



**ACTIVITIES OF JOINT
USAGE/RESEARCH
CENTER**



JURC Cooperative Research Subjects 2016

(1 April 2016 ~ 31 March 2017)

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

A Study of Magneto-optic and Electro-optic Effects by Laser Induced Pico-second Electromagnetic Pulses
YASUHARA, Ryo, National Institutes of Natural Sciences, National Institute for Fusion Science
Host in JURC SAKABE, Shuji

Diagnostics of Li-Ion Batteries with Laser-Accelerated Protons
KATO, Yoshiaki, The Graduate School for the Creation of New Photonics Industries
Host in JURC SAKABE, Shuji

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

Feasibility Study of Deuteron Beam for Compact Neutron Sources
HIROTA, Katsuya, Graduate School of Science, Nagoya University
Host in JURC IWASHITA, Yoshihisa

Development of Neutron Resonance Spin Flipper at BL06(VIN ROSE) at J-PARC/MLF
HINO, Masahiro, Research Reactor Institute, Kyoto University
Host in JURC IWASHITA, Yoshihisa

Fundamental Research on Compact Neutron Source with Permanent Magnet
OHNUMA, Masato, Division of Quantum Science and Engineering Faculty of Engineering, Hokkaido University
Host in JURC IWASHITA, Yoshihisa

Synthesis of Transition Metal Complexes with a Multidentate Phosphaalkene 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 TAKEUCHI, Katsuhiko

Development of a Novel 3d Metal Catalyst Bearing a M-E Bond as a Key Active Site
NAKAJIMA, Yumiko, Interdisciplinary Research Center for Catalytic Chemistry, National Institute of Advanced Industrial Science and Technology
Host in JURC OZAWA, Fumiyuki [F]

Dielectric Function and Excitonic Effect of Dynamical Screening in Semiconducting Materials for Photoelectric Conversion
SUZUURA, Hidekatsu, Graduate School of Engineering, Hokkaido University
Host in JURC KANEMITSU, Yoshihiko

Characterization of Self-assembled Peptides on Two-dimensional Semiconductor Nanomaterials by Microscopic Photoluminescence Lifetime Measurements
HAYAMIZU, Yuhei, Graduate School of Engineering, Tokyo Institute of Technology
Host in JURC KANEMITSU, Yoshihiko

Investigation of Photocarrier Characteristics in Halide-perovskite-based Photodevices
YAMADA, Yasuhiro, Department of Physics, Graduate School of Science, Chiba University
Host in JURC KANEMITSU, Yoshihiko

Development of Synthetic Organic Reactions Mediated by Low-valent Fe Complexes of N-heterocyclic Carbenes
OHKI, Yasuhiro, Department of Chemistry, Graduate School of Science, Nagoya University
Host in JURC NAKAMURA, Masaharu

Development of Transition metal Complexes Based on Controlled Coordination Ability of NHC
YAMAGUCHI, Yoshitaka, Faculty of Engineering, Division of Materials Science and Chemical Engineering, Yokohama National University
Host in JURC NAKAMURA, Masaharu

Precise Separation and Characterization of Novel Thiolate Protected Metal Clusters by Using LC/MS
NEGISHI, Yuichi, Faculty of Science, Department of Applied Chemistry, Tokyo University of Science
Host in JURC TAKAYA, Hikaru

Analysis and Control of Complex Bipartite Networks
JOSE, C. Nacher, Department of Science, Toho University
Host in JURC AKUTSU, Tatsuya

Flexible and Efficient Search Algorithms for Structured Data in Bioinformatics
TAKASU, Atsuhiko, Division of Digital Content and Media Sciences Research, National Institute of Informatics
Host in JURC AKUTSU, Tatsuya

Pathway Database for Human Gut Microbiome and the Application Toward Metagenomics
YAMADA, Takuji, Graduate School of Bioscience and Biotechnology, Tokyo Institute of Technology
Host in JURC GOTO, Susumu

Biological Molecular Interaction Data Analysis Using Auxiliary Information
SHIGA, Motoki, Informatics Course, Department of Electrical, Electronic and Computer Engineering, Faculty of Engineering, Gifu University
Host in JURC MAMITSUKA, Hiroshi [I]

