



**A**CTIVITIES OF **J**OINT  
**U**SAGE/**R**ESEARCH  
**C**ENTER



# JURC Cooperative Research Subjects 2018

(1 April 2018 ~ 31 March 2019)

## STARTING-UP SUBJECTS (IN SPECIFIC FIELDS CHOSEN BY JURC)

Fabrication of Chiral Metal Nanocrystals and Clarification of Their Optical Property

KAWAI, Takeshi, Faculty of Engineering, Tokyo University of Science

**Host in JURC** KURATA, Hiroki

Probing Ultrafast Motion of Critical Surface Pushed by Multi-pico-second Relativistic Radiation Pressure

FUJIOKA, Shinsuke, Institute of Laser Engineering, Osaka University

**Host in JURC** INOUE, Shunsuke

I

Development of Neutron Velocity Concentrator

KITAGUCHI, Masaaki, Center for Experimental Studies, Kobayashi-Maskawa Institute for the Origin of Particles and the Universe (KMI), Nagoya University

**Host in JURC** IWASHITA, Yoshihisa

Synthesis of Transition Metal Complexes Bearing a Low-coordinate Phosphorus Ligand and Their Application to Catalytic Reactions

MATSUO, Tsukasa, Faculty of Science and Engineering / Graduate School of Science and Engineering Research, Kindai University

**Host in JURC** OZAWA, Fumiyuki

Feasibility Study of Novel Cooling Devices with Perovskite Semiconductors

YAMADA, Noboru, Department of Science of Technology Innovation, Nagaoka University of Technology

**Host in JURC** KANEMITSU, Yoshihiko

Optical Properties of Pb Perovskite Solar Cells by Heterodyne Interference Spectroscopy

OGAWA, Yoshihiro, Joetsu University of Education

**Host in JURC** KANEMITSU, Yoshihiko

Development of First-row Late Transition-metal Complexes with Constrained Geometry Using Tridentate Anionic Ligands

YAMAGUCHI, Yoshitaka, Faculty of Engineering, Division of Materials Science and Chemical Engineering, Yokohama National University

**Host in JURC** NAKAMURA, Masaharu

Analysis of Complex Networks with Degree Correlations

TAKEMOTO, Kazuhiro, Department of Bioscience and Bioinformatics, Kyushu Institute of Technology

**Host in JURC** AKUTSU, Tatsuya

Novel Approaches to Prediction of Caspase Cleavage Sites

SONG, Jiangning, Monash Biomedicine Discovery Institute, Monash University

**Host in JURC** AKUTSU, Tatsuya

I

Control and Analysis of Complex Networks via Minimum Dominating Sets

NACHER, Jose C., Department of Information Science, Faculty of Science, Toho University

**Host in JURC** AKUTSU, Tatsuya

Development of Prediction Method for Growth Conditions Based on Microbial Genome Information

GOTO, Susumu, Joint Support-Center for Data Science Research, Research Organization of Information and Systems

**Host in JURC** OGATA, Hiroyuki

Ecological Roles of Giant Viruses during the Succession after Red Tide Blooms

NAGASAKI, Keizo, Faculty of Agriculture and Marine Science, Kochi University

**Host in JURC** OGATA, Hiroyuki

Isolation and Genome Analysis of New Giant Viruses from Japanese Aquatic Environments

TAKEMURA, Masaharu, Faculty of Science, Tokyo University of Science

**Host in JURC** OGATA, Hiroyuki

Machine Learning Based Integration of Diverse Biological Data with Network

KARASUYAMA, Masayuki, Department of Computer Science, Nagoya Institute of Technology

**Host in JURC** MAMITSUKA, Hiroshi

I

Total Synthesis of Blespirol

IMAYOSHI, Ayumi, Graduate School of Life and Environmental Sciences, Kyoto Prefectural University

**Host in JURC** KAWABATA, Takeo

F

Synthesis of Novel Non-alternant Heterocycles toward Organic Functional Material

KUROTOBI, Kei, National Institute of Technology, Kurume College

**Host in JURC** MURATA, Yasujiro

Development of Small-molecule n-Type Organic Semiconductors That Can Be Processed via Precursor Approaches

SUZUKI, Mitsuharu, Graduate School of Materials Science, Nara Institute of Science and Technology (NAIST)

**Host in JURC** MURATA, Yasujiro

Synthesis and Thermoelectric Performance of  $\pi$ -Conjugated Coordination Polymers

MURATA, Michihisa, Department of Applied Chemistry, Osaka Institute of Technology

