



ACTIVITIES OF
INTERNATIONAL **J**OINT
USAGE/**R**ESEARCH
CENTER



iJURC Cooperative Research Subjects 2021

(1 April 2021 ~ 31 March 2022)

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

Synthesis and Optical Characterization of Gold Nanohelices with Controllable Aspect Ratio
NAKAGAWA, Makoto, Osaka Research Institute of Industrial Science and Technology
Host in iJURC KURATA, Hiroki

Development of Position Sensitive Active Target for Heavy Ion Storage Ring
YAMAGUCHI, Yoshitaka, RIKEN Nishina Center, Instrumentation Development Group
Host in iJURC WAKASUGI, Masanori

Verification of Radiochemical Reaction Mechanism for FLASH Radiotherapy with Electron Beams
KODAIRA, Satoshi, Radiation Measurement Group, Department of Radiation Measurement and Dose Assessment, National Institute of Radiological Sciences, National Institutes for Quantum Science and Technology
Host in iJURC OGAWARA, Ryo

Development of New Nano-structure Target for ISOL
OHNISHI, Tetsuya, RIKEN Nishina Center, SCRIT Team
Host in iJURC WAKASUGI, Masanori

Electronic Structure of Biomimetic [Mo₃S₄Fe] Clusters and its Relation to the catalytic N₂-Reduction: A Computational Study
SAMEERA, W. M. C., Institute of Low Temperature Science, Hokkaido University,
Host in iJURC OHKI, Yasuhiro I

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

Investigating Iron Nitrides Prepared by New High-Pressure Synthesis with Mössbauer Spectroscopy
Kloß, Simon D., Centre for Science at Extreme Conditions and School of Chemistry, University of Edinburgh
Host in iJURC SHIMAKAWA, Yuichi I

C-H Borylation and Silylation under Visible-Light Enabled Fe-Catalysis
HAJRA, Alakananda, Department of Chemistry, Visva-Bharati University
Host in iJURC NAKAMURA, Masaharu I

Development of Iron-Based Electrocatalysts 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 Asymmetric Carbozincation and Ring-Opening Reactions of Oxabicyclic Alkenes
ADAK, Laksmikanta, Department of Chemistry, Indian Institute of Engineering Science and Technology
Host in iJURC NAKAMURA, Masaharu I

Synthesis of Ferrocenyl-Phosphines and Their Application in the Preparation of Fe Clusters
OGASAWARA, Masamichi, Department of Natural Science, Graduate School of Science and Technology, Tokushima International Science Institute, and Research Cluster on “Innovative Chemical Sensing”, Tokushima University
Host in iJURC OHKI, Yasuhiro

Development of THz-STM for Low-Temperature and High Magnetic Field
TACHIZAKI, Takehiro, Tokai University
Host in iJURC KANEMITSU, Yoshihiko

Strong Carrier Modulation in 2D Semiconducting Materials by Coupled Molecular Vibrations
KIRIYA, Daisuke, Osaka Prefecture University
Host in iJURC KANEMITSU, Yoshihiko

Exploration of Energy Materials by High Pressure Synthesis Technique
YABUUCHI, Naoaki, Department of Chemistry and Life Science, Yokohama National University
Host in iJURC KAN, Daisuke

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

Development of Heteroacenes with Excellent Photophysical and Electrochemical Properties
MITSUDO, Koichi, Graduate School of Natural Science and Technology, Okayama University
Host in iJURC WAKAMIYA, Atsushi

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

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

Development of the Method for the Detection of Coronavirus Diversity
WATANABE, Tokiko, Research Institute for Microbial Diseases, Osaka University
Host in iJURC OGATA, Hiroyuki

Synthesis of Inorganic Molecules for Elucidation of Biosynthetic Pathways of Iron-Sulfur Clusters
RIBBE, Markus W., Department of Molecular Biology and Biochemistry, University of California, Irvine
Host in iJURC OHKI, Yasuhiro I