[I] : International Joint Research

[F] : Female PI

Total Synthesis of Dendrochrysanene
KURAMOCHI, Koji, Graduate School of Life and Environmental
Sciences, Kyoto Prefectural University
Host in JURC KAWABATA, Takeo

Polymer Nano-architectonics for Bridging a Gap between
Macroscopic Interfacial Phenomena and Molecular Function
NAKANISHI, Waka, MANA, National Institute for Materials
Science
Host in JURC SAKAKIBARA, Keita [F]

Precursor Approach towards Controlled Preparation of Organic
Heterojunction Layers
SUZUKI, Mitsuharu, Graduate School of Materials Science, Nara
Institute of Science and Technology (NAIST)
Host in JURC MURATA, Yasujiro

Development of Novel Nonalternant Heterocycles toward Electronic
Materials
KUROTOBI, Kei, National Institute of Technology, Kurume College
Host in JURC MURATA, Yasujiro

Study on Transportation of Metal Ions through a Liquid Membrane
Aiming at Highly Efficient Mutual Separation of Metal Ions
MUKAI, Hiroshi, Faculty of Education, Kyoto University of
Education
Host in JURC SOHRIN, Yoshiki

Simulation of Photoacoustic Signals Generated by Gold Nanoparticles
OKAWA, Shinpei, National Defense Medical College
Host in JURC TERANISHI, Toshiharu

Kinetic Analysis of Hydrogen Absorption Process Observed on
Shape-controlled Pd Nanoparticles
YAMAUCHI, Miho, International Institute for Carbon-Neutral
Energy Research, Kyushu University
Host in JURC TERANISHI, Toshiharu [F]

Preparation and Evaluation of Colorful Dye-Sensitized Solar Cell
Devices Using Designed Anthocyanins 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 MURATA, Yasujiro; WAKAMIYA, Atsushi [F]

Test of Soret Effect via Plasmon Heating of Periodic Metal Domain
Structure
SHIMADA, Ryoko, Department of Mathematical and Physical
Sciences, Faculty of Science, Japan Women's University
Host in JURC WATANABE, Hiroshi [F]

EXPANDING SUBJECTS (IN SPECIFIC FIELDS CHOSEN BY JURC)

Intense THz Emission for Nonlinear Interaction Physics
NAGASHIMA, Takeshi, Faculty of Science and Engineering,
Setsunan University
Host in JURC HASHIDA, Masaki

Study for High-repetition Electron/Ion Generation with High Power
Laser
ARIKAWA, Yasunobu, Institute of Laser Engineering, Osaka
University
Host in JURC INOUE, Shunsuke

Research and Development on Future Accelerator toward ILC project
HAYANO, Hitoshi, 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

X-ray Structural Biology Study of Flavin Reductase Involved in
Resorcinol Catabolism
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

Construction and Functionality of Phosphasilene and Silanethione at
Transition-metals
OKAZAKI, Masaaki, Graduate School of Science and Technology,
Hirosaki University
Host in JURC OZAWA, Fumiuyuki

Mechanistic Studies of C-H Bond Functionalization Reactions Using
Iron and Related Base Metal Catalysts
YOSHIKAI, Naohiko, Division of Chemistry and Biological
Chemistry, School of Physical and Mathematical Sciences, Nanyang
Technological University
Host in JURC NAKAMURA, Masaharu [I]

Development of Cooperative Asymmetric Pincer-Fe Catalyst
ARAI, Takayoshi, Department of Chemistry, Graduate School of
Science, Chiba University
Host in JURC NAKAMURA, Masaharu

Elucidation of Electronic Structures of Cycloparaphenylenes and
Their Application to Materials Science
UCHIYAMA, Masanobu, Graduate School of Pharmaceutical
Science, The University of Tokyo
Host in JURC YAMAGO, Shigeru

Synthesis of Cyclic π -conjugated Molecules and Their Properties
SUZUKI, Toshiyasu, Institute for Molecular Science, National
Institute of Natural Sciences
Host in JURC YAMAGO, Shigeru

MiSeq Amplicon Analysis of Megaviridae DNA Polymerase
YOSHIDA, Takashi, Graduate School of Agriculture, Kyoto
University
Host in JURC OGATA, Hiroyuki

Comparative Population Genomics of Parmales
KUWATA, Akira, Tohoku National Fisheries Research Institute
Host in JURC OGATA, Hiroyuki

