



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



# iJURC Cooperative Research Subjects 2020

(1 April 2020 ~ 31 March 2021)

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

Fabrication and Design of Chiral Plasmonic Nanostructures Based on Chemical Methods  
NAKAGAWA, Makoto, Osaka Research Institute of Industrial Science and Technology  
**Host in iJURC** KURATA, Hiroki

Study of Formation of Fine Periodic Structures Induced by Two Color Optical Pulses  
NAGASHIMA, Takeshi, Faculty of Science and Engineering, Setsunan University  
**Host in iJURC** HASHIDA, Masaki

Development of New Nano-structure Target for ISOL  
OHNISHI, Tetsuya, SCRIT Team, Instrumentation Development Group, Nishina Center for Accelerator-Based Science, RIKEN  
**Host in iJURC** WAKASUGI, Masanori

Study of Strange Structures of Short-lived Unstable Nuclei by Electron Scattering  
SUDA, Toshimi, Electron Photon Science Laboratory, Tohoku University  
**Host in iJURC** WAKASUGI, Masanori

Gas Sensing Properties Research of Transition-metal Oxides  
GUO, Haichuan, Ningbo Institute of Industrial Technology (CNITECH) of the Chinese Academy of Sciences  
**Host in iJURC** SHIMAKAWA, Yuichi I

Separation and Evaluation of Thiolate Protected Metal Clusters with Atomic Precision by Using LC/MS  
NEGISHI, Yuichi, Department of Applied Chemistry, Tokyo University of Science  
**Host in iJURC** TAKAYA, Hikaru I

Iron-catalyzed C-H Borylation  
HAJRA, Alakananda, Department of Chemistry, Visva-Bharati University  
**Host in iJURC** NAKAMURA, Masaharu I

Electrochemically Engineered Peptide Based Organic-Inorganic Nanohybrids for Electrocatalytic Conversion of Biomass into Value Added Chemicals  
DAS, Apurba K., Department of Chemistry, Indian Institute of Technology Indore  
**Host in iJURC** NAKAMURA, Masaharu I

Iron-catalyzed Enantioselective Carbometalation and Ring-opening Reactions of Oxabicycloalkenes and other Related Substrates and Mechanistic Consideration  
ADAK, Laksmikanta, Department of Chemistry, Indian Institute of Engineering Science and Technology  
**Host in iJURC** NAKAMURA, Masaharu I

Functionalization of Urushiol Coating Film Using Magnetic Particles  
TACHIBANA, Yoichi, Kyoto Municipal Institute of Industrial Technology and Culture  
**Host in iJURC** NAKAMURA, Masaharu

A Study on Statistical Machine Learning for Efficient Graph Structured Data Analysis  
KARASUYAMA, Masayuki, Department of Computer Science, Nagoya Institute of Technology  
**Host in iJURC** MAMITSUKA, Hiroshi I

Revealing Associations Between Giant Viruses and Eukaryotes in the Global Ocean Through Community Networks Inference and Mining  
CHAFFRON, Samuel, Laboratoire des Sciences du Numérique de Nantes (LS2N), Centre National de la Recherche Scientifique (CNRS)  
**Host in iJURC** ENDO, Hisashi I

Unveiling the Genomic Contents of Ecologically Important Marine Giant Viruses  
DELMONT, Tom, Genoscope, Centre National de la Recherche Scientifique (CNRS)  
**Host in iJURC** OGATA, Hiroyuki I

Development of Predictive Methods for Marine Microbial Communities Based on Remote Sensing Data  
TOMII, Kentaro, Artificial Intelligence Research Center, The National Institute of Advanced Industrial Science and Technology  
**Host in iJURC** OGATA, Hiroyuki

Control and Analysis of Complex Networks via Probabilistic Minimum Dominating Sets  
NACHER, Jose C., Department of Information Science, Faculty of Science, Toho University  
**Host in iJURC** AKUTSU, Tatsuya

Genomics and Transcriptomics of Giant Viruses  
TAKEMURA, Masaharu, Faculty of Science, Tokyo University of Science  
**Host in iJURC** OGATA, Hiroyuki

Whole Genome Analyses of Marine Bacterivorous Heterotrophic Nanoflagellates  
KATAOKA, Takafumi, Faculty of Marine Science and Technology, Fukui Prefectural University  
**Host in iJURC** ENDO, Hisashi

Comparative Genome Analysis of Parmales and Diatoms: Looking for the Ancestral Genomic Feature  
SATO, Shinya, Faculty of Marine Science and Technology, Fukui Prefectural University  
**Host in iJURC** OGATA, Hiroyuki

Exploration of Cycloaddition Properties of Guanidine Functionalized Anthracenes  
DAVOR, Margetic, Division of Organic Chemistry and Biochemistry, Rudjer Boskovic Institute  
**Host in iJURC** MURATA, Yasujiro I