I: International Joint Research

F: Female PI

Synthesis of Self-Assembled Organoboron Compounds, Elucidation of Self-Assembly Process, and Creation of New Functions
WAKABAYASHI, Shigeharu, Department of Clinical Nutrition, Faculty of Health Science, Suzuka University of Medical Science
Host in iJURC OHKI, Yasuhiro

Chiral Silica with Preferred-Handed Helical Structure via Chiral Transfer
HIRAI, Tomoyasu, Department of Applied Chemistry, Osaka Institute of Technology
Host in iJURC TAKENAKA, Mikihito

Elucidation of the Lubrication Properties of Hyperbranched Polymers and Their Optimization
TAKAHASHI, Yutaka, New Industry Creation Hatchery Center, Tohoku University
Host in iJURC TOSAKA, Masatoshi

Development of Simulation Scheme for Wall-Slip of Polymers
IANNIRUBERTO, Giovanni, Dipartimento di Ingegneria Chimica, dei Materiali e della Produzione Industriale, Università degli Studi di Napoli "Federico II"
Host in iJURC SATO, Takeshi I

Molecular Understanding on the Structures and Dynamics of End-Modified Polymers
VAO-SOONGNERN, Suranaree University of Technology
Host in iJURC WATANABE, Hiroshi I

Effect of Microplastics on Distribution of Trace Heavy Metals in Seawater
NAKAGUCHI, Yuzuru, Faculty of Science and Engineering, Kindai University
Host in iJURC SOHRIN, Yoshiki

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

A Spectroscopic Analysis on Bio-Degradation Processes of Polymer Thin Film Surfaces
AOKI, Takashi, Faculty of Fiber Science and Engineering, Kyoto Institute of Technology
Host in iJURC HASEGAWA, Takeshi

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

EXPANDING SUBJECTS (IN SPECIFIC FIELDS CHOSEN BY iJURC)

Crystal Structure Analysis of GraE from Root-Nodule-Forming Bacterium
OIKAWA, Tadao, Faculty of Chemistry, Materials and Bioengineering, Kansai University
Host in iJURC FUJII, Tomomi

Enhanced Production of Fast Ions by TNSA with Pre-Pulse Laser
SUNAHARA, Atsushi, Institute of Laser Engineering, Osaka University
Host in iJURC INOUE, Syunsuke

Development and Device Evaluation of New D- π -A Emitters Based on Fluorinated Triarylborone Acceptors
MARDER, Todd B., Julius-Maximilians-Universität Würzburg, Institut für Anorganische Chemie
Host in iJURC KAJI, Hironori I

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 I

Small Molecule Activation Using Anionic Crypto-FLPs
STREUBEL, Rainer, Institute for Inorganic Chemistry, University of Bonn
Host in iJURC TOKITOH, Norihiro I

Development of Unsymmetrical π -Electron Systems of Heavier Main Group Elements and Elucidation of Their Property
IWAMOTO, Takeaki, Department of Chemistry, Tohoku University
Host in iJURC TOKITOH, Norihiro I

Magnon-Phonon Excitation in Multiferroic Materials by Intense Pulses
SATO, Takuya, Department of Physics, Tokyo Institute of Technology
Host in iJURC HIRORI, Hideki

Study on the Physical Mechanism on Novel-Ternary Nanoparticle Formation
TATETSU, Yasutomi, Meio University
Host in iJURC TERANISHI, Toshiharu

Development of Collaborative Reaction Fields Based on Dinuclearization of Mononuclear Complexes
YAMAGUCHI, Yoshitaka, Graduate School 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, Institute of Bioinformatics & Systems Biology, National Chiao Tung University
Host in iJURC AKUTSU, Tatsuya I

Developing Data-Driven Deep Learning Approaches for Accurate Identification of Protease-Specific Substrate Targets and Cleavage Sites
SONG, Jianning, Biomedicine Discovery Institute, Monash University
Host in iJURC AKUTSU, Tatsuya I

Unveiling the Genomic Contents of Ecologically Important Marine Giant Viruses
DELMONT, Tom, CNRS, Genoscope, UMR8030
Host in iJURC OGATA, Hiroyuki I

