



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

# JURC Cooperative Research Subjects 2015

(1 April 2015 ~ 31 March 2016)

## 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**

Fundamental Study on "Stochastic Vacuum Heating" Mechanism in Laser-driven Ion Acceleration  
YOGO, Akihumi, Institute of Laser Engineering, Osaka University  
**Host in JURC SAKABE, Shuji**

Development of the Methodology for the Removal of Carbon Contaminant on the Metal Target for the Laser-driven High Energy Heavy Ion Acceleration  
NISHIUCHI, Mamiko, Japan Atomic Energy Agency, Quantum Beam Science Directorate  
**Host in JURC HASHIDA, Masaki**

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**

Development of Middle Beta Accelerator for the Precise Measurement of Muon  $g-2$ /EDM  
MIBE, Tsutomu, Institute of Particle and Nuclear Studies, High Energy Accelerator Research Organization  
**Host in JURC IWASHITA, Yoshihisa**

Development of Gas Load Reduction Method for Pulse Ion Sources  
ICHIKAWA, Masahiro, Japan Atomic Energy Agency  
**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**

Study of 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, Faculty of Engineering, Hokkaido University  
**Host in JURC IWASHITA, Yoshihisa**

Synthesis of  $\pi$ -extension Building Block by Iron-catalyzed Diboration of Strained Cyclic Acetylenes  
ORITA, Akihiro, Department of Applied Chemistry, Okayama University  
**Host in JURC NAKAMURA, Masaharu**

Development of Silane Alcoholysis Reaction with 2D-arrayed Gold Nanoparticle Catalyst  
MIKI, Kazushi, Polymer Materials Unit, National Institute for Materials Science  
**Host in JURC ISOZAKI, Katsuhiko**

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**

Development of Novel Pincer-Type Phosphaalkene Ligands and Their Application to Catalytic Reactions  
MATSUO, Tsukasa, Faculty of Science and Engineering / Graduate School of Science and Engineering Research, Kinki University  
**Host in JURC TAKEUCHI, Katsuhiko**

Synthesis of Metal Complexes with a High Spin State and Their Applications to Catalysis  
NAKAJIMA, Yumiko, Interdisciplinary Research Center for Catalytic Chemistry, National Institute of Advanced Industrial Science and Technology  
**Host in JURC OZAWA, Fumiyuki**

Synthesis of Novel Low-Coordinated Phosphine-Metal Catalysts Based on the Chemistry of Diphosphene  
ITO, Shigekazu, Graduate School of Science and Engineering, Tokyo Institute of Technology  
**Host in JURC OZAWA, Fumiyuki**

Investigation of Photoconversion Mechanism in Halide-perovskite Solar Cells  
YAMADA, Yasuhiro, Department of Physics, Graduate School of Science Chiba University  
**Host in JURC KANEMITSU, Yoshihiko**

Study for Dielectric Function and Exciton Binding Energy in Semiconductors  
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**

Development of PCR-primers Specific to Megaviridae  
YOSHIDA, Takashi, Graduate School of Agriculture, Kyoto University  
**Host in JURC OGATA, Hiroyuki**

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

Comparative Genomic Analysis of Parmales and Diatom  
KUWATA, Akira, Tohoku National Fisheries Research Institute  
**Host in JURC OGATA, Hiroyuki**

Flexible and Efficient Search Algorithms for Structured Data in Bioinformatics

TAKASU, Atsuhiko, National Institute of Informatics Digital Content and Media Sciences Research Division

**Host in JURC** AKUTSU, Tatsuya

Analysis and Control of Complex Bipartite Networks

JOSE, C. Nacher, Department of Science, Toho University

**Host in JURC** AKUTSU, Tatsuya

Biological Data Analysis Based on Statistical Machine Learning Approach

SHIGA, Motoki, Informatics Course, Department of Electrical, Electronic and Computer Engineering, Faculty of Engineering, Gifu University

**Host in JURC** MAMITSUKA, Hiroshi

Knowledge Discovery from Life-Science Data with Discrete Structures

TAKIGAWA, Ichigaku, Graduate School of Information Science and Technology, Hokkaido University

**Host in JURC** MAMITSUKA, Hiroshi

Development of Novel Nonalternant Heterocycles toward Electronic Materials

KUROTOBI, Kei, National Institute of Technology, Kurume College

**Host in JURC** MURATA, Yasujiro

Transition Metal-Catalyzed Dehydrogenative Cyclization Leading to Dithienosiloles and Their Properties