Preparation of Dynamic Induced-helical Conformation in Block Copolymer and Investigation of Its Dominant Factor  
HIRAI, Tomoyasu, Osaka Institute of Technology  
**Host in iJURC** TAKENAKA, Mikihiro

I: International Joint Research

F: Female PI

Development of Kinetic Resolution for N-N Axial Chirality by Organocatalyst

YOSHIDA, Keisuke, Faculty of Pharmacy, Meijo University

**Host in iJURC** KAWABATA, Takeo

Molecular Understanding on the Structures and Dynamics of Ionic End-aggregation Polymers

VAO-SOONGNERN, Visit, School of Chemistry, Suranaree University of Technology

**Host in iJURC** WATANABE, Hiroshi

Dynamics of Shear-induced Concentration Fluctuation in Polymer Solutions

ENDOH, Maya K., Department of Material Science and Chemical Engineering, Stony Brook University

**Host in iJURC** TAKENAKA, Mikihito

Identification of an Active Gibberellin Compound in the Basal Land Plant *Marchantia polymorpha*

KOHCHI, Takayuki, Graduate School of Biostudies, Kyoto University

**Host in iJURC** YAMAGUCHI, Shinjiro

Dynamic Viscoelasticity and Tensile Properties of Thermoplastic Elastomers

NORO, Atsushi, Department of Applied Chemistry, Nagoya University

**Host in iJURC** WATANABE, Hiroshi

Construction of Theoretical Guidelines for Designing Plasmonic Nanoalloys

IIDA, Kenji, Institute for Catalysis, Hokkaido University

**Host in iJURC** TERANISHI, Toshiharu

Study on Transportation of Metal Ions Through a Polymer Membrane Containing Ionic Liquid

MUKAI, Hiroshi, Faculty of Education, Kyoto University of Education

**Host in iJURC** SOHRIN, Yoshiki

## EXPANDING SUBJECTS

### (IN SPECIFIC FIELDS CHOSEN BY iJURC)

Unveil the Effect of Vibrational Strong Coupling on Molecular Reactivity

HIRAI, Kenji, Research Institute for Electronic Science, Hokkaido University

**Host in iJURC** KANEMITSU, Yoshihiko

X-Ray Structural Studies on Ligand Complexes of Maleylacetate Reductase

OIKAWA, Tadao, Faculty of Chemistry, Materials and Bioengineering, Kansai University

**Host in iJURC** FUJII, Tomomi

New Functionalities on Metal Surface with Controlling Laser Plasma Density

KUSABA, Mitsuhiro, Department of Electronics, Information and Communication Engineering, Faculty of Engineering, Osaka Sangyo University

**Host in iJURC** HASHIDA, Masaki

Small Molecule Activation Using Anionic Crypto-FLPs

STREUBEL, Rainer, Institute for Inorganic Chemistry, University of Bonn

**Host in iJURC** TOKITOH, Norihiro

Design and Tailoring Advanced Functional Materials: Symmetry Operation and High Pressure Synthesis

CHEN, Wei-Tin, Center for Condensed Matter Sciences, National Taiwan University

**Host in iJURC** SHIMAKAWA, Yuichi

Development of Unsymmetrical  $\pi$ -Electron Systems of Heavier Main Group Elements and Elucidation of Their Property

IWAMOTO, Takeaki, Department of Chemistry, Tohoku University

**Host in iJURC** TOKITOH, Norihiro

Optical Control of High-order Harmonic Generation from Solids

SATO, Shunsuke A., Max-Planck Institute for Structure and Dynamics of Matter/Center for Computational Sciences, University of Tsukuba

**Host in iJURC** KANEMITSU, Yoshihiko

Study on the Stability of Novel Ternary Nanoparticles by Doping 3rd Elements

TATETSU, Yasutomi, Liberal Arts Education Center, Meio University

**Host in iJURC** TERANISHI, Toshiharu

Development of an Ultrashort Mid-infrared Light Source for Highly Efficient Extreme Nonlinear Optics in Solids

ISHII, Nobuhisa, National Institutes for Quantum and Radiological Science and Technology

**Host in iJURC** KANEMITSU, Yoshihiko

Magnon-phonon Excitation in Multiferroic Materials by Intense Terahertz Pulses

SATOH, Takuya, Department of Physics, Tokyo Institute of Technology

**Host in iJURC** HIRORI, Hideki

Comprehensive Understanding and Modeling of the Termination Mechanism in Radical Polymerization

NAKAMURA, Yasuyuki, Research and Services Division of Materials Data and Integrated System, National Institute for Materials Science

**Host in iJURC** YAMAGO, Shigeru

Development of Dinuclear Nickel Complexes Based on a Monoanionic Tridentate Pincer-type Ligand

YAMAGUCHI, Yoshitaka, Faculty of Engineering, Yokohama National University

**Host in iJURC** NAKAMURA, Masaharu

Creation of Effective Oxidation Scavenger for Efficient Perovskite-based Solar Cells