Molecular Network Analysis by Combinations of Machine Learning and Statistics

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

Host in JURC MAMITSUKA, Hiroshi

Colloidal Microparticles with Polymer Brushes for Laser Applications
FURUMI, Seiichi, Faculty of Science Division 1, Tokyo University of Science

Host in JURC OHNO, Kohji

Organic Photovoltaic Devices Composed of Novel Fluorine-Containing Donor Polymer and Fullerene Derivatives

IE, Yutaka, The Institute of Scientific and Industrial Research, Osaka University

Host in JURC MURATA, Yasujiro

Exploration of Novel Charge Transport Materials for Perovskite Solar Cell via Direct Evaluation of Charge Transfer Process

SAEKI, Akinori, Graduate School of Engineering, Osaka University

Host in JURC WAKAMIYA, Atsushi

A Study on Open-shell Molecules in Cyclophenylene Structures

ABE, Manabu, Graduate School of Science, Hiroshima University

Host in JURC YAMAGO, Shigeru

A Study of Roll-off Mechanisms of External Quantum Efficiency of Organic Light-emitting Diodes Based on Thermally-assisted Delayed Fluorescent Materials

NAITO, Hiroyoshi, Department of Electronics, University of Osaka Prefecture

Host in JURC KAJI, Hironori

Making of the Vertical Cross Section of Bioactive Trace Metals in the East China Sea

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

Host in JURC SOHRIN, Yoshiki

Structural Analysis of Mixed Oxide Nanoparticles Protected by Organic Compounds and Their Magnetic Properties

HARADA, Masafumi, Faculty of Human Life and Environment, Nara Women's University

Host in JURC TERANISHI, Toshiharu

Examination of Randomness of Lithium Silicate Glasses using Light-scattering Spectroscopy

KOREEDA, Akitoshi, Department of Physical Science, College of Science and Engineering, Ritsumeikan University

Host in JURC MASAI, Hirokazu

Stress-Optical Law for Polymeric Liquids under High Shear

MASUBUCHI, Yuichi, National Composite Center, Nagoya University

Host in JURC MATSUMIYA, Yumi

Dynamics of Entanglements between Polymer Networks by Contrast Variation Optical-rheometry

KATASHIMA, Takuya, Graduate School of Science, Osaka University

Host in JURC MATSUMIYA, Yumi

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

Study on Lipid Secretion Pathways of Plant Cells

YAZAKI, Kazufumi, Research Institute for Sustainable Humanosphere, Kyoto University

Host in JURC AOYAMA, Takashi

Study on the Regulatory Mechanism of Plant Epidermal Cell Differentiation

TOMINAGA, Rumi, Graduate School of Biosphere Science, Hiroshima University

Host in JURC AOYAMA, Takashi

Role of PIP5K and ROP-GTPase in Plant Cell Morphogenesis

KUSANO, Hiroaki, Department of Technology and Science, Tokyo University of Science

Host in JURC AOYAMA, Takashi

Chemical Biology of Endogenous Vitamin D Derivatives

KITAKA, Atsushi, Faculty of Pharma Sciences, Teikyo University

Host in JURC UESUGI, Motonari

Effect of Dzyaloshinskii-Moriya-Interaction on Domain Wall Motion
NAKATANI, Yoshinobu, Department of Communication Engineering and Informatics, The University of Electro-Communications

Host in JURC ONO, Teruo

Study of Tunnel Magnetoresistance Effect of the Magnetic Insulator Films with Perpendicular Magnetic Anisotropy for Development of High Spin Polarized Current Source

TANAKA, Masaaki, Department of Engineering Physics, Electronics and Mechanics, Nagoya Institute of Technology

Host in JURC ONO, Teruo

Selective Chemical Modification of Biomolecules in Membrane by Functionalized Catalysts

KUNISHIMA, Munetaka, Faculty of Pharmaceutical Sciences, Institute of Medical, Pharmaceutical, and Health Sciences, Kanazawa University

Host in JURC KAWABATA, Takeo

Characteristics of Membrane Vesicles Produced by Intestinal Bacteria and Their Biogenesis

KURATA, Atsushi, Faculty of Agriculture, Kindai University

Host in JURC KURIHARA, Tatsuo

Precise Analysis for Brill Transition of Polyurea

MATSUBA, Go, Graduate School of Science and Engineering, Yamagata University

Host in JURC NISHIDA, Koji

Physical and Structural Properties of Glass-ceramics Fabricated at High Temperatures and High Pressures