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

**Host in JURC** MURATA, Yasujiro

Synthesis and Properties of the Supramolecular Spiral Staircase

KURAMOCHI, Koji, Graduate School of Life and Environmental Sciences, Kyoto Prefectural University

**Host in JURC** KAWABATA, Takeo

Fabrication of Novel Photoacoustic Imaging Probes Using Functional Metal Nanoparticles

ISHIHARA, Miya, National Defense Medical College

**Host in JURC** TERANISHI, Toshiharu

Dynamical Correlations between Molecules in Polymeric Liquids

SUKUMARAN, Sathish Kumar, Graduate School of Science and Engineering, Yamagata University

**Host in JURC** MASUBUCHI, Yuichi

Precise Analysis during Processing of Bi-axial Drawing Films

MATSUBA, Go, Faculty of Engineering, Yamagata University

**Host in JURC** KANAYA, Toshiji

Study on Transportation and Separation of Metal Ions through a Liquid Membrane by Complex Formation with Multidentate

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

**Host in JURC** SOHRIN, Yoshiki

Molecular Studies on Highly Efficient and Colorful Dye-sensitized Solar Cell Device Oriented by Natural Anthocyanins

YOSHIDA, Kumi, Department of Complex Systems Science, Graduate School of Information Science, Nagoya University

**Host in JURC** MURATA, Yasujiro

Study on Size- and Shape-dependent Hydrogen Storage in Pd Nanoparticles by Time-resolved Synchrotron XRD Technique

YAMAUCHI, Miho, Kyushu University

**Host in JURC** TERANISHI, Toshiharu

Analysis of Molecular Structure in a Monolayer of Fluorinated Amphiphilic Molecules

SONOYAMA, Masashi, Graduate School of Engineering, Gunma University

**Host in JURC** HASEGAWA, Takeshi

## EXPANDING SUBJECTS

### (IN SPECIFIC FIELDS CHOSEN BY JURC)

Research and Development on Future Accelerator toward ILC Project  
HAYANO, Hitoshi, Accelerator Laboratory, High Energy Accelerator Research Organization

**Host in JURC** IWASHITA, Yoshihisa

Development of Devices for Ultra-cold Neutrons

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

**Host in JURC** IWASHITA, Yoshihisa

X-ray Analysis of Structure-Function Relationship of Resorcinol Monooxygenase

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

**Host in JURC** FUJII, Tomomi

X-ray Structural Studies on Environmental Adaptation of Psychrophilic Aspartate Racemase

MATSUI, Daisuke, Faculty of Engineering, Toyama Prefectural University

**Host in JURC** HATA, Yasuo

X-ray Crystallographic Studies on Structure-Function of L-Asparaginase from *T. litoralis*

KATO, Shiro, Organization for Research and Development of Innovative Science and Technology, Kansai University

**Host in JURC** FUJII, Tomomi

Design and Synthesis of Thermally Activated Delayed Fluorescence Materials and the Organic Light-Emitting Diodes

ADACHI, Chihaya, Center for Organic Photonics and Electronics Research, Kyushu University

**Host in JURC** KAJI, Hironori

Development of Lignin-binding Metalated Peptide Catalysts for Oxidative Degradation of Wooden Biomasses

WATANABE, Takashi, Research Institute for Sustainable Humanosphere, Kyoto University

**Host in JURC** NAKAMURA, Masaharu

Synthesis of Cyclic  $\pi$ -conjugated Molecules and Their Properties

SUZUKI, Toshiyasu, Institute for Molecular Science, National Institute of Natural Sciences

**Host in JURC** YAMAGO, Shigeru

Elucidation of Electronic Structures of Cycloparaphenylenes

UCHIYAMA, Masanobu, Graduate School of Pharmaceutical Science, The University of Tokyo

**Host in JURC** YAMAGO, Shigeru

Organic Photovoltaic Devices Composed of Novel Donor Polymer and Fullerene Derivatives

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

**Host in JURC** MURATA, Yasujiro

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

**Host in JURC** OHNO, Kohji

Development of Novel Hole Transport Polymers Based on Carbazole Chromophore

TANI, Keita, Division of Natural Science, Osaka Kyoiku University

**Host in JURC** TSUJII, Yoshinobu

Molecular Simulation of Cellulosic Janus-type Bottlebrushes toward Chiral Microphase Separation

