in Applied Physics)

Professional positions:

2010-Present	Director, Emergent Materials Department, Group Director, Cross-Correlated Materials Research Group, RIKEN Advanced Science Institute Director, Quantum-Phase Electronics Center, University of Tokyo
2008-Present	AIST Fellow, National Institute of Advanced Industrial Science and Technology (AIST)
2007-Present	Group Director, Cross-Correlated Materials Research Group, RIKEN Advanced Science Institute
2006-2012.Mar.	Research Director, Multiferroics Project (MF), Exploratory Research for Advanced Technology Organization (ERATO), JST
1995-Present	Professor, Department of Applied Physics, University of Tokyo

Awards:
1990 IBM Japan Science Prize, Nishina Memorial Prize, 1991 Bernd Matthias Prize,
2002 Asahi Prize, 2003 Medal with Purple Ribbon, 2010 Fujihara Prize

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Education background:
1992 Ph. D in Materials Science
1987 Master in Inorganic Materials
1984 Bachelor in Carbon Materials

Professional positions:
1990-1992 Guest Researcher, Kyushu National Industrial Research Institute, AIST, MITI, Japan
1992-1993 Research Associate, Faculty of Engineering, Nagasaki University, Japan
1993-1994 Associate Professor, IMR CAS
1994-now Professor, IMR CAS
1997-1998 Senior Visiting Scientist, Dept. of Physics, MIT, USA
2000-now Editor, Carbon

Awards:
2010 Prize for Scientific and Technological Progress of Ho Leung Ho Lee Foundation
2010 The Charles E. Pettinos Award, American Carbon Society, USA
2006 The 2nd class National Natural Science Award, China
1999 The Ryukiti Hasiguchi Foundation Award

His research activities mainly focus on the synthesis, properties and applications of carbon nanotubes, graphene, energy storage materials, photocatalytic materials, and high-performance bulk carbon materials. He edited the first book on carbon nanotubes in Chinese and published over 300 peer-reviewed papers with 12,000 citations. Prof. Cheng was the co-chairman of the World Conference on Carbon in 2002 (Beijing) and in 2011 (Shanghai), and has given more than 50 plenary/keynote/invited talks in international conferences and symposia. He is also the Editor of Carbon and Editor-in-Chief of New Carbon Materials.

The future of materials science and IMR CAS

Materials are the milestone of mankind's civilization and also building blocks for modern societies from building, transportation, to energy and information. Therefore, materials are recognized as one of the three most important fields (energy, information and materials) of the current society. The connotation of materials science has been changing, from synthesis/processing, composition/structure and properties in 1960s, to synthesis/processing, composition/structure, properties, and performance in 1990s, to synthesis/processing, composition/structure, properties, performance, and end-users' needs and constraits in 2000s, finally to synthesis/processing, resources (composition), performance, cost, and environments (repairing and recycling) to 2050s. Based on the above understanding, the future research trends in the four aspects of materials science, including measurement methods/tools, understanding and theory, materials/structures, and synthesis/processing, are identified.

The Institute of Metal Research (IMR), Chinese Academy of Sciences (CAS) will be briefly introduced. IMR was founded in 1953 and is now one of the most important R & D base for materials science and engineering in China. IMR is mainly engaged in research and development of high-performance metallic materials, new inorganic nonmetallic materials and advanced composite materials covering their structures, properties, performance, corrosion and protection, as well as the relationship among them. IMR pays equal attention to materials engineering such as synthesis, fabrication, processing and applications. Presently IMR has one national laboratory, one state key laboratory, twenty research divisions, two national engineering research centers and several spin-off high-tech enterprises. Its mission is to excel in materials research, develop advanced materials technology and foster exceptional talents, serving the nation, the society and mankind. The three major R&D fields, high-temperature structural materials for advanced engine systems, heavy corrosion protection technology for large projects, and nanoscience and nanotechnology for engineering metallic materials, have being vigirously developed.

IMR has close relationships with institutions, universities and academic associations from more than 30 countries and regions to carry out scientific exchanges and co-operations. Since 1984, IMR has been collaborating with RIKEN, starting from automobile steel sheet forming technology. IMR is looking forward to continuously collaborating with RIKEN on materials science and engineering, in particular, on computational materials science, advanced energy materials, bio-materials, and resource-saving and environment-friendly materials.