Revealing Associations between Giant Viruses and Eukaryotes in the Global Ocean through Community Networks Inference and Mining
CHAFFRON, Samuel, LS2N, CNRS UMR6004
Host in iJURC ENDO, Hisashi I

Comprehensive Analysis of Viral Succession during the Transition of Multiple Types of Algal Blooms
NAGASAKI, Keizo, Faculty of Agriculture and Marine Science, Graduate School of Integrated Arts and Sciences, Kochi University
Host in iJURC OGATA, Hiroyuki

Effective Molecular Network Analysis and Application to Medical and Agricultural Research
KAYANO, Mitsunori, Research Center for Global Agromedicine, Obihiro University of Agriculture and Veterinary Medicine
Host in iJURC MAMITSUKA, Hiroshi

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

Exploration of Cycloaddition Properties of Guanidine Functionalized Isobenzofurans
MARGETIC, Davor, Division of Organic Chemistry and Biochemistry, Laboratory for Physical Organic Chemistry, Rudjer Boskovic Institute
Host in iJURC MURATA, Yasujiro

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

Development of Thermally Activated Delayed Fluorescent Materials Based on Through-Space Charge Transfer Using Dibenzophenazine as an Electron-Acceptor
TAKEDA, Youhei, Department of Applied Chemistry, Graduate School of Engineering, Osaka University
Host in iJURC KAJI, Hironori

Development of Nonsymmetrical Organic Semiconducting Molecules Toward Efficient Photovoltaics
SUZUKI, Mitsuharu, Graduate School of Engineering, Osaka University
Host in iJURC MURATA, Yasujiro

Synthesis and Properties of π -Conjugated Zwitterions with Negligible Solvatochromism
SHIMIZU, Akihiro, Department of Materials Engineering Science, Graduate School of Engineering Science, Osaka University
Host in iJURC HIROSE, Takashi

Host-Guest Complexation of Cyclohexa-2,7-Anthrylene Ethynylene Derivatives with [n]CPP
KOBAYASHI, Kenji, Research Institute of Green Science and Technology, Shizuoka University
Host in iJURC YAMAGO, Shigeru

Trace Metal Elemental and Isotopic Composition in the North Pacific Ocean: Sources and Internal Cycling (2)
HO, Tung-Yuan, Research Center for Environmental Changes, Academia Sinica
Host in iJURC SOHRIN, Yoshiki

Resolving the Structure-Dynamics-Property Relationship in Polymer Nanocomposites under Uniaxial Stretching
KOGA, Tadanori, Department of Material Science and Chemical Engineering, Stony Brook University
Host in iJURC TAKENAKA, Mikihiro

High Frequency Response of Polymeric Liquids: Rheology and Dielectric Relaxation
SUKUMARAN, Sathish K., Graduate School of Organic Materials Science, Yamagata University
Host in iJURC SATO, Takeshi

Vibronic Effect between Photon and Energy Conversions Studied by Solid State NMR and Time Resolved EPR Spectroscopy
KOBORI, Yasuhiro, Laser Molecular Photoscience Laboratory, Molecular Photoscience Research Center, Kobe University
Host in iJURC KAJI, Hironori

Spatial Distribution of Nanostructures Composed of Sulfur Element in Polymer Thin Films
FUJIWARA, Akihiko, School of Engineering, Kwansei Gakuin University
Host in iJURC TAKENAKA, Mikihiro

Structure Analysis of Polymer Materials Having Sulfur Atoms in a Wet State by Resonant Small-Angle Scattering Methods
YAMAMOTO, Katsuhiko, Department of Life Science & Applied Chemistry, Graduate School of Engineering, Nagoya Institute of Technology
Host in iJURC TAKENAKA, Mikihiro

Construction of Theoretical Guidelines for Designing Plasmonic Nanoalloys
IIDA, Kenji, Institute for Catalysis, Hokkaido University
Host in iJURC TERANISHI, Toshiharu

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

Glass Transition and Molecular Dynamics of Guest Low Mass Molecules in the Clathrate of Polymer Crystals
URAKAWA, Osamu, Department of Macromolecular Science, Osaka University
Host in iJURC MATSUMIYA, Yumi