MASUNO, Atsunobu, Institute of Industrial Science, The University of Tokyo

Host in JURC SHIMAKAWA, Yuichi

Solvent Extraction for Metal Ion Using Synergistic Effect of Surfactants

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

Host in JURC SOHRIN, Yoshiki

Development of Functional Materials Highly Selective for the Separation of Rare Metals
YAMAZAKI, Shoko, Department of Chemistry, Nara University of Education

Host in JURC UMETANI, Shigeo

[F]

Au Nanoparticle Single-electron Transistors by Using Four-legs Sb-porphyrin and Three-legs Phenol as Ligand and Anchor and Vice Versa

MAJIMA, Yutaka, Materials and Structures Laboratory, Tokyo Institute of Technology

Host in JURC TERANISHI, Toshiharu

Molecular Structure Determination by Combination of Spectroscopy and Chemometrics

SHIMADA, Toru, Faculty of Education, Hirosaki University

Host in JURC HASEGAWA, Takeshi

In-situ Observation of Interfacial Chemical Reaction Using Polarization Modulation Infrared Reflection Adsorption Spectroscopy
HAMA, Tetsuya, Institute of Low Temperature Science, Hokkaido University

Host in JURC HASEGAWA, Takeshi

Development of a Prediction Method Using Cell Penetrating Peptides for Anticancer Effects on a New Anticancer Drug "PARP inhibitors"
OKUDA, Akiko, Graduate School of Health Sciences, Niigata University

Host in JURC FUTAKI, Shiroh

[F]

Construction of Novel Cell-penetrating Peptides that Have Retentivity in Blood

KUWATA, Keiko, Institute of Transformative Bio-Molecules, Nagoya University

Host in JURC FUTAKI, Shiroh

[F]

Cell Penetrating Peptide (CPP)-based Material Delivery System into Colon Cancer Stem Cells

OHASHI, Wakana, Graduate School of Medicine and Pharmaceutical Sciences for Research, University of Toyama

Host in JURC FUTAKI, Shiroh

[F]

Preparation of Sm-doped Amorphous Materials for Radiophotoluminescence Applications

OKADA, Go, Graduate School of Materials Science, Nara Institute of Science and Technology

Host in JURC MASAI, Hirokazu

Creation of Organic Functional Materials Based on Nitrogen-containing Macrocyclic Compounds

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

Host in JURC MURATA, Yasujiro

Viscoelastic Relaxation of Linear and Ring Rouse Chains at Association/Dissociation Equilibrium
KWON, Youngdon, School of Chemical Engineering, Sungkyunkwan University

Host in JURC MATSUMIYA, Yumi

[I]

Preparation and Mechanical Properties of Noncovalent-Bonded Soft Elastomers

NORO, Atsushi, Graduate School of Engineering, Nagoya University

Host in JURC WATANABE, Hiroshi

Synthesis of Metal Complexes Bearing Chiral Multidentate Carboxylic Acid Ligands and Application to Catalytic Reactions
SUGIURA, Masaharu, Faculty of Life Sciences, Kumamoto University

Host in JURC NAKAMURA, Masaharu

EXPANDING SUBJECTS (ON-DEMAND FROM RELATED COMMUNITIES)

Prevention of NASH-induced Cancer Progression by SREBP Inhibitors

NAKAGAWA, Hayato, The University of Tokyo Hospital

Host in JURC UESUGI, Motonari

Developments of Novel Spintornics Materials with Ferrimagnetic Spinel Ultrathin Films

NAGAHAMA, Taro, Laboratory of Advanced Materials Chemistry, Graduate School of Engineering, Hokkaido University

Host in JURC ONO, Teruo

Electric Field Induced Magnetic Domain Wall Motion

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

Host in JURC ONO, Teruo

Relationship between Molecular Motions and Triplet Lifetime in Amorphous Materials

HIRATA, Shuzo, Department of Materials Science and Engineering, Tokyo Institute of Technology

Host in JURC KAJI, Hironori

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

Functional Analysis of the Bound D-Amino Acids in Food Proteins

OHMORI, Taketo, Department of Biomedical Engineering, Osaka Institute of Technology