SASAMORI, Takahiro, Division of Chemistry, Faculty of Pure and Applied Sciences, University of Tsukuba

**Host in iJURC** WAKAMIYA, Atsushi

Integrating Omics Data and Module-based Network with Deep Learning to Develop Cancer Type Predictive Models

YANG, Jinn-Moon, Department of Biological Science and Technology, National Chiao Tung University /Institute of Bioinformatics & Systems Biology

**Host in iJURC** AKUTSU, Tatsuya

Next-generation Bioinformatics Approaches for the Accurate Identification of Protease-specific Substrate Cleavage Sites

SONG, Jiangning, Biomedicine Discovery Institute, Monash University

**Host in iJURC** AKUTSU, Tatsuya

Statistical Machine Learning Methods and Applications in Molecular Network Analysis

KAYANO, Mitsunori, Research Center for Global Agromedicine, Obihiro University of Agriculture and Veterinary Medicine  
**Host in iJURC** MAMITSUKA, Hiroshi

Light Emission from Halide Perovskites and Related Materials  
LIU, Ru-Shi, Department of Chemistry, National Taiwan University

**Host in iJURC** KANEMITSU, Yoshihiko I

Development of New Blue TADF Emitters with Horizontal Molecular Orientations

ZYSMAN-COLMAN, Eli, EaStCHEM School of Chemistry, Organic Semiconductor Centre, University of St Andrews

**Host in iJURC** KAJI, Hironori I

Coupling of Nanographenes and Curved  $\pi$ -Systems and Elucidation of Their Electronic and Optical Interactions

NARITA, Akimitsu, Organic and Carbon Nanomaterials Unit, Okinawa Institute of Science and Technology Graduate University (OIST)

**Host in iJURC** HIROSE, Takashi I

Development of Hole Transport Materials for Tin-perovskite and Device Characterization

SAEKI, Akinori, Department of Applied Chemistry, Graduate School of Engineering, Osaka University

**Host in iJURC** WAKAMIYA, Atsushi I

Development of  $\pi$ -Conjugated Nickel Complexes for High Performance n-Type Thermoelectric Materials

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

**Host in iJURC** MURATA, Yasujiro

Synthesis of Novel Organic Functional Dye Bearing Heteroazulene Unit

KUROTOBI, Kei, Department of Liberal Arts (Natural Science and Mathematics), National Institute of Technology, Kurume College

**Host in iJURC** MURATA, Yasujiro

A Study of Reactive Intermediates in Macrocyclic Systems

ABE, Manabu, Department of Chemistry, Graduate School of Science, Hiroshima University

**Host in iJURC** YAMAGO, Shigeru

Observation of Orbital Hall Effect in Ferromagnet/Nonmagnet Bilayers

KIM, Sanghoon, Department of Physics, University of Ulsan

**Host in iJURC** ONO, Teruo I

High Frequency Response of Polymeric Liquids: Rheology and Dielectric Relaxation

SUKUMARAN, Sathish K., Graduate School of Organic Materials Science, Yamagata University

**Host in iJURC** WATANABE, Hiroshi I

Trace Metal Elemental and Isotopic Composition in the North Pacific Ocean: Sources and Internal Cycling

HO, Tung-Yuan, Academia Sinica, Research Center for Environmental Changes

**Host in iJURC** SOHRIN, Yoshiki I

Revealing Exciton Quenching Mechanisms in Thermally Activated Delayed Fluorescent Devices

SAMUEL, Ifor D. W., Organic Semiconductor Centre, SUPA, School of Physics and Astronomy, University of St Andrews

**Host in iJURC** KAJI, Hironori I

Fabrication of Low Bandgap Semiconductor Films and Their Light Induced Interfacial Charge Transfer and Charge Transport Dynamics

TACHIBANA, Yasuhiro, School of Engineering, RMIT University

**Host in iJURC** TERANISHI, Toshiharu I

Visualization of Sulfur Distribution in Polymer Thin Films Using GISAXS-CT

FUJIWARA, Akihiko, Kwansai Gakuin University

**Host in iJURC** TAKENAKA, Mikihito

Origin Analysis of Atmospheric Aerosol of Mountainous Areas by Trace Metal Analysis

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

**Host in iJURC** SOHRIN, Yoshiki

Analysis of Membrane Structure and Properties of Partially Fluorinated Amphiphilic Molecules

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

**Host in iJURC** HASEGAWA, Takeshi

Exploration of Hierarchical Dynamics of Amorphous Polymers by Broadband Dielectric Spectroscopy

URAKAWA, Osamu, Department of Macromolecular Science, Osaka University

**Host in iJURC** MATSUMIYA, Yumi

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

Dielectric Relaxation of Type-A Rouse Chain under End-adsorption/desorption Equilibrium: Effect of Motional Coupling