Masatoshi Takeichi

Professor, Director of RIKEN Center for Developmental Biology and RIKEN Kobe Institute

Cells into Organs: Construction, Destruction and Repair

Animal cells assemble into tissues and organs with precisely ordered structures. We can destroy these structures by treating the tissues with proteolytic enzymes, which results in the dissociation of cells. These dissociated cells, however, can exhibit surprising behavior. They can autonomously re-assemble, and regain their original multicellular structures when cultured under the right 3D-conditions. This self-assembling ability of cells is considered to play a critical role in the formation of organs (1). Supporting this notion, recent studies from our institute has demonstrated that the entire retina can be generated autonomously from ES cell aggregates in vitro, without passing through the normal embryonic development (2). The self-organization of tissues is achieved by a series of complex molecular and cellular events, in which one critical step is cell-cell adhesion. Cadherins, a group of transmembrane proteins, are responsible for the cell-cell adhesion. When cadherin-dependent processes are disrupted in the animal body, it causes not only serious morphogenetic defects, but also diseases, such as cancer and neuronal disorders. Cells can also use their self-assembling ability to repair injured organs. If healthy cells or their “stem cells” are artificially implanted into the damaged organs, they could autonomously restore the organ. This is the idea of so-called regenerative medicine, and a better understanding of the basic mechanisms of cellular behavior would facilitate its implementation.

(1) Takeichi M. (2011) Self-organization of animal tissues: cadherin-mediated processes. Dev. Cell 21:24-26.

(2) Eiraku M, Takata N, Ishibashi H, Kawada M, Sakakura E, Okuda S, Sekiguchi K, Adachi T, Sasai Y. (2011) Self-organizing optic-cup morphogenesis in three-dimensional culture. Nature 472:51-56.

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1966 B.Sc. in Biology, Nagoya University
1973 Ph.D. in Biophysics, Kyoto University

Professional positions:

1970-1999 Assistant Professor- Associate Professor- Professor, Department of Biophysics, Faculty of Science, Kyoto University
1999-2002 Professor, Department of Cell and Developmental Biology, Graduate School of Biostudies, Kyoto University
2002-present Director, RIKEN Center for Developmental Biology and Group Director, Laboratory for Cell Adhesion and Tissue Patterning

Awards:

Tsukahara Award, 1989; Chunichi Cultural Award, 1992; Osaka Science Award, 1993; Asahi Award, 1994; Academic Prize of the Princess Takamatsuno-miya Cancer Research Foundation, 1995; Uehara Prize, 1996; Japan Academy Prize, 1996; Membership of the Japan Academy, 2000; Ross Harrison Prize (International Society of Developmental Biologists), 2001; Keio Medical Science Prize, 2001; Foreign honorary member of American Academy of Arts & Sciences, 2004; Honorary member of the American Association of Anatomists, 2004; Person of Cultural Merits, 2004; France Palmes Académiques, 2004; Japan Prize, 2005; Foreign associate of the National Academy of Sciences, 2007; Associate member of EMBO, 2009; Honorary doctorate degree, Ghent University, 2012.

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Professional positions:

2008-present Professor, Executive Director, Institute of Biochemistry and Cell Biology, Shanghai Institutes for Biological Sciences, the Chinese Academy of Sciences, China
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1991-1995 Associate Professor, Shanghai Institute of Biochemistry, the Chinese Academy of Sciences, China
2000 Visiting Professor, Kumamoto University School of Medicine, Japan
1996-1997 Visiting Scholar, Max Planck Institute of Biophysical Chemistry, Germany
1992-1993 Visiting Scholar, The Institute of Physical and Chemical Research (RIKEN), Tsukuba, Japan
1989-1991 Postdoctoral Research Fellow, The Institute of Physical and Chemical Research (RIKEN), Tsukuba, Japan

BMP signaling and central nervous system development

Bone morphogenic proteins (BMPs), a subfamily of cytokines of the transforming growth factor-β (TGF-β) superfamily, play key roles in regulating a wide range of biological responses during embryonic development and adult tissue homeostasis. Because deregulation of BMP signaling leads to many developmental disorders and diseases, the stringent control of its activity is critical for normal development and tissue maintenance. This stringent control of BMP activity could be achieved by cross-regulation between BMP and other signaling pathways, such as FGF, Wnt, retinoic acid (RA), and Notch pathways. We recently found that BMP down-stream target Id proteins could interact directly with Hes1, the down-stream target of Notch pathway, and release the negative feedback auto-regulation of Hes1 gene. This cross-talk between BMP and Notch pathways inhibits precocious neurogenesis and maintains the neural stem cell pool in early embryos (Dev Cell, 2007, 13, 183-297). We also showed that RA could regulate BMP signal duration by promoting the degradation of phosphorylated Smad1. And this cross-talk between BMP and RA pathways is involved in the proper patterning of dorsal neural tube of chicken embryo (PNAS, 2010, 107, 18886-18891). Furthermore, we showed that Smad6, a negative regulator of BMP signaling, could recruit the co-repressor, CtBP, into the β-Catenin/TCF complex to inhibit Wnt/β-Catenin pathway, and this cross-talk between BMP and Wnt signaling pathways could promote neuronal differentiation in the intermediate zone of the dorsal neural tube of chicken embryo (PNAS, 2011, 108, 12119-12124).