Host in JURC KURIHARA, Tatsuo

Functional Studies on Proteins Involved in the Microbial Metal Respiration

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

Host in JURC KURIHARA, Tatsuo

Search for Four Wave-mixing in the Vacuum

HONMA, Kensuke, Graduate School of Science, Hiroshima University

Host in JURC SAKABE, Shuji

Exploration of Novel Functional Properties of Transition Metal Oxides Using Ionic Liquid Gating

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

Host in JURC KAN, Daisuke

Research on Physical Properties and Functions of Complex Iron Oxide Thin Films

FUJII, Tatsuo, Graduate School of Natural Science and Technology, Okayama University

Host in JURC SAITO, Takashi

Control of Chromophore Orientation by Means of Dipole-Arrays of Perfluoroalkyl Amphiphile

YAMADA, Norihiro, Graduate School of Education, Chiba University

Host in JURC HASEGAWA, Takeshi

Toward Long Spin Coherence Time of NV Center by High Quality Diamond Growth

TOKUDA, Norio, Faculty of Electrical and Computer Engineering, Institute of Science and Engineering, Kanazawa University

Host in JURC MIZUOCHI, Norikazu

Electrical Control of Spin of NV Center

YAMASAKI, Satoshi, Power Electronics Research Center, National Institute of Advanced Industrial Science and Technology

Host in JURC MIZUOCHI, Norikazu

Development of Nanoarchitectures Formed from Composites of Magnetic Metal Complexes with Diblock Copolypeptide Amphiphiles and Their Application for Magnetic Probes

KUROIWA, Keita, Department of Nanoscience, Sojo University

Host in JURC SASAMORI, Takahiro

Structural Analysis of Chiral Lithium Binaphtholate Complex and Development of Novel Catalysts

NAKAJIMA, Makoto, Faculty of Life Sciences, Kumamoto University

Host in JURC KAWABATA, Takeo

Mechanistic Studies of Hydrogen Transfer Ability of Aliphatic Amines and Application to Related Reactions

KOTANI, Shunsuke, Priority Organization for Innovation and Excellence, Kumamoto University

Host in JURC FURUTA, Takumi

SUBJECTS FOCUSING OF JOINT USAGE OF JURC/ICR FACILITIES

Correlation between Melting Point and Crystalline Structure of Ionic Liquid-polymer Gel Electrolyte Dependent on Concentration of Lithium Salt

OSAKA, Noboru, Department of Chemistry, Graduate School of Science, Okayama University of Science

Host in JURC TOSAKA, Masatoshi

Synthesis and Elucidation of Properties of Unsymmetrically-Substituted Disilyne and Related π -Electron Systems

IWAMOTO, Takeaki, Graduate School of Science, Tohoku University

Host in JURC TOKITOH, Norihiro

Experimental Electron Density Distribution Analysis of Organogermanium Compounds

HASHIZUME, Daisuke, Center for Emergent Matter Science, RIKEN

Host in JURC TOKITOH, Norihiro

Synthesis and Structural Elucidation of Unsaturated Compounds of Group 14 Elements

MATSUO, Tsukasa, Faculty of Science and Engineering, Kindai University

Host in JURC TOKITOH, Norihiro

Synthesis and Structure of Kinetically Stabilized Main Group Element Compounds using 9-Triptycyl Groups

MINOURA, Mao, Faculty of Science, Rikkyo University

Host in JURC TOKITOH, Norihiro

Studies on Structure-property Relationship of Pyrylium Salts

NAGAHORA, Noriyoshi, Department of Chemistry, Faculty of Science, Fukuoka University

Host in JURC SASAMORI, Takahiro

STEM-EELS Measurement of a Plasmonic Full Bandgap and Cavity Modes

HATA, Satoshi, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University

Host in JURC KURATA, Hiroki

Nano-electron Spectroscopic Study on Hydrogen and Helium Behavior in Divertor Materials for Nuclear Fusion Devices

MIYAMOTO, Mitsutaka, Interdisciplinary Faculty of Science and Engineering, Shimane University

Host in JURC KURATA, Hiroki

Fabrication of Metal Nanowires and Nanomeshes and Their Catalytic Activity

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

Host in JURC KURATA, Hiroki

Study on Novel Supramolecular Assemblies Using High-resolution Mass Spectrometry

YAMANAKA, Masamichi, Faculty of Science, Department of Chemistry, Shizuoka University