KWON, Youngdon, School of Chemical Engineering, Sungkyunkwan University

**Host in iJURC** MATSUMIYA, Yumi I

Role of PX-PH-type Phospholipase Ds in Plant Intracellular Membrane Traffic

OHASHI, Yohei, MRC Laboratory of Molecular Biology

**Host in iJURC** AOYAMA, Takashi I

Application of Artificial Viral Capsid to Intracellular Delivery

MATSUURA, Kazunori, Department of Chemistry and Biotechnology, Tottori University

**Host in iJURC** FUTAKI, Shiroh

Novel Strategy for Intracellular Delivery of Nanomedicines

PUJALS, Silvia, Nanoscopy for Nanomedicine Group, Institute for Bioengineering of Catalonia (IBEC)

**Host in iJURC** FUTAKI, Shiroh I F

Construction of Heterologous Protein Secretion System at Low Temperatures by Using Cold-adapted Microorganisms

DAI, Xianzhu, College of Resources and Environment, Southwest University

**Host in iJURC** KURIHARA, Tatsuo I F

Formation of Supramolecular Complexes Through a Host-guest Interaction Between Cycloparaphenylene and Azacorannulenes

ITO, Shingo, Division of Chemistry and Biological Chemistry, School of Physical and Mathematical Sciences, Nanyang Technological University (NTU)

**Host in iJURC** YAMAGO, Shigeru I

Interdisciplinary Approach to Nanostructured Materials for Applications

BUCHER, Jean-Pierre, Institut de Physique et Chimie des Matériaux (IPCMS), Université de Strasbourg

**Host in iJURC** TERANISHI, Toshiharu I

Relationship between Chain Orientation, Amount of Defects, and Toughness of Glassy Polystyrene Materials

CHEN, Quan, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences (CAS)

**Host in iJURC** MATSUMIYA, Yumi I

Fabrication of Thin Films and Structural Characterization of Self-Assembled Lanthanoid Complexes

MIEDA, Eiko, Graduate School of Science Molecular Materials Science Course, Osaka City University

**Host in iJURC** HASEGAWA, Takeshi F

Study on the Regulatory Network of Plant Epidermal Cell Differentiation

TOMINAGA, Rumi, Graduate School of Integrated Sciences for Life, Hiroshima University

**Host in iJURC** AOYAMA, Takashi F

Immune-stimulatory Nano-assemblies

YAMASAKI, Sho, Research Institute for Microbial Disease, Osaka University

**Host in iJURC** UESUGI, Motonari

Analysis of Phase Equilibrium and Molecular Dynamics in Mixture of Nematic Liquid Crystal and Solvent

SHIMADA, Ryoko, Department of Mathematical and Physical Sciences, Japan Women's University

**Host in iJURC** WATANABE, Hiroshi F

Functional Analysis of the CYP711A Family in Strigolactone Biosynthesis of Rice

IZAWA, Takeshi, Graduate School of Agricultural and Life Sciences, The University of Tokyo

**Host in iJURC** MASHIGUCHI, Kiyoshi

Self-assembling Molecules for Improvement of Cardiomyocyte Engraftment

SHIBA, Yuji, School of Medicine, Shinshu University

**Host in iJURC** UESUGI, Motonari

Giant Exchange Reaction from H to D Terminating on Nanocrystalline Silicon Surface and Their Use

MATSUMOTO, Takahiro, Graduate School of Design and Architecture Industrial Innovation Design, Nagoya City University

**Host in iJURC** KANEMITSU, Yoshihiko

Solid Phase Extraction of Metal Ion by Solvent Impregnated Resin Using Surfactant

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

**Host in iJURC** SOHRIN, Yoshiki

Studies on Aromaticity of Cyclic Paraphenylenes with Möbius Topology

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

**Host in iJURC** YAMAGO, Shigeru

Study on Electronic and Magnetic Behavior of Perpendicularly Magnetized Cobalt Ferrite Films

TANAKA, Masaaki, Department of Physical Science and Engineering, Nagoya Institute of Technology

**Host in iJURC** ONO, Teruo

Study of the Generation and Sustainment of High Energy Density Plasmas due to the Interaction between High Power Laser and Structured Medium

KISHIMOTO, Yasuaki, Graduate School of Energy Science, Kyoto University

**Host in iJURC** INOUE, Shunsuke

Functional Analysis of Membrane Lipids on Environmental Stress Tolerance in Acetic Acid Bacteria

TOYOTAKE, Yosuke, Department of Biotechnology, College of Life Sciences, Ritsumeikan University

**Host in iJURC** OGAWA, Takuya

Study on Water Freezing with Cellulose and Their Anti-icing Control by Surface Modification

SAKAKIBARA, Keita, National Institute of Advanced Industrial Science and Technology