**Host in JURC** MURATA, Yasujiro

Synthesis and Properties of Novel Tehinoacenes Synthesized by Addition-Elimination Reaction and Following Cyclization

SUGA, Seiji, Graduate School of Natural Science and Technology, Okayama University

**Host in JURC** MURATA, Yasujiro

In Vivo Detection of Temperature Change Using Optical Spectroscopic Characterization of Metal Nanoparticle

ISHIHARA, Miya, National Defense Medical College

**Host in JURC** TERANISHI, Toshiharu

F

I: International Joint Research

F: Female PI

Structure Analysis of Monolayer Assembly with  $\pi$ -Conjugated Units Studied by pMAIRS  
YAMAMOTO, Shunsuke, Institute of Multidisciplinary Research for Advanced Materials, Tohoku University  
**Host in JURC** HASEGAWA, Takeshi

Relationship between Hydrogen Bonding and Rheological Properties of Polyurethanes Having Several Chemical Structures  
URAKAWA, Osamu, Graduate School of Science, Osaka University  
**Host in JURC** MATSUMIYA, Yumi

Analysis of Molecular Condensation in Temperature Gradient Field Created through Plasmonic Heating  
SHIMADA, Ryoko, Department of Mathematical and Physical Sciences, Faculty of Science, Japan Women's University  
**Host in JURC** WATANABE, Hiroshi [F]

Study on Improvement of Transportation Efficiency of Metal Ions through a Liquid Membrane  
MUKAI, Hiroshi, Faculty of Education, Kyoto University of Education  
**Host in JURC** SOHRIN, Yoshiki

Hydrogen Absorption Properties for Shape Controlled Pd Nanoparticles in Wide Temperature Region  
YAMAUCHI, Miho, International Institute for Carbon-Neutral Energy Research, Kyushu University  
**Host in JURC** TERANISHI, Toshiharu [F]

Fabrication and Evaluation of Dye-sensitized Solar Cells Using Mixture of Flavonoid Compounds, and Their Theoretical Studies toward Improvement of the Efficiency  
YOSHIDA, Kumi, Department of Complex Systems Science, Graduate School of Information Science, Nagoya University  
**Host in JURC** WAKAMIYA, Atsushi [F]

#### EXPANDING SUBJECTS (IN SPECIFIC FIELDS CHOSEN BY JURC)

Directional Neutron Generation via Laser-driven-photonuclear Reaction by Using a Spin Polarized Deuterium Target  
ARIKAWA, Yasunobu, Institute of Laser Engineering, Osaka University  
**Host in JURC** INOUE, Shunsuke

X-Ray Structural Studies on Reaction Mechanism of Maleylacetate Reductase  
OIKAWA, Tadao, Faculty of Chemistry, Materials and Bioengineering, Kansai University  
**Host in JURC** FUJII, Tomomi

X-ray Crystallographic Studies on Thermostability and Substrate Specificity of L-Asparaginase  
KATO, Shiro, International Institute of Rare Sugar Research and Education, Kagawa University  
**Host in JURC** FUJII, Tomomi

Fundamental Study on Micro-fabrication of Semiconductor with Controlling Laser Absorption  
KUSABA, Mitsuhiro, Electronics, Information and Communication Engineering, Osaka Sangyo University  
**Host in JURC** HASHIDA, Masaki

Advanced Functionality on Materials Induced by Intense THz Interaction  
NAGASHIMA, Takeshi, Faculty of Science and Engineering, Setsunan University  
**Host in JURC** HASHIDA, Masaki

A Study of Laser Driven High-intensity Terahertz Surface Wave  
TOKITA, Shigeki, Institute of Laser Engineering, Osaka University  
**Host in JURC** SAKABE, Shuji

Intense Deuteron Beam Generation by Ultra-intense Laser Irradiation for Development of Li-battery Diagnostics and Laser-driven Compact Neutron Source  
FUJITA, Kazuhisa, The Graduate School for the Creation of New Photonics Industries  
**Host in JURC** SAKABE, Shuji

Investigation of Accelerator Beam Component Using Permanent Magnets  
TERUNUMA, Nobuhiro, Accelerator Laboratory, High Energy Accelerator Research Organization  
**Host in JURC** IWASHITA, Yoshihisa

Fabrication Process of a Superconducting Electron Accelerating Cavity Operated by Small Electricity Power for a CEP-stabilized Free-Electron Laser  
HAJIMA, Ryoichi, Quantum Beam Science Research Division, National Institutes for Quantum and Radiological Science and Technology  
**Host in JURC** IWASHITA, Yoshihisa