Host in JURC TAKAYA, Hikaru

Novel Synthesis of Metal Clusters Protected with Organic Ligands and Determination of Their Compositions

KOYASU, Kiichirou, Department of Chemistry, Graduate School of Science, The University of Tokyo

Host in JURC TAKAYA, Hikaru

Development of Direct Visualization Methods of Steroid Hormones by Imaging Mass Spectrometry

HATANO, Osamu, Department of Anatomy and Cell Biology, Nara Medical University

Host in JURC ISOZAKI, Katsuhiko

SUBJECTS ENCOURAGING JOINT PROGRAM

Research Collaborations Aiming for a New Paradigm in Oxide Electronics

HITOSUGI, Taro, School of Materials and Chemical Technology, Tokyo Institute of Technology

Host in JURC KAN, Daisuke

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

BÁNÓCZI, Zoltán, Department of Organic Chemistry, Eötvös Loránd University of Sciences, Hungary

Host in JURC FUTAKI, Shiroh I

The Twelfth International Workshop for East Asian Young Rheologists

INOUE, Tadashi, Graduate School of Science, Osaka University

Host in JURC WATANABE, Hiroshi I

Clarification of the Relationship between Layered Oxide Structure and Its Magnetic Property

SUZUKI, Furitsu, School of Chemical Sciences, The University of Auckland

Host in JURC KAJI, Hironori I

JURC Publications (Selected Examples)

(until 31 May 2016)

Purely Organic Electroluminescent Material Realizing 100% Conversion from Electricity to Light

Kaji, H.; Suzuki, H.; Fukushima, T.; Shizu, K.; Suzuki, K.; Kubo, S.; Komino, T.; Oiwa, H.; Suzuki, F.; Wakamiya, A.; Murata, Y.; Adachi, C., *Nat. Commun.*, **6**, [8476-1]-[8476-8] (2015).

Abstract

Efficient organic light-emitting diodes have been developed using emitters containing rare metals, such as platinum and iridium complexes. However, there is an urgent need to develop emitters composed of more abundant materials. Here we show a thermally activated delayed fluorescence material for organic light-emitting diodes, which realizes both approximately 100% photoluminescence quantum yield and approximately 100% up-conversion of the triplet to singlet excited state. The material contains electron-donating diphenylaminocarbazole and electron-accepting triphenyltriazine moieties. The typical trade-off between effective emission and triplet-to-singlet up-conversion is overcome by fine-tuning the highest occupied molecular orbital and lowest unoccupied molecular orbital distributions. The nearly zero singlet-triplet energy gap, smaller than the thermal energy at room temperature, results in an organic light-emitting diode with external quantum efficiency of 29.6%. An external quantum efficiency of 41.5% is obtained when using an out-coupling sheet. The external quantum efficiency is 30.7% even at a high luminance of 3,000 cd m⁻².

Photoluminescence of Monovalent Indium Centres in Phosphate Glass

Masai, H.; Yamada, Y.; Okumura, S.; Yanagida, T.; Fujimoto, Y.; Kanemitsu, Y.; Ina, T., *Sci. Rep.*, **5**, 13646 (2015).

Abstract

Valence control of polyvalent cations is important for functionalization of various kinds of materials. Indium oxides have been used in various applications, such as indium tin oxide in transparent electrical conduction films. However, although metastable In⁺ (5s² configuration) species exhibit photoluminescence (PL), they have attracted little attention. Valence control of In⁺ cations in these materials will be important for further functionalization. Here, we describe In⁺ species using PL and X-ray absorption fine structure (XAFS) analysis. Three absorption bands in the UV region are attributed to the In⁺ centre: two weak forbidden bands (¹S₀ → ³P₁, ¹S₀ → ³P₂) and a strong allowed band (¹S₀ → ¹P₁). The strongest PL excitation band cannot be attributed to the conventional allowed transition to the singlet excited state. Emission decay of the order of microseconds suggests that radiative relaxation occurs from the triplet excitation state. The XAFS analysis suggests that these In⁺ species have shorter In–O distances with lower coordination numbers than in In₂O₃. These results clearly demonstrate that In⁺ exists in a metastable amorphous network, which is the origin of the observed luminescent properties.