**Host in iJURC** TSUJII, Yoshinobu

Asymmetric Umpolung C–C Bond Formation via Expression of Dynamic Chirality

MORIYAMA, Katsuhiko, Graduate School of Science, Chiba University

**Host in iJURC** KAWABATA, Takeo

Studies on Enantioselective Total Syntheses of Marine Natural Product Bohemamines and Their Derivatives

YOSHIMURA, Tomoyuki, Division of Pharmaceutical Sciences, Graduate School of Medical Science, Kanazawa University

**Host in iJURC** KAWABATA, Takeo

Development of Efficient Conversion Method of Woody Biomass, Renewable Biological Resources, to Advanced Chemical Materials

HATANO, Osamu, Nara Medical University

**Host in iJURC** NAKAMURA, Masaharu

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

Molecular Mechanisms for the Inactivation of a Growth Hormone in Rice

HE, Zuhua, Institute of Plant Physiology and Ecology, CAS Center for Excellence in Molecular Plant Sciences, Chinese Academy of Sciences

**Host in iJURC** YAMAGUCHI, Shinjiro I

Well-defined AIE-based Polymer Brush for the Application of the Electrochemical Luminescence Biosensors

MA, Ying, Chemistry and Chemical Engineering, South China University of Technology

**Host in iJURC** OHNO, Kohji I

Role of Phosphoinositide Signaling in Pollen Development

ZHONG, Sheng, School of Life Sciences, Peking University

**Host in iJURC** AOYAMA, Takashi I F

Proteomic Approach to Discovering Specific Inhibitors for Bile-acid Interacting Enzymes

LEI, Xiaoguang, College of Chemistry and Molecular Engineering, Peking University

**Host in iJURC** UESUGI, Motonari I

Transfer of Redox Sensitive Elements (Fe, Mn, Zn) Across the Sediment-water Interface in a Hypoxia Area Near the East Chia Sea