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

Nonlinear Rheological Behavior of Telechelic Ionomer with a Distribution of Number of Ionic Stickers at the Ends
ZHANG, Zhijie, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences (CAS)
Host in iJURC MATSUMIYA, Yumi

Role of PX-PH-Type Phospholipase Ds in Plant Intracellular Membrane Traffic
OHASHI, Yohei, MRC Laboratory of Molecular Biology, University of Cambridge
Host in iJURC AOYAMA, Takashi

Self-Assembling Adjuvant-Built-In Vaccines for Cancer Immune Therapy
LI, Yan-Mei, Department of Chemistry, Tsinghua University
Host in iJURC UESUGI, Motonari

Application of Ferrimagnets for Spintronics Devices
SAMARDAK, Alexander, School of Natural Science, Far Eastern Federal University
Host in iJURC ONO, Teruo

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

Optimizing Sampling Devices and Procedures to Quantify Sources of Metals and Microplastics in Metro Manila, Philippines' Water Resources
CID-ANDRES, Abigail P., Department of Physical Sciences, College of Science, Polytechnic University of the Philippines,

Host in iJURC SOHRIN, Yoshiki I F

Verification and Development of Dynamic Stiction Theory
NAKANO, Ken, Faculty of Environment and Information Sciences, Yokohama National University

Host in iJURC TSUJII, Yoshinobu I

Novel Strategy for Intracellular Delivery of Nanomedicines
PUJALS, Silvia, Nanoscopy for Nanomedicine Group, Institute for Bioengineering of Catalonia (IBEC)

Host in iJURC FUTAKI, Hiroh I F

Analysis of Novel Transporters for Strigolactones or Their Biosynthetic Intermediates
ZHAO, Yunde, Department of Cell and Developmental Biology, Division of Biological Sciences, University of California San Diego

Host in iJURC MASHIGUCHI, Kiyoshi I

1,3-Dipolar Cycloaddition Reactions of Cycloparaphenylenes with Azomethine Ylide
ITO, Shingo, Division of Chemistry and Biological Chemistry, School of Physical and Mathematical Sciences, Nanyang Technological University (NTU)

Host in iJURC YAMAGO, Shigeru I

Investigation of Relationship between Molecular Structure and Viscoelastic Parameters of Model Poly(Alkylstyrene)s.
TAKANO, Atsushi, Nagoya University

Host in iJURC MATSUMIYA, Yumi

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

Demonstration of Topological Phase Control in Chalcogenide Superlattices
MOROTA, Misako, Device Technology Research Institute, National Institute of Advanced Industrial Science and Technology(AIST)

Host in iJURC ONO, Teruo F

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

Analysis of Membrane Lipid-Dependent Fermentation Stress Response in Acetic Acid Bacteria
TOYOTAKE, Yosuke, Department of Biotechnology, College of Life Sciences, Ritsumeikan University

Host in iJURC KURIHARA, Tatsuo

Thermal Conduction of Pseudo-Ordered Oxide Glasses
MASUNO, Atsunobu, Graduate School of Science and Technology, Hirotsaki University

Host in iJURC SHIMAKAWA, Yuichi

Development of Eu Separation Method by Solid Phase Extraction Using Surfactant
KURAHASHI, Kensuke, Environmental and Materials Chemistry Course, College of Technology, Osaka Prefecture University

Host in iJURC SOHRIN, Yoshiki

Study on Water Freezing with Lignocellulose Nanofibers and Their Surface Modification Toward Functional Materials
SAKAKIBARA, Keita, National Institute of Advanced Industrial Science and Technology

Host in iJURC TSUJII, Yoshinobu

Development of Efficient Conversion Method of Woody Biomass, Renewable Biological Resources, to Advanced Chemical Materials
HATANO, Osamu, School of Medicine, Nara Medical University

Host in iJURC NAKAMURA, Masaharu

Switching of Aromaticity/Anti-Aromaticity of Oxidized Cycloparaphenylenes
FUJITSUKA, Mamoru, The Institute of Scientific and Industrial Research, Osaka University