Catalytic Discrimination between Formyl Groups in Regio- and Stereoselective Intramolecular Cross-aldol Reactions

Baba, T.; Yamamoto, J.; Hayashi, K.; Sato, M.; Yamanaka, M.; Kawabata, T.; Furuta, T., *Chem. Sci.*, **7**, 3791-3797 (2016).

Abstract

Catalytic discrimination between inequivalent formyl groups was achieved using an aniline-type acid–base catalyst for the regio-, diastereo-, and enantioselective intramolecular cross-aldol reactions of enolizable dialdehydes. Although L-proline gave a mixture of the regio- and

stereoisomeric products in the presence of an *N*-containing 1,6-dialdehyde, the aniline-type catalyst afforded *anti*-3,4-disubstituted pyrrolidine in high regio-, and stereoselectivity beyond the background reaction, which led to the regioisomeric 2,3-disubstituted products. The mild reactivity of the aniline-type amine facilitated catalytic discrimination between the inequivalent formyl groups. Kinetic isotope effect studies and reductive amination experiments suggested that the regioselectivity was controlled under the enamine-forming steps.

Rhombic Coulomb Diamonds in a Single-electron Transistor Based on an Au Nanoparticle Chemically Anchored at Both Ends

Azuma, Y.; Onuma, Y.; Sakamoto, M.; Teranishi, T.; Majima, Y., *Nanoscale*, **8**, 4720-4726 (2016).

Abstract

Rhombic Coulomb diamonds are clearly observed in a chemically anchored Au nanoparticle single-electron transistor. The stability diagrams show stable Coulomb blockade phenomena and agree with the theoretical curve calculated using the orthodox model. The resistances and capacitances of the double-barrier tunneling junctions between the source electrode and the Au core (*R*₁ and *C*₁, respectively), and those between the Au core and the drain electrode (*R*₂ and *C*₂, respectively), are evaluated as 4.5 MΩ, 1.4 aF, 4.8 MΩ, and 1.3 aF, respectively. This is determined by fitting the theoretical curve against the experimental Coulomb staircases. Two-methylene-group short octanedithiols (C8S2) in a C8S2/hexanethiol (C6S) mixed self-assembled monolayer is concluded to chemically anchor the core of the Au nanoparticle at both ends between the electroless-Au-plated nanogap electrodes even when the Au nanoparticle is protected by decanethiol (C10S). This is because the *R*₁ value is identical to that of *R*₂ and corresponds to the tunneling resistances of the octanedithiol chemically bonded with the Au core and the Au electrodes. The dependence of the Coulomb diamond shapes on the tunneling resistance ratio (*R*₁/*R*₂) is also discussed, especially in the case of the rhombic Coulomb diamonds. Rhombic Coulomb diamonds result from chemical anchoring of the core of the Au nanoparticle at both ends between the electroless-Au-plated nanogap electrodes.

Soliton-like Magnetic Domain Wall Motion Induced by the Interfacial Dzyaloshinskii–Moriya Interaction

Yoshimura, Y.; Kim, K.-J.; Taniguchi, T.; Tono, T.; Ueda, K.; Hiramatsu, R.; Moriyama, T.; Yamada, K.; Nakatani, Y.; Ono, T., *Nat. Phys.*, **12**, 157-161 (2016).

Abstract

Topological defects such as magnetic solitons, vortices and skyrmions have started to play an important role in modern magnetism because of their extraordinary stability, which can be exploited in the production of memory devices. Recently, a type of antisymmetric exchange interaction, namely the Dzyaloshinskii–Moriya interaction (DMI; refs), has been uncovered and found to influence the formation of topological defects. Exploring how the DMI affects the dynamics of topological defects is therefore an important task. Here we investigate the dynamics of the magnetic domain wall (DW) under a DMI by developing a real time DW detection scheme. For a weak DMI, the DW velocity increases with the external field and reaches a peak velocity at a threshold field, beyond which it abruptly decreases. For a strong DMI, on the other hand, the velocity reduction is completely suppressed and the peak velocity is maintained constant even far above the threshold field. Such a distinct trend of the velocity can

be explained in terms of a magnetic soliton, the topology of which is protected during its motion. Our results therefore shed light on the physics of dynamic topological defects, which paves the way for future work in topology-based memory applications.