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B. Sc. (1982): China University of Petroleum
M. Sc. (1986): Kyushu University
Ph.D. (1989): Kyushu University

Professional positions:

1989-1991: Postdoctoral Researcher, RIKEN
1991-1993: Postdoctoral Researcher, University of Windsor
1993-1997: Research Scientist, Organometallic Chemistry Laboratory, RIKEN
1997-2002: Senior Scientist, Organometallic Chemistry Laboratory, RIKEN
2002-present: Chief Scientist and Director of Organometallic Chemistry Laboratory, RIKEN Advanced Science Institute
2010-present: Group Director (joint appointment), Advanced Synthesis Research Group, RIKEN Advanced Science Institute

Awards and Honors:

The Award of the Society of Polymer Science, Japan (2012). The Global Experts Recruitment Program of China (2011), Asia Core Program Lectureship Award (2011), The Rare Earth Society of Japan Award (2009), The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology of Japan: The Prizes for Science and Technology (2008), The Chang Jiang Scholars of the Ministry of Education of China (2008), The JSPS Prize (2007), The Chemical Society of Japan Award for Creative Work (2007), The Mitsui Chemicals Catalysis Science Award (2007), Progress Award in Synthetic Organic Chemistry, Japan (2000), Rare Earth Society of Japan Award for Young Scientists (1997), Japan Society of Coordination Chemistry Award for Young Scientists (1996).

Search for New Catalysts for More Efficient, Selective Chemical Synthesis

The development of new catalysts for more efficient, selective chemical transformations has been a long-standing research subject in both academia and industry. Nowadays, efforts toward this goal have become ever-increasingly important, as more concerns over the environmental impact of chemical productions have emerged. We have been aiming at the development of new generations of catalysts which are complementary or superior to the existing ones for efficient synthesis of functional polymer materials and fine chemicals as well as for the activation and efficient utilization of untapped small molecules. In this talk, I would like to give an overview on our recent studies in this area with focus on the following topics: (1) regio- and stereospecific copolymerization of two and more olefin monomers, (2) catalytic carboxylation using carbon dioxide, and (3) activation and hydrogenation of dinitrogen (N_2) under mild conditions.

Li-Jun Wan

Professor,
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Academic Exchange between ICCAS and RIKEN during the Past 30 Years

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3/1978-1/1982: B.E., Mechanical Engineering, Dalian University of Technology, P.R. China

Professional positions:

Present Status:
Member, Chinese Academy of Sciences
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Fellow, Royal Society of Chemistry
Director, Institute of Chemistry, CAS
Director, CAS Center for Molecular Science
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Acc. Chem. Res., J. Am. Chem. Soc., Chem. Mater., J. Phys. Chem.
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Members of Editorial Board:
PCCP (Phys. Chem. Chem. Phys.; Regional Editor), NANO, Scientia Sinica (Chimica),
Acta Physico-Chimica Sinica, Chemical Journal of Chinese University,
Science of Advanced Materials (Asian Associate Editor)

Awards:

Chemistry Award of TWAS (Academy of Sciences for the Developing World) (2009)
2nd class Award of National Natural Science of China (2007)
1st class Award of Natural Science of Beijing (2005)
Young Knowledge Innovation Prize of Chinese Chemical Society-BASF (2001-2002)

Dr. Li-Jun Wan is a Professor of Chemistry and Director-general at Institute of Chemistry, Chinese Academy of Sciences (CAS). His research focuses on the physical chemistry of single molecule and molecular organization on two-dimensional surface, nanomaterials and their applications in energy science and environment science.
During the past 30 years ICCAS and RIKEN have collaborated in many research fields due to their mutual interest and benefit, including surface chemistry, supramolecular chemistry, photochemistry, nanoscience and nanotechnology. Though the exchange of staff members, students and scientific information including delivering lectures and holding joint symposium, ICCAS and RIKEN have made mutual achievements in the past 30 years. And many scientists of ICCAS have become the outstanding professors through the academic exchange with RIKEN.
ICCAS which was founded in 1956, is a multi-disciplinary research institute dedicated to the basic research in broad fields of chemical sciences, and to the key developments of the innovative high-technology aiming to the imperative national needs and important strategic targets, as well as to the collaborative high-technology applications and transfers. ICCAS is one of the China's important chemical research institutions with international reputation.
In the future, we are looking forward to further collaboration in the fields of new method and technology in green chemistry, photochemistry, chemical biology, molecular imaging science and functional materials, to promote the development of molecular science frontier of the world.

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