Host in iJURC YAMAGO, Shigeru

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, Syunsuke

EXPANDING SUBJECTS (ON-DEMAND FROM RELATED COMMUNITIES)

Role of Phosphoinositide Signaling in Pollen Development
ZHONG, Sheng, School of Life Sciences, Peking University

Host in iJURC AOYAMA, Takashi I F

Site-Selective Protein Acetylation by a Small Molecule
ZHOU, Lu, School of Pharmacy, Fudan University

Host in iJURC UESUGI, Motonari I

Orbitronics with New Material Systems
KIM, Sanghoon, University of Ulsan

Host in iJURC ONO, Teruo I

Study of Characteristics of Spin Wave in Magnetic Insulator
KIM, Kab-Jin, Department of Physics, Korea Advanced Institute of Science and Technology

Host in iJURC ONO, Teruo I

Highly Efficient Red Thermally Activated Delayed Fluorescence Emitters with Sterically Hindered Donor Skeleton
KWON, Jang Hyuk, Department of Information Display

Host in iJURC KAJI, Hironori 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

- 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
- Fabrication of Nanotopographical Polymer Surfaces for Bactericidal Properties-III
 ENDOH, 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
- Development of Semiconductor Quantum Dot Solid Films and Their Charge Carrier Dynamics
 TACHIBANA, Yasuhiro, School of Engineering, RMIT University
Host in iJURC TERANISHI, Toshiharu 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
- 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
- Research Toward Stable NV Centers at Shallow Region and Spin Dynamics in Diamond
 BALASUBRAMANIAN, Gopalakrishnan, Leibniz institute for surface engineering, Leipzig, Germany
Host in iJURC MIZUOCHI, Norikazu I
- Research of Quantum Controls in Multi-Qubit Diamond Quantum Processors and Quantum Sensors
 DOHERTY, Marcus W., Research School of Physics and Engineering, Australian National University
Host in iJURC MIZUOCHI, Norikazu I
- Molecular Mechanisms for the Inactivation of a Growth Hormone in Rice
 HE, Zuhua, Chinese Academy of Sciences, CAS Center for Excellence in Molecular Plant Sciences, Institute of Plant Physiology and Ecology
Host in iJURC YAMAGUCHI, Shinjiro I
- Dendritic Amphiphilic Block Copolymers as Additive for Polyvinylidene fluoride Based Membranes
 SEMSARILAR, Mona, Institut Europeen des Membranes (IEM), CNRS
Host in iJURC YAMAGO, Shigeru I
- Search for Four-Wave-Mixing in the Vacuum-Unveiling Dark Components in the Universe –
 HOMMA, Kensuke, Physics, Hiroshima University
Host in iJURC INOUE, Syunsuke I
- Development of Perovskite and Perovskite-Like Emitters and Their Applications
 LIN, Hao-Wu, Department of Materials Science and Engineering, National Tsing Hua University, Taiwan
Host in iJURC WAKAMIYA, Atsushi I
- Immune-Stimulatory Nano-Assemblies
 YAMASAKI, Sho, Research Institute for Microbial Disease, Osaka University
Host in iJURC UESUGI, Motonari
- Self-Assembling Molecules for Improvement of Cardiomyocyte Engraftment
 SHIBA, Yuji, School of Medicine, Shinshu University
Host in iJURC UESUGI, Motonari
- Development of π -Conjugated Polymers for High-Efficiency Non-Fullerene Solar Cells
 OSAKA, Itaru, Department of Applied Chemistry, Graduate School of Engineering and Applied Chemistry Program, Graduate School of Advanced Science and Engineering, Hiroshima University
Host in iJURC WAKIOKA, Masayuki
- Study of Spin Dynamics in Garnet Nanocrystal 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
- Electronic and Spintronic Properties of Multilayer System Including NiCo_2O_4 and Fe_3O_4
 NAGAHAMA, Taro, Solid State Chemistry Laboratory, Faculty of Engineering, Hokkaido University
Host in iJURC ONO, Teruo
- Development of Thermally Activated Delayed Fluorescence Materials with Nanosecondorder Reverse Intersystem Crossing
 AIZAWA, Naoya, RIKEN Center for Emergent Matter Science
Host in iJURC KAJI, Hironori
- Mechanism of the RISC in TADF Studied by Time-Resolved Laser Spectroscopy
 YAMAKATA, Akira, Graduate School of Engineering, Toyota Technological Institute
Host in iJURC KAJI, Hironori
- Functional Characterization of Extracellular Vesicles Produced by Intestinal Bacteria and Development of Their Applications
 YAMASAKI, Shino, Department of Chemistry and Materials Engineering, Kansai University
Host in iJURC KURIHARA, Tatsuo F
- Synthesis and Study of Oxides with Unusually High-Valent Cation
 SAITO, Takashi, High Energy Accelerator Research Organization (KEK)
Host in iJURC SHIMAKAWA, Yuichi
- Fine Synthesis of Polymer Brush on Nano-Platelet for Functional Photonic LC
 UCHIDA, Yoshiaki, Graduate School of Engineering Science, Osaka University
Host in iJURC OHNO, Kohji
- Water in the Polymer Brush Layer: Structure and Freezing Behavior
 GENMEI, Makoto, Graduate School of Innovative Life Science, Toyama University
Host in iJURC OHNO, Kohji