Research on the High-performance Superconducting Cavity and the Cost Reduction by Noble Inner-surface Processes  
SAEKI, Takayuki, Accelerator Laboratory, High Energy Accelerator Research Organization  
**Host in JURC** IWASHITA, Yoshihisa

Study on Magnification of the Pulsed-neutron Transmission Image Using the Sextupole Magnet, Aimed at Visualization of Charge and Discharge in the Electrode Materials of Li-ion Batteries  
KINO, Koichi, Research Institute for Measurement and Analytical Instrumentation, National Institute of Advanced Industrial Science and Technology  
**Host in JURC** IWASHITA, Yoshihisa

Construction of Metal-substituted Carbenium Ion and Silyl Cation and Their Applications for Lewis Acid Catalysts  
OKAZAKI, Masaaki, Graduate School of Science and Technology, Hirotsaki University  
**Host in JURC** OZAWA, Fumiyouki

Basic Study for Unveiling Crystal Structure of Carbon-, Nitrogen-based Frameworks  
SAKAUSHI, Ken, Center for Green Research on Energy and Environmental Materials, National Institute for Materials Science  
**Host in JURC** KAJI, Hironori

Investigation on Quantum Properties of Luminescent Nanomaterials Using Novel Techniques of Laser Microscopic Spectroscopy  
IHARA, Toshiyuki, Advanced ICT Research Institute, National Institute of Information and Communications Technology  
**Host in JURC** KANEMITSU, Yoshihiko

Discovery of Novel Functional Transition-metal Oxides with Ultra-high-pressure Condition  
CHEN, Wei-Tin, Center for Condensed Matter Sciences, National Taiwan University  
**Host in JURC** SHIMAKAWA, Yuichi [I]

Synthesis of Low-coordinated Heavier Group 14 Species Bearing Stable Redox Behavior and Elucidation of Their Structures  
SASAMORI, Takahiro, Graduate School of Natural Sciences, Nagoya City University  
**Host in JURC** TOKITOH, Norihiro

Base Metal Catalysis for Creation of Functional Materials  
ILIES, Laurean, Department of Chemistry, School of Science,  
The University of Tokyo

**Host in JURC** NAKAMURA, Masaharu

Unraveling In-plane Aromaticity in Cycloparaphenylenes  
MURANAKA, Atsuya, Advanced Elements Chemistry Labora-  
tory (The Uchiyama Group), RIKEN

**Host in JURC** YAMAGO, Shigeru

Study of the Reaction Mechanisms of Radical Polymerization  
Utilizing the Reactivity of Organotellurium Compounds  
NAKAMURA, Yasuyuki, Adhesive Materials Group, Research  
Center for Structural Materials, National Institute for Materials  
Science

**Host in JURC** YAMAGO, Shigeru

Differential Molecular Network Analysis through Statistical  
Machine Learning

KAYANO, Mitsunori, Research Center for Global Agromedicine,  
Obihiro University of Agriculture and Veterinary Medicine

**Host in JURC** MAMITSUKA, Hiroshi

Studies on the Reactivities between Curved Pi-conjugated Mole-  
cules and Transition Metal Complexes and Their Applications  
OGOSHI, Sensuke, Graduate School of Engineering, Osaka  
University

**Host in JURC** YAMAGO, Shigeru

Organic Photovoltaic Devices Composed of Novel Organic  
Semiconductors  
IE, Yutaka, The Institute of Scientific and Industrial Research,  
Osaka University

**Host in JURC** WAKAMIYA, Atsushi

Electronic Landscape and Optoelectronics of Non-lead Perovskite  
Solar Cell

SAEKI, Akinori, Graduate School of Engineering, Osaka University

**Host in JURC** WAKAMIYA, Atsushi

Biogeochemical Study of Bioactive Trace Metals in the Aerosols  
over Northern North Pacific Ocean

NAKAGUCHI, Yuzuru, Faculty of Science and Engineering,  
Kindai University

**Host in JURC** SOHRIN, Yoshiki

Correlated Molecular Motion in Polymeric Liquids  
SUKUMARAN, Sathish Kumar, Graduate School of Organic  
Materials Science, Yamagata University

**Host in JURC** WATANABE, Hiroshi I

The Study on Density Fluctuations of Polycarbonate by Using  
Time-resolved Scattering Method

NISHITSUJI, Shotaro, Graduate School of Organic Materials  
Science, Yamagata University