YAMANE, Chihiro, Faculty of Home Economics, Kobe Women's University

**Host in JURC** TSUJII, Yoshinobu

Fabrication of Oxide Glass Containing Li for Radiation Applications  
YANAGIDA, Takayuki, Kyushu Institute of Technology

**Host in JURC** MASAI, Hirokazu

Development of Cystine/glutamate Antiporter xCT Inhibitors and Regulation of Cellular Oxidative Stress

SATO, Hideyo, Faculty of Medicine, Niigata University

**Host in JURC** HIRATAKE, Jun

Elucidation of Oxidation Properties for [N]Cycloparaphenylenes  
NISHINAGA, Tohru, Graduate School of Science and Engineering, Tokyo Metropolitan University

**Host in JURC** YAMAGO, Shigeru

Simulation of Dielectric Relaxation of Polymer Melt under Fast Shear

UNEYAMA, Takashi, Division of Natural Sciences, Graduate School of Natural Science and Technology, Kanazawa University

**Host in JURC** MASUBUCHI, Yuichi

Fundamental Study on the Characteristics of Molecular Rotor in Clathrate Crystal of Syndiotactic Polystyrene

URAKAWA, Osamu, Graduate School of Science, Osaka University

**Host in JURC** MATSUMIYA, Yumi

Colloidal Crystallization Dynamics of Aqueous Dispersion of Polymer Microgels

TAKESHITA, Hiroki, Department of Materials Science and Technology, Nagaoka University of Technology

**Host in JURC** KANAYA, Toshiji

Co-crystallization of Syndiotactic Polystyrene Delta-phase Crystal and Carboxylic Acid

KAWAGUCHI, Tatsuya, Graduate School of Science, Osaka University

**Host in JURC** KANAYA, Toshiji

Elucidation of Transport Process of Bioactive Trace Metals in the South Pacific Ocean and the Antarctic Ocean(2)

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

**Host in JURC** SOHRIN, Yoshiki

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

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

Synergistic Effect of Surfactants for Solvent Extraction of Rare Metal Elements

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

**Host in JURC** SOHRIN, Yoshiki

Development of Organic Functional Materials Based on Nitrogen-containing  $\pi$ -Conjugated Compounds

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

**Host in JURC** MURATA, Yasujiro

Development of Biofunctional Peptide-modified Exosomes for Drug Delivery

NAKASE, Ikuhiko, Nanoscience and Nanotechnology Research Center, Osaka prefecture University

**Host in JURC** FUTAKI, Shiroh

Development of a Method Using Cell Penetrating Peptides for Detection of Poly(ADP-ribose) in Breast Cancer Cells

OKUDA, Akiko, Graduate School of Health Sciences, Niigata University

**Host in JURC** FUTAKI, Shiroh

Material Delivery into Gastrointestinal Epithelium Using Cell-penetrating Peptide (CPP)

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

**Host in JURC** FUTAKI, Shiroh

Characterization of Fine Bubbles and Ion Uptake Efficiency of Agricultural Plants

NIHEI, Naoto, Graduate School of Agricultural and Life Sciences, The University of Tokyo

**Host in JURC** TOKUDA, Yomei

Examination of Randomness of Oxide Glasses using Light-scattering Spectroscopy

KOREEDA, Akitoshi, Ritsumeikan University

**Host in JURC** MASAI, Hirokazu

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

Introduction of Nanoparticles into Nanogap Electrodes Using Localized Surface Plasmon Resonance Radiation Force

MAJIMA, Yutaka, Tokyo Institute of Technology

**Host in JURC** TERANISHI, Toshiharu

Study for Local Magnetism of Ferromagnetic Films and Tunnel Magnetoresistance Effect 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

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

Development of the Anticancer Drug Targeting Gamma-glutamylcyclotransferase (GGCT)

KAGEYAMA, Susumu, The Department of Urology, Shiga University of Medical Science

**Host in JURC** HIRATAKE, Jun

Study on the Regulatory Mechanism of Plant Epidermal Cell Differentiation

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

**Host in JURC** AOYAMA, Takashi

Functional Analysis of Miraculin Using *Arabidopsis thaliana*

INOUE, Hiroyasu, Department of Food Science and Nutrition, Nara Women's 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

Discovery of New Cellular Functions of Acyldopamine

ITO, Akihiro, RIKEN Center for Sustainable Resource Science

**Host in JURC** UESUGI, Motonari

Study of the Enhancement Mechanism of Surface Enhanced Infrared Absorption by Using