Giant Magnetic Resistance on Single-Electron Transistor
MAJIMA, Yutaka, Laboratory for Materials and Structures,
Tokyo Institute of Technology
Host in iJURC TERANISHI, Toshiharu

Identification of Novel Cellular Uptake Stimulation Proteins
KUWATA, Keiko, Institute of Transformative Bio-Molecules,
Nagoya University
Host in iJURC FUTAKI, Shiroh [F]

Cellular Uptake Using Macropinocytosis
MAEKAWA, Masashi, Keio University
Host in iJURC FUTAKI, Shiroh

Research by Atomically Flat Surface Diamond for Quantum
Information Science and Technology
TOKUDA, Norio, Institute of Science and Engineering, Faculty
of Electrical and Computer Engineering, Kanazawa University
Host in iJURC MIZUOCHI, Norikazu

Development of Quantum Technology and Diamond Synthesis
for Higher Sensitivity of NV Quantum Sensor
MAKINO, Toshiharu, National Institute of Advanced Industrial
Science and Technology Power Industrial Technology Research
Institute
Host in iJURC MIZUOCHI, Norikazu

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

Coupling of Concentration Fluctuation and Orientation Fluctuation
in Mixture of Nematic Liquid Crystal and Solvent
SHIMADA, Ryoko, Japan Women's University
Host in iJURC WATANABE, Hiroshi [F]

SUBJECTS FOCUSING OF JOINT USAGE OF iJURC/ ICR FACILITIES

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

Tackling the Electronic Instability of Charge-Density Waves by
Electron Energy-Loss Spectroscopy Use
CHU, Ming-Wen, Center for Condensed Matter Sciences, Na-
tional Taiwan University
Host in iJURC KURATA, Hiroki [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]

Synthesis and Characterization of Novel Group 16 Element
Compounds
MINOURA, Mao, Department of Chemistry, College of Science,
Rikkyo University
Host in iJURC TOKITOH, Norihiro [I] [F]

Analyses of Organic Crystals and Thin Films Using Solid-State
NMR Spectroscopy
IE, Yutaka, Department of Soft Nanomaterials Nanoscience and
Nanotechnology Center, Osaka University
Host in iJURC KAJI, Hironori

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

Radiative Lifetime Control of Rare-Earth Codoped Nanoparticles
SAITO, Hikaru, Institute for Materials Chemistry and Engineer-
ing, Kyushu University
Host in iJURC 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 Materials Science and Engi-
neering, College of Engineering, Ibaraki University
Host in iJURC TOKITOH, Norihiro

Synthesis and Structural Characterization of Halostannylenes
MATSUO, Tsukasa, Faculty of Science and Engineering, Kindai
University
Host in iJURC TOKITOH, Norihiro