**Host in JURC** TAKENAKA, Mikihito

Depth-resolved Structure Analysis of Organic Thin Films by  
Energy Dispersive GISAXS Utilizing Tender X-rays

YAMAMOTO, Katsuhiko, Graduate School of Engineering,  
Nagoya Institute of Technology

**Host in JURC** TAKENAKA, Mikihito

Analysis of Physical Properties and Structure of Partially Fluori-  
nated Phospholipid Bilayer

SONOYAMA, Masashi, Faculty of Science and Technology,  
Gunma University

**Host in JURC** HASEGAWA, Takeshi

## STARTING-UP SUBJECTS (ON-DEMAND FROM RELATED COMMUNITIES)

Dynamics of the Transcription Factor ARR1 on Plant Chromo-  
somal DNA

KIM, Jong-Myong, RIKEN Center for Sustainable Resource Sci-  
ence

**Host in JURC** AOYAMA, Takashi

Discovery and Use of Bioactive Self-Assembling Molecules  
ZHOU, Lu, School of Pharmacy, Fudan University

**Host in JURC** UESUGI, Motonari I

Promotion of Wound Healing by a Synthetic Cell-adhesion  
Molecule

NISHIKAWA, Makiya, Faculty of Pharmaceutical Sciences,  
Tokyo University of Science

**Host in JURC** UESUGI, Motonari

Study of Spin-filtering Effect of the Magnetic Insulator Films  
with Perpendicular Magnetic Anisotropy

TANAKA, Masaaki, Department of Physical Science and Engi-  
neering, Nagoya Institute of Technology

**Host in JURC** ONO, Teruo

Real Time Observation of Topological Hall Effect

KIM, Kab-Jin, Department of Physics, Korea Advanced Institute  
of Science and Technology

**Host in JURC** ONO, Teruo I

Electric Field Induced Skyrmion Motion

NAKATANI, Yoshinobu, Department of Communication Engi-  
neering and Informatics, The University of Electro-Communica-  
tions

**Host in JURC** ONO, Teruo

Studies on Spin Dynamics of TADF Molecules

IKOMA, Tadaaki, Graduate School of Science and Technology,  
Niigata University

**Host in JURC** KAJI, Hironori

Characteristics of Membrane Vesicles Produced by Intestinal  
Bacteria and Fermented Food-derived Bacteria and Their Biogen-  
esis

KURATA, Atsushi, Faculty of Agriculture, Kindai University

**Host in JURC** KURIHARA, Tatsuo

Determination and Functional Analyses of Cyclization Enzymes  
in the Biosynthesis of Plant Polycyclic Aromatic Compounds

TAKANASHI, Kojiro, Institute of Mountain Science, Shinshu  
University

**Host in JURC** WATANABE, Bunta

Development of Recognition and Separation System Highly  
Selective for Rare Metals

YAMAZAKI, Shoko, Department of Chemistry, Nara University  
of Education

**Host in JURC** UMETANI, Shigeo F

Reptation Relaxation of Entangled Polymer Chains Undergoing  
Head-to-Head Association and Dissociation

KWON, Youngdon, School of Chemical Engineering, Sungkyunkwan  
University

**Host in JURC** MATSUMIYA, Yumi I

Antisense-Induced Guanine Quadruplex Formation in mRNAs  
HAGIHARA, Masaki, Graduate School of Science and Technol-  
ogy, Hirosaki University

**Host in JURC** SATO, Shinichi

Development of Catalysts for Regio- and Stereoselective Oxidation

ITO, Akichika, Gifu Pharmaceutical University

**Host in JURC** KAWABATA, Takeo

Development of Organocatalytic Site-selective Phosphorylation and Sulfation Reactions of Carbohydrate and Its Application to Drug Delivery

NAGASAWA, Hideko, Gifu Pharmaceutical University

**Host in JURC** KAWABATA, Takeo

[F]

Synergistic Effect of Surfactant for Solid Phase Extraction Using Solvent Impregnated Resin

KURAHASHI, Kensuke, Environmental and Materials Chemistry Course, Osaka Prefecture University College of Technology

**Host in JURC** SOHRIN, Yoshiki

Room Temperature Operation of Au<sub>25</sub> Cluster Single-electron Transistor

MAJIMA, Yutaka, Laboratory for Materials and Structures, Institute of Innovative Research, Tokyo Institute of Technology

**Host in JURC** TERANISHI, Toshiharu

Vibrational Spectroscopy Study on Ozonolysis of Kalanchoe Pinnata Leaf Surface

HAMA, Tetsuya, Institute of Low Temperature Science, Hokkaido University

**Host in JURC** HASEGAWA, Takeshi

Creation of Organic Functional Materials Based on Macrocycles Incorporating Triphenylamine Units