CAI, Pinghe, Department of Marine Chemistry and Geochemistry, Xiamen University

**Host in iJURC** SOHRIN, Yoshiki I

- Structural and Functional Analysis of Curvature-inducing Peptides and Application  
ULRICH, Anne S., Institute of Organic Chemistry (IOC) and Institute of Biological Interfaces (IBG-2), Karlsruhe Institute of Technology (KIT)  
**Host in iJURC** FUTAKI, Shiroh I F
- Site-selective Protein Acetylation by a Small Molecule  
ZHOU, Lu, School of Pharmacy, Fudan University  
**Host in iJURC** UESUGI, Motonari I
- Modulation of Ferrimagnetic Spin Waves by Electric Field  
KIM, Kab-Jin, Department of Physics, Korea Advanced Institute of Science and Technology  
**Host in iJURC** ONO, Teruo I
- Development of Highly Efficient and Stable Blue Organic Light Emitting Diodes Using Thermally Activated Delayed Fluorescent Materials with Ultrafast Reverse Intersystem Crossing  
DUAN, Lian, Department of Chemistry, Tsinghua University  
**Host in iJURC** KAJI, Hironori I
- Fabrication of Nanotopographical Polymer Surfaces for Bactericidal Properties-II  
ENDO, Maya K., Department of Material Science and Chemical Engineering, Stony Brook University  
**Host in iJURC** TAKENAKA, Mikihito I F
- Synthesis of Polyether Nanocomposite Solid Polymer Electrolytes for Lithium Ion Batteries  
FERRIER, Robert C., Chemical Engineering and Materials Science, Michigan State University  
**Host in iJURC** OHNO, Kohji I
- Structural and Functional Analysis of the Surface Glycolipids of Outer Membrane Vesicles Released by Bacteria  
CORSARO, Maria Michela, Department of Chemical Sciences, University of Naples Federico II  
**Host in iJURC** KURIHARA, Tatsuo I F
- Molecular Mechanisms Governing Gene Expression Regulation in Plant Plasticity  
RUBIO, Vicente, Plant Molecular Genetics Department, National Center of Biotechnology (CNB-CSIC)  
**Host in iJURC** TSUGE, Tomohiko I
- Research of Multi-qubit Diamond Quantum Processors  
DOHERTY, Marcus W., Research School of Physics and Engineering, Australian National University  
**Host in iJURC** MIZUOCHI, Norikazu I
- Research Toward Stable NV Centers at Shallow Region in Diamond  
BALASUBRAMANIAN, Gopalakrishnan, Max-Planck Institute for Biophysical Chemistry  
**Host in iJURC** MIZUOCHI, Norikazu I
- Advanced Iodine – Mediated Stereoselective Flow Electrochemistry  
WIRTH, Thomas, School of Chemistry, Cardiff University  
**Host in iJURC** KAWABATA, Takeo I
- Cation- $\pi$  Interaction in Enolate Chemistry  
CLAYDEN, Jonathan, School of Chemistry, University of Bristol  
**Host in iJURC** KAWABATA, Takeo I
- Search for Four-wave-mixing in the Vacuum–Unveiling Dark Components in the Universe –  
HOMMA, Kensuke, Physics, Hiroshima University  
**Host in iJURC** INOUE, Shunsuke I
- Fine Synthesis of Polymer Brush on Ferromagnetic Nano-platelet for Magnetophotonic LC  
UCHIDA, Yoshiaki, Graduate School of Engineering Science, Osaka University  
**Host in iJURC** OHNO, Kohji
- Functional Analysis of Non-canonical Strigolactones as Plant Hormones and Root-derived Signals  
SETO, Yoshiya, School of Agriculture, Meiji University  
**Host in iJURC** YAMAGUCHI, Shinjiro
- Analysis of the Physiological Functions of Extracellular Vesicles Produced by Intestinal Bacteria and Fermented Food-derived Bacteria and Their Application  
KURATA, Atsushi, Faculty of Agriculture, Kindai University  
**Host in iJURC** KURIHARA, Tatsuo
- Observation of Spin Wave Propagation in Polycrystalline YIG Thin Films Prepared by Coprecipitation Method  
YAMADA, Keisuke, Materials Chemistry Course, Department of Chemistry and Biomolecular Science, Graduate School of Engineering, Gifu University  
**Host in iJURC** ONO, Teruo
- Control of Malignant Behavior of Colorectal Cancer by Antitumoral Cell Penetrating Peptide (CPP)  
OHASHI, Wakana, Department of Pharmaceutical Sciences, Keio University  
**Host in iJURC** FUTAKI, Shiroh F
- Anomalous Hall Effect of Ultrathin Pt Films Grown on Magnetic Oxide  
NAGAHAMA, Taro, Solid State Chemistry Laboratory, Faculty of Engineering, Hokkaido University  
**Host in iJURC** ONO, Teruo
- Synthesis and Study of Oxides with Unusually High-valent Cation  
SAITO, Takashi, High Energy Accelerator Research Organization (KEK)  
**Host in iJURC** SHIMAKAWA, Yuichi
- Prediction of Charge Transport Mobilities of Organic p-Type Semiconductors based on Multiscale Simulation  
KIDO, Junji, Department of Organic Device Engineering, Yamagata University  
**Host in iJURC** KAJI, Hironori
- Development of Novel  $\pi$ -Conjugated Polymers by DArP and Their Application to Organic Photovoltaics  
OSAKA, Itaru, Graduate School of Engineering, Hiroshima University  
**Host in iJURC** WAKIOKA, Masayuki
- Spin and Valence Electron Dependent Au<sub>25</sub> Ferromagnetic Single-electron Transistor  
MAJIMA, Yutaka, Materials and Structures Laboratory, Tokyo Institute of Technology  
**Host in iJURC** TERANISHI, Toshiharu
- Manufacture of Nano-scale Shallow NV Centers in Diamond  
TOKUDA, Norio, Nanomaterials Research Institute, Kanazawa University  
**Host in iJURC** MIZUOCHI, Norikazu
- Electrical Control and Detection of Spin of NV Center  
MAKINO, Toshiharu, National Institute of Advanced Industrial Science and Technology (AIST)  
**Host in iJURC** MIZUOCHI, Norikazu

Theoretical Study on Chemoselective Acylation Catalyzed by 4-Pyrrolidinopyridine Derivatives  
YAMANAKA, Masahiro, Department of Chemistry, Rikkyo University  
**Host in iJURC** KAWABATA, Takeo

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

Study on the Mechanism of the Crystal Structural Evolution of Polydimethylsiloxane  
LI, Liangbin, National Synchrotron Radiation Laboratory, University of Science and Technology of China  
**Host in iJURC** TOSAKA, Masatoshi [I]

High-pressure Synthesis of Potential Multiferroic Oxides  
JI, Kunlang, Centre for Science at Extreme Conditions and School of Chemistry, University of Edinburgh  
**Host in iJURC** SHIMAKAWA, Yuichi [I]

Micro- and Nano-structural Characterization by Advanced Transmission Electron Microscopy of Novel Functional Materials for Battery Development  
CHAIRUANGSR, Torranin, Industrial Chemistry, Chiang Mai University  
**Host in iJURC** KURATA, Hiroki [I]

Electron Energy Loss Spectroscopy Analysis of Hexagonal Multilayer Graphene  
WEN, Cheng-Yen, Department of Materials Science and Engineering, National Taiwan University  
**Host in iJURC** KURATA, Hiroki [I]

Electronic Excitations in Charge-density-wave Systems  
CHU, Ming-Wen, Center for Condensed Matter Sciences, National Taiwan University  
**Host in iJURC** KURATA, Hiroki [I]

Synthesis and Characterization of Novel Organoselenium and -tellurium Compounds  
MINOURA, Mao, Department of Chemistry, College of Science, Rikkyo University  
**Host in iJURC** TOKITOH, Norihiro [I]

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 Materials Science and Engineering, College of Engineering, Ibaraki University  
**Host in iJURC** TOKITOH, Norihiro

Synthesis and Structural Characterization of Low-valent Species of Heavier Group 14 Elements  
MATSUO, Tsukasa, Faculty of Science and Engineering, Kindai University  
**Host in iJURC** TOKITOH, Norihiro

Development of Functional Group Analysis on the Surface of Carbon Materials Using DNP-NMR  
GOTOH, Kazuma, Department of Chemistry, Faculty of Science, Okayama University  
**Host in iJURC** KAJI, Hironori

Theoretical Design of Planar Silicene Nanoribbons and Search for New Operating Principles  
TAKAHASHI, Masae, Graduate School of Agricultural Science, Tohoku University  
**Host in iJURC** TOKITOH, Norihiro [F]

High Accuracy Measurement of Hydrogen and Helium Behavior in Plasma Facing Materials for Nuclear Fusion Devices  
MIYAMOTO, Mitsutaka, Interdisciplinary Faculty of Science and Engineering, Shimane University  
**Host in iJURC** KURATA, Hiroki

Synthesis and Structures of Cationic Aromatics Bearing Thiopyrylium Units  
NAGAHORA, Noriyoshi, Department of Chemistry, Faculty of Science, Fukuoka University  
**Host in iJURC** TOKITOH, Norihiro

Analysis of Chemical Properties and Origins of Organic Matter in Lakes and Soils Using FT-ICR-MS  
FUSE, Yasuro, Faculty of Molecular Chemistry and Engineering, Kyoto Institute of Technology  
**Host in iJURC** NAKAMURA, Masaharu

STEM-EELS Analysis of Bound Excitons at Defects in Two-dimensional Materials  
SAITO, Hikaru, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University  
**Host in iJURC** KURATA, Hiroki

#### SUBJECTS ENCOURAGING JOINT PROGRAM

Determine the Three-dimensional Structure of <sup>13</sup>C Labeled  $\alpha$ -Synuclein(61-95) in the Langmuir-Blodgett Film and Supported Phospholipids Bilayers by p-MAIRS FT-IR  
WANG, Chengshan, Chemistry, Middle Tennessee State University  
**Host in iJURC** HASEGAWA, Takeshi [I]

Hydrophilic Dendrimers as Additive for Polyvinylidene difluoride Based Membranes  
SEMSARILAR, Mona, Institut Europeen des Membranes (IEM), CNRS  
**Host in iJURC** YAMAGO, Shigeru [I]

Resolving Percolation Dynamics Responsible for Mechanical Reinforcement in Polymer Nanocomposites Under Uniaxial Stretching  
KOGA, Tadanori, Department of Material Science and Chemical Engineering, Stony Brook University  
**Host in iJURC** TAKENAKA, Mikihito [I]

The 16th International Workshop for East Asian Young Rheologists  
INOUE, Tadashi, Department of Macromolecular Science, Osaka University  
**Host in iJURC** MATSUMIYA, Yumi [I]

# iJURC Publications (Selected Examples)

(until 31 May 2020)

## Reversible Isomerizations between 1,4-Digermbenzenes and 1,4-Digerma-Dewar-benzenes: Air-stable Activators for Small Molecules

Sugahara, T.; Guo, J.-D.; Hashizume, D.; Sasamori, T.; Tokitoh, N., *J. Am. Chem. Soc.*, **141**, 2263-2267 (2019).

### Abstract

The first examples of stable, crystalline, and air-sensitive 1,4-digermbenzenes were isolated. These species photochemically isomerize into the corresponding air-stable digerma-Dewar-benzenes. More importantly, alkyl-substituted Dewar-type-1,4-digermbenzenes can be considered as reversible "air-stable activators" for small molecules such as dihydrogen, carbon dioxide, and acetylene at room temperature. The regeneration of these activators can be accomplished via a thermal retro-isomerization that affords the corresponding 1,4-digermbenzenes.

## H<sub>2</sub>O/Olefinic- $\pi$ Interaction inside a Carbon Nanocage

Hashikawa, Y.; Murata, Y., *J. Am. Chem. Soc.*, **141**, 12928-12938 (2019).

### Abstract

The H<sub>2</sub>O/CH<sub>2</sub>=CH<sub>2</sub>-type hydrogen-bonding (H-bonding) model was experimentally constructed using a water complex of an open-cage C<sub>60</sub> derivative, in which an olefinic double bond and a single molecule of H<sub>2</sub>O are geometrically confined. To investigate OH/ $\pi$ -type H-bonding, that is, H<sub>2</sub>O $\cdots$ (C=C) interaction, we performed <sup>1</sup>H NMR spectroscopic studies that demonstrated the monotonic downfield shift of the proton signal corresponding to H<sub>2</sub>O with remarkable rotational perturbation by lowering the temperature. From the temperature dependence of the angular momentum correlation time ( $\tau_j$ ), the interaction energy was quantitatively estimated to be ca. 0.3 kcal/mol. The computational studies were thoroughly conducted to clarify its inherent nature. As a consequence, the orientation of H<sub>2</sub>O was found to play a prominent role in varying the bonding strength as well as contribution from the electrostatic attraction and orbital-orbital interaction significantly driven by the favorable orbital overlap identified as  $\pi(\text{C}=\text{C}) \rightarrow \sigma^*(\text{OH})$  interaction.

## Bulk Dzyaloshinskii–Moriya Interaction in Amorphous Ferrimagnetic Alloys

Kim, D.-H.; Haruta, M.; Ko, H.-W.; Go, G.; Park, H.-J.; Nishimura, T.; Kim, D.-Y.; Okuno, T.; Hirata, Y.; Futakawa, Y.; Yoshikawa, H.; Ham, W.; Kim, S.; Kurata, H.; Tsukamoto, A.; Shiota, Y.; Moriyama, T.; Choe, S.-B.; Lee, K.-J.; Ono, T., *Nat. Mater.*, **18**, 685-690 (2019).

### Abstract

Symmetry breaking is a fundamental concept that prevails in many branches of physics. In magnetic materials, broken inversion symmetry induces the Dzyaloshinskii-Moriya interaction (DMI), which results in fascinating physical behaviours with the potential for application in future spintronic devices. Here, we report the observation of a bulk DMI in GdFeCo amorphous ferrimagnets. The DMI is found to increase linearly with an increasing thickness of the ferrimagnetic layer, which is a clear signature of the bulk nature of DMI. We also found that the DMI is independent of the interface between the heavy metal and ferrimagnetic layer. This bulk DMI is attributed to an asymmetric distribution of the elemental content in the GdFeCo layer, with spatial inversion symmetry broken throughout the layer. We expect that our experimental identification of a bulk DMI will open up additional possibilities to exploit this interaction in a wide range of materials.

## Dielectric Relaxation of Type-A Chains Undergoing Head-to-Tail Association/Dissociation: Difference from Head-to-Head Case and Correlation with Viscoelastic Relaxation

Kwon, Y.; Matsumiya, Y.; Watanabe, H., *Macromolecules*, **52**, 8484-8502 (2019).

### Abstract

Dielectric relaxation of type-A chains reflects global motion of the chains but is also affected by relative alignment of the dipoles along the chain backbone, namely, by the dipole inversion. Head-to-head association of type-A unimers gives a symmetrically dipole-inverted dimer, and the association/dissociation equilibrium of these unimers and dimer results in motional coupling of these chains, thereby affecting the dielectric behavior. In fact, for this head-to-head case, eigenmode analysis has been reported in the literature to reveal that motional coupling results in moderate retardation and acceleration of the dielectric relaxation of the unimer and dimer obeying the reptation dynamics. In contrast, the coupling has no effect on the dielectric relaxation of the Rouse unimer and dimer, namely, the effect of motional coupling on the dielectric relaxation changes with the type of chain dynamics. This effect was not clarified for head-to-tail associating unimers and their dimer having no dipole inversion. Thus, for completeness, this study makes the eigenmode analysis of the dielectric relaxation for this case of head-to-tail reaction. For the unimer and dimer obeying either Rouse or reptation dynamics, the analysis indicates that the retardation and acceleration of the dielectric relaxation of the unimer and dimer are much more significant for the head-to-tail case than for the head-to-head case irrespective of the chain dynamics, and that the dielectric relaxation function for the former case exactly coincides with the viscoelastic relaxation function if the unimer and dimer obey the reptation dynamics. This result suggests an interesting method of resolving some detail of the chain dynamics under the reaction through comparison of dielectric and viscoelastic responses of the associative type-A chains.

## Probabilistic Controllability Approach to Metabolic Fluxes in Normal and Cancer Tissues

Schwartz, J.-M.; Otokuni, H.; Akutsu, T.; Nacher, J. C., *Nat. Commun.*, **10**, 2725 (2019).

<https://doi.org/10.1038/s41467-019-10616-z>

### Abstract

Recent research has shown that many types of cancers take control of specific metabolic processes. We compiled metabolic networks corresponding to four healthy and cancer tissues, and analysed the healthy-cancer transition from the metabolic flux change perspective. We used a Probabilistic Minimum Dominating Set (PMDS) model, which identifies a minimum set of nodes that act as driver nodes and control the entire network. The combination of control theory with flux correlation analysis shows that flux correlations substantially increase in cancer states of breast, kidney and urothelial tissues, but not in lung. No change in the network topology between healthy and cancer networks was observed, but PMDS analysis shows that cancer states require fewer controllers than their corresponding healthy states. These results indicate that cancer metabolism is characterised by more streamlined flux distributions, which may be focused towards a reduced set of objectives and controlled by fewer regulatory elements.