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]

Synthesis and Structures of Cationic Aromatics Bearing Thiopy-
rylium 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, Department of Chemistry and Material Technology,
Kyoto Institute of Technology
Host in iJURC NAKAMURA, Masaharu

SUBJECTS ENCOURAGING JOINT PROGRAM

Determine the Three-Dimensional Structure of ^{13}C Labeled α -
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]

Modulation of In-Cell Protein-Protein Interactions Using Mid-
Sized Peptides ICR Partner
HAYASHI, Yoshio, The School of Pharmacy, Tokyo University
of Pharmacy and Life Sciences (TUPLS)
Host in iJURC FUTAKI, Shiroh [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 2021)

Double-Holed Fullerenes

Hashikawa, Y.; Fushino, T.; Murata, Y., *J. Am. Chem. Soc.*, **142**, 20572-20576 (2020).

Abstract

Fully-fused caged nanocarbons with multiple orifices are segmental structures of porous carbon frameworks long envisioned as synthetic targets of interest. Conventional bottom-up approaches, however, could not overcome the high strain energies required for graphitic precursors to be rounded up. Herein, we report a top-down approach to produce fully-fused carbon nanoelbows as double-holed fullerenes derived from strained C_{60} . The concise one-pot synthesis featuring unique selectivity enabled the isolation of six compounds, while orifice sizes were modifiable from 8- to 12-membered rings and vice versa. The crystallographic analysis confirmed their elbow-shaped structures with different curvatures. Within the crystal, cylindrical nanoporous arrangement were found with the inclusion of solvent guests, reminiscent of hypothetical fullerene sponges.

Observation of Superconducting Diode Effect

Ando, F.; Miyasaka, Y.; Li, T.; Ishizuka, J.; Arakawa, T.; Shiota, Y.; Moriyama, T.; Yanase, Y.; Ono, T., *Nature*, **584**, 373-376 (2020).

Abstract

Nonlinear optical and electrical effects associated with a lack of spatial inversion symmetry allow direction-selective propagation and transport of quantum particles, such as photons and electrons. The most common example of such nonreciprocal phenomena is a semiconductor diode with a p-n junction, with a low resistance in one direction and a high resistance in the other. Although the diode effect forms the basis of numerous electronic components, such as rectifiers, alternating-direct-current converters and photodetectors, it introduces an inevitable energy loss due to the finite resistance. Therefore, a worthwhile goal is to realize a superconducting diode that has zero resistance in only one direction. Here we demonstrate a magnetically controllable superconducting diode in an artificial superlattice $[Nb/V/Ta]_n$ without a centre of inversion. The nonreciprocal resistance versus current curve at the superconducting-to-normal transition was clearly observed by a direct-current measurement, and the difference of the critical current is considered to be related to the magnetochiral anisotropy caused by breaking of the spatial-inversion and time-reversal symmetries. Owing to the nonreciprocal critical current, the $[Nb/V/Ta]_n$ superlattice exhibits zero resistance in only one direction. This superconducting diode effect enables phase-coherent and direction-selective charge transport, paving the way for the construction of non-dissipative electronic circuits.

Discovery of Self-Assembling Small Molecules as Vaccine Adjuvants

Jin, S.; Vu, H. T.; Hioki, K.; Noda, N.; Yoshida, H.; Shimane, T.; Ishizuka, S.; Takashima, I.; Mizuhata, Y.; Pe, K. B.; Ogawa, T.; Nishimura, N.; Packwood, D.; Tokitoh, N.; Kurata, H.; Yamasaki, S.; Ishii, K. J.; Uesugi, M., *Angew. Chem. Int. Ed.*, **60**(2), 961-969 (2021).