IWANAGA, Tetsuo, Department of Chemistry, Faculty of Science, Okayama University of Science

**Host in JURC** WAKAMIYA, Atsushi

#### EXPANDING SUBJECTS

##### (ON-DEMAND FROM RELATED COMMUNITIES)

Regulatory Network of Gene Expression for Plant Cell Morphogenesis

QU, Li-Jia, School of Life Sciences, Peking University

**Host in JURC** AOYAMA, Takashi

[I]

Modulation of New Cellular Functions of Vitamin D

NAGASAWA, Kazuo, Department of Biotechnology and Life Science, Tokyo University of Agriculture and Technology

**Host in JURC** UESUGI, Motonari

Interface Structure and Spin Current Phenomena of Spinel Ferrite/Heavy Metal Systems

NAGAHAMA, Taro, Graduate School of Engineering, Hokkaido University

**Host in JURC** ONO, Teruo

Observation of Current-Driven Domain Wall Motions in the Ni Nanowire

YAMADA, Keisuke, Faculty of Engineering, Gifu University

**Host in JURC** ONO, Teruo

Electric Field Effect on Magnetic Domain Wall Velocity in a System with an Induced Magnetic Moment

CHIBA, Daichi, School of Engineering, The University of Tokyo

**Host in JURC** ONO, Teruo

Mechanism Study of Heterogeneous Catalysis on Zeolites by DNP-NMR

XU, Jun, Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences

**Host in JURC** KAJI, Hironori

[I]

Determination of High-order Structure of Organic Device Molecules Using Dynamic Nuclear Polarization Solid-state NMR

KOBAYASHI, Takeshi, U.S. Department of Energy, Ames National Laboratory

**Host in JURC** KAJI, Hironori

[I]

Functional Study of Metal-induced Proteins in Microbial Metal Respiration

MIHARA, Hisaaki, Department of Biotechnology, College of Life Sciences, Ritsumeikan University

**Host in JURC** KURIHARA, Tatsuo

Studies on the Formation Mechanism of the Bound D-Amino Acids Using the Synthetic Peptides

OMORI, Taketo, Faculty of Engineering, Osaka Institute of Technology

**Host in JURC** KURIHARA, Tatsuo

Studies on the Biosynthesis and Physiological Functions of Human Steroidal Hormones in Plant

OHNISHI, Toshiyuki, Graduate School of Agriculture, Shizuoka University

**Host in JURC** WATANABE, Bunta

Studies on Mesenchymal Stem Cells Differentiation Induced by Two-Dimensional Ordered Arrays of Monodisperse Microparticles with a Polymer Brush for Regenerative Medicine

YAMAMOTO, Masaya, Graduate School of Engineering, Tohoku University

**Host in JURC** OHNO, Kohji

Intramolecular Photoinduced Charge Separation in D-A Cycloparaphenylenes

FUJITSUKA, Mamoru, The Institute of Scientific and Industrial Research, Osaka University

**Host in JURC** YAMAGO, Shigeru

Development of Novel  $\pi$ -Conjugated Polymers and Their Application to Organic Photovoltaics

OSAKA, Itaru, Graduate School of Engineering, Hiroshima University

**Host in JURC** WAKIOKA, Masayuki

Theoretical Study on Chemoselective Acylation Catalyzed by 4-Pyrrolidinopyridine Derivatives

YAMANAKA, Masahiro, Department of Chemistry, College of Science, Rikkyo University

**Host in JURC** KAWABATA, Takeo

Search for Four Wave-mixing in the Vacuum

HONMA, Kensuke, Graduate School of Science, Hiroshima University

**Host in JURC** SAKABE, Shuji

[I]

Exploring Functional Properties Transition Metal Oxides by Electric-field-induced Electrochemical Etching

HATANO, Takafumi, Department of Crystalline Materials Science, Nagoya University

**Host in JURC** KAN, Daisuke

Study on Unusual Photoresponses of Upper Critical Solution Temperature of Polymer Solutions Using an Azobenzene-doped Liquid-crystalline Solvent

YAMAMOTO, Takahiro, Research Institute for Sustainable Chemistry, National Institute of Advanced Industrial Science and Technology (AIST)

**Host in JURC** OHNO, Kohji

**Host in JURC** OHNO, Kohji



Interfacial Structure Control and Photo-induced Charge Transfer Dynamics of Semiconductor Nanocrystal Based Hybrid Materials  
TACHIBANA, Yasuhiro, School of Aerospace, Mechanical and Manufacturing Engineering, RMIT University  
**Host in JURC** TERANISHI, Toshiharu I

Electrical Control and Detection of Qubit of NV Center  
MAKINO, Toshiharu, Energy Technology Research Institute, National Institute of Advanced Industrial Science and Technology (AIST)  
**Host in JURC** MIZUOCHI, Norikazu

Toward Long Spin Coherence Time of NV Center in Diamond  
TOKUDA, Norio, Faculty of Electrical and Computer Engineering, Institute of Science and Engineering, Kanazawa University  
**Host in JURC** MIZUOCHI, Norikazu

Research toward Ultra-high Sensitivity Sensor by Using Diamond  
HATANO, Mutsuko, School of Engineering, Department of Electrical and Electronic Engineering, Tokyo Institute of Technology  
**Host in JURC** MIZUOCHI, Norikazu F

Development of Functional Supramolecular Multiblock Copolymer  
HAINO, Takeharu, Graduate School of Science, Hiroshima University  
**Host in JURC** YAMAGO, Shigeru

Investigation of Relationship between Sequence Length and Segment Size of Various Kinds of Two-component Multiblock Copolymers  
TAKANO, Atsushi, Graduate School of Engineering, Nagoya University  
**Host in JURC** WATANABE, Hiroshi

#### SUBJECTS FOCUSING OF JOINT USAGE OF JURC/ICR FACILITIES

Nano-electron Spectroscopic Study on Hydrogen and Helium Behavior in Plasma Facing Materials for Nuclear Fusion Devices  
MIYAMOTO, Mitsutaka, Interdisciplinary Faculty of Science and Engineering, Shimane University  
**Host in JURC** KURATA, Hiroki

Elucidation of the Fluorous Interactions in the Crystal Structures of Fluorine-containing Conjugated Molecules by the Single-crystal X-Ray Structural Analysis  
AGOU, Tomohiro, Department of Biomolecular Functional Engineering, College of Engineering, Ibaraki University  
**Host in JURC** TOKITOH, Norihiro

Synthesis and Structure of Kinetically Stabilized Main Group Element Compounds Using Triptycylmethyl Groups  
MINOURA, Mao, College of Science, Rikkyo University  
**Host in JURC** TOKITOH, Norihiro

Theoretical Design of Flat and Perfect Two-dimensional  $\pi$ -Conjugated "Silicene" and the Search of Their Solid-state Properties  
TAKAHASHI, Masae, Graduate School of Agricultural Science, Tohoku University  
**Host in JURC** TOKITOH, Norihiro F

Analysis of Gap Plasmon Modes by Electron Energy-loss Spectroscopy  
SAITO, Hikaru, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University  
**Host in JURC** KURATA, Hiroki

Synthesis and Elucidation of Properties of Unsymmetrically-substituted Disilyne and Related  $\pi$ -Electron Systems  
IWAMOTO, Takeaki, Graduate School of Science, Tohoku University  
**Host in JURC** TOKITOH, Norihiro

Synthesis and Structural Characterization of Low-coordinate Compounds of Group 14 Elements  
MATSUO, Tsukasa, Faculty of Science and Engineering, Kindai University  
**Host in JURC** TOKITOH, Norihiro

Synthesis and Structures of Phosphorus-containing Aromatics Bearing an Amine Moiety  
NAGAHORA, Noriyoshi, Department of Chemistry, Faculty of Science, Fukuoka University  
**Host in JURC** TOKITOH, Norihiro

Studies of Porphyrin Hetero-dimer Formation by Using High-resolution FT-MS Spectroscopic Monitoring. Precise Analysis of Its Molecular Recognition, Oligomerization, and Dynamic Chirality  
TOKUNAGA, Yuji, Graduate School of Engineering, University of Fukui  
**Host in JURC** NAKAMURA, Masaharu

Study of the Mechanism of Steroid Hormone Production Using Imaging Mass Spectrometry  
HATANO, Osamu, Department of Anatomy and Cell Biology, Nara Medical University  
**Host in JURC** ISOZAKI, Katsuhiko

Determination of Compositions of Protected Novel Metal Clusters with Precise Mass Analysis  
KOYASU, Kiichirou, Department of Chemistry, School of Science, The University of Tokyo  
**Host in JURC** ISOZAKI, Katsuhiko

Synthesis of Metal Clusters Protected by Hydrophilic Thiolate, and Precise Separation and Evaluation by LC/MS  
NEGISHI, Yuichi, Faculty of Science, Department of Applied Chemistry, Tokyo University of Science  
**Host in JURC** ISOZAKI, Katsuhiko

#### SUBJECTS ENCOURAGING JOINT PROGRAM

Joint Seminar 2018 on Next Generation Materials  
FUJIMOTO, Kenjiro, Department of Pure and Applied Chemistry, Faculty of Science and Technology, Tokyo University of Science  
**Host in JURC** KAN, Daisuke I

Facile Intracellular Delivery by the Structural Alteration of Oligoarginines  
CHENG, Richard, Department of Chemistry, National Taiwan University  
**Host in JURC** FUTAKI, Shiroh I

Novel Drug-delivery System Using Albumin as a Reservoir  
SAGAN, Sandrine, Laboratoire des Biomolécules, UMR7203 CNRS–University Pierre et Marie Curie –École Normale Supérieure Paris  
**Host in JURC** FUTAKI, Shiroh I F

Functional Design for Drug Delivery into Brain  
GIRALT, Ernest, Institute for Research in Biomedicine, University of Barcelona  
**Host in JURC** FUTAKI, Shiroh I

Modification of Cell-penetrating Peptides for the Effective Delivery of Molecules into the Cells

HUDECZ, Ferenc, ELTE-Hungarian Academy of Sciences

**Host in JURC** FUTAKI, Shiroh

I

The 14th International Workshop for East Asian Young Rheologists

INOUE, Tadashi, Graduate School of Science, Osaka University

**Host in JURC** WATANABE, Hiroshi

I

Study on Emergent Spin-orbit Phenomena in Artificial Superlattices without Structural Inversion Symmetry

KIM, Sanghoon, Physics Department, University of Ulsan

**Host in JURC** ONO, Teruo

I

3rd Solid-State Chemistry Forum

MIYASAKA, Hitoshi, Institute for Materials Research, Tohoku University

**Host in JURC** SHIMAKAWA, Yuichi

# JURC Publications (Selected Examples)

(until 31 May 2018)

## Directional Linearly Polarized Terahertz Emission from Argon Clusters Irradiated by Noncollinear Double-pulse Beams

Mori, K.; Hashida, M.; Nagashima, T.; Li, D.; Teramoto, K.; Nakamiya, Y.; Inoue, S.; Sakabe, S., *Appl. Phys. Lett.*, **111**, 241107 (2017).

### Abstract

It has been demonstrated that the interaction between argon clusters and intense femtosecond double laser pulses with appropriate intervals in time and space provides important properties for terahertz electromagnetic wave generation, namely, high forward directivity, power enhancement, and linear polarization with a variable direction. Irradiating argon clusters with double pulses (1 and 3 mJ, 40 fs, 810 nm) in 133-ps and 40- $\mu$ m intervals results in terahertz wave emission in the forward direction that is 10 times greater than that for a single pulse. The polarization direction of terahertz electromagnetic waves can be varied by changing the relative focal positions of the first and second pulses.

## Critical Controllability Analysis of Directed Biological Networks Using Efficient Graph Reduction

Ishitsuka, M.; Akutsu, T.; Nacher, J. C., *Sci. Rep.*, **7**, 14361 (2017).

### Abstract

Network science has recently integrated key concepts from control theory and has applied them to the analysis of the controllability of complex networks. One of the proposed frameworks uses the Minimum Dominating Set (MDS) approach, which has been successfully applied to the identification of cancer-related proteins and in analyses of large-scale undirected networks, such as proteome-wide protein interaction networks. However, many real systems are better represented by directed networks. Therefore, fast algorithms are required for the application of MDS to directed networks. Here, we propose an algorithm that utilizes efficient graph reduction to identify critical control nodes in large-scale directed complex networks. The algorithm is 176-fold faster than existing methods and increases the computable network size to 65,000 nodes. We then applied the developed algorithm to metabolic pathways consisting of 70 plant species encompassing major plant lineages ranging from algae to angiosperms and to signalling pathways from *C. elegans*, *D. melanogaster* and *H. sapiens*. The analysis not only identified functional pathways enriched with critical control molecules but also showed that most control categories are largely conserved across evolutionary time, from green algae and early basal plants to modern angiosperm plant lineages.

## Fullerene C<sub>70</sub> as a Nanoflask That Reveals the Chemical Reactivity of Atomic Nitrogen

Morinaka, Y.; Zhang, R.; Sato, S.; Nikawa, H.; Kato, T.; Furukawa, K.; Yamada, M.; Maeda, Y.; Murata, M.; Wakamiya, A.; Nagase, S.; Akasaka, T.; Murata, Y., *Angew. Chem. Int. Ed.*, **56**, 6488-6491 (2017).

### Abstract

To investigate the intrinsic reactivity of atomic nitrogen, which had previously been accomplished only by examining its decay in the gas phase using special equipment, a nitrogen atom was inserted into a series of molecule-encapsulating C<sub>60</sub> and C<sub>70</sub> fullerenes. Among the studied endofullerenes, H<sub>2</sub>@C<sub>70</sub> was able to encapsulate an additional nitrogen atom within the fullerene cage under radiofrequency plasma conditions. The product was analyzed by ESR spectroscopy and mass spectrometry in solution, which revealed that the nitrogen atom with a quartet ground state does not react but weakly interact with the H<sub>2</sub> molecule, thus demonstrating the utility of such fullerenes as “nanoflasks”.

## Vitamin D Metabolite, 25-Hydroxyvitamin D, Regulates Lipid Metabolism by Inducing Degradation of SREBP/SCAP

Asano, L.; Watanabe, M.; Ryoden, Y.; Usuda, K.; Yamaguchi, T.; Khambu, B.; Takashima, M.; Sato, S.; Sakai, J.; Nagasawa, K.; Uesugi, M., *Cell Chem. Biol.*, **24**, 207-217 (2017).

### Abstract

Sterol regulatory element-binding proteins (SREBPs) are transcription factors that control lipid homeostasis. SREBP activation is regulated by a negative feedback loop in which sterols bind to SREBP cleavage-activating protein (SCAP), an escort protein essential for SREBP activation, or to insulin-induced genes (Insigs) (endoplasmic reticulum [ER] anchor proteins), sequestering the SREBP-SCAP-Insig complex in the ER. We screened a chemical library of endogenous molecules and identified 25-hydroxyvitamin D (25OHD) as an inhibitor of SREBP activation. Unlike sterols and other SREBP inhibitors, 25OHD impairs SREBP activation by inducing proteolytic processing and ubiquitin-mediated degradation of SCAP, thereby decreasing SREBP levels independently of the vitamin D receptor. Vitamin D supplementation has been proposed to reduce the risk of metabolic diseases, but the mechanisms are unknown. The present results suggest a previously unrecognized molecular mechanism of vitamin D-mediated lipid control that might be useful in the treatment of metabolic diseases.

## Synthesis of Aryl C-Glycosides via Iron-Catalyzed Cross Coupling of Halosugars: Stereoselective Anomeric Arylation of Glycosyl Radicals

Adak, L.; Kawamura, S.; Toma, G.; Takenaka, T.; Isozaki, K.; Takaya, H.; Orita, A.; Li, H. C.; Shing, T. K. M.; Nakamura, M., *J. Am. Chem. Soc.*, **139**, 10693-10701 (2017).

### Abstract

We have developed a novel diastereoselective iron-catalyzed cross-coupling reaction of various glycosyl halides with aryl metal reagents for the efficient synthesis of aryl C-glycosides, which are of significant pharmaceutical interest due to their biological activities and resistance toward metabolic degradation. A variety of aryl, heteroaryl, and vinyl metal reagents can be cross-coupled with glycosyl halides in high yields in the presence of a well-defined iron complex, composed of iron(II) chloride and a bulky bisphosphine ligand, TMS-SciOPP. The chemoselective nature of the reaction allows the use of synthetically versatile acetyl-protected glycosyl donors and the incorporation of various functional groups on the aryl moieties, producing a diverse array of aryl C-glycosides, including Canagliflozin, an inhibitor of sodium-glucose cotransporter 2 (SGLT2), and a prevailing diabetes drug. The cross-coupling reaction proceeds via generation and stereoselective trapping of glycosyl radical intermediates, representing a rare example of highly stereoselective carbon-carbon bond formation based on iron catalysis. Radical probe experiments using 3,4,6-tri-*O*-acetyl-2-*O*-allyl- $\alpha$ -d-glucopyranosyl bromide (**8**) and 6-bromo-1-hexene (**10**) confirm the generation and intermediacy of the corresponding glycosyl radicals. Density functional theory (DFT) calculations reveal that the observed anomeric diastereoselectivity is attributable to the relative stability of the conformers of glycosyl radical intermediates. The present cross-coupling reaction demonstrates the potential of iron-catalyzed stereo- and chemoselective carbon-carbon bond formation in the synthesis of bioactive compounds of certain structural complexity.