Abstract

Immune potentiators, termed adjuvants, trigger early innate immune responses to ensure the generation of robust and long-lasting adaptive immune responses of vaccines. Presented here is a study that takes advantage of a self-assembling small-molecule library for the development of a novel vaccine adjuvant. Cell-based screening of the library and subsequent structural optimization led to the discovery of a simple, chemically tractable deoxycholate derivative (molecule **6**, also named cholicamide) whose well-defined nanoassembly potentially elicits innate immune responses

in macrophages and dendritic cells. Functional and mechanistic analyses indicate that the virus-like assembly enters the cells and stimulates the innate immune response through Toll-like receptor 7 (TLR7), an endosomal TLR that detects single-stranded viral RNA. As an influenza vaccine adjuvant in mice, molecule **6** was as potent as Alum, a clinically used adjuvant. The studies described here pave the way for a new approach to discovering and designing self-assembling small-molecule adjuvants against pathogens, including emerging viruses.

Highly Luminescent $CsPbBr_3@Cs_4PbBr_6$ Nanocrystals and Their Application in Electroluminescent Emitters

Bao, Z.; Chiu, H.-D.; Wang, W.; Su, Q.; Yamada, T.; Chang, Y.-C.; Chen, S.; Kanemitsu, Y.; Chung, R.-J.; Liu, R.-S., *J. Phys. Chem. Lett.*, **11**, 10196-10202 (2020).

Abstract

Zero-dimensional perovskite nanocrystals (NCs) are becoming the most attractive material due to their excellent optical performance and better stability compared with high-dimensional perovskite. However, their application in electroluminescent (EL) emitters for high-quality displays is still limited. In this work, we successfully achieved $CsPbBr_3@Cs_4PbBr_6$ NCs around 13.9 ± 0.2 nm by using the hot-injection method. Additional $SnBr_2$ was mixed in the $PbBr_2$ precursor to provide extra Br^- ions and reduce the excessive amount of Pb^{2+} ions to promote the formation of $CsPbBr_3@Cs_4PbBr_6$. Time resolution photoluminescence analysis indicated that the green emission of our $CsPbBr_3@Cs_4PbBr_6$ NCs originated from the embedded $CsPbBr_3$ NCs, which corresponds to our previous research. The Cs_4PbBr_6 crystals passivated the surface of $CsPbBr_3$ NCs, resulting in the absence of trions for the high photoluminescence quantum yield. The as-synthesized $CsPbBr_3@Cs_4PbBr_6$ NCs were used to fabricate quantum dot light-emitting diode (QLED) devices with the highest current efficiency of 4.89 cd/A. This is the best performance of the $CsPbBr_3@Cs_4PbBr_6$ -system QLED device, which reveals the great potential of $CsPbBr_3@Cs_4PbBr_6$ NCs and will inspire further study of zero-dimensional perovskite composite NCs for EL emitters.

Biogeography of Marine Giant Viruses Reveals Their Interplay with Eukaryotes and Ecological Functions

Endo, H.; Blanc-Mathieu, R.; Li, Y.; Salazar, G.; Henry, N.; Labadie, K.; de Vargas, C.; Sullivan, M. B.; Bowler, C.; Wincker, P.; Karp-Boss, L.; Sunagawa, S.; Ogata, H., *Nat. Ecol. Evol.*, **4**, 1639-1649 (2020).

Abstract

Nucleocytoplasmic large DNA viruses (NCLDVs) are ubiquitous in marine environments and infect diverse eukaryotes. However, little is known about their biogeography and ecology in the ocean. By leveraging the *Tara* Oceans pole-to-pole metagenomic data set, we investigated the distribution of NCLDVs across size fractions, depths and biomes, as well as their associations with eukaryotic communities. Our analyses reveal a heterogeneous distribution of NCLDVs across oceans, and a higher proportion of unique NCLDVs in the polar biomes. The community structures of NCLDV families correlate with specific eukaryotic lineages, including many photosynthetic groups. NCLDV communities are generally distinct between surface and mesopelagic zones, but at some locations they exhibit a high similarity between the two depths. This vertical similarity correlates to surface phytoplankton biomass but not to physical mixing processes, which suggests a potential role of vertical transport in structuring mesopelagic NCLDV communities. These results underscore the importance of the interactions between NCLDVs and eukaryotes in biogeochemical processes in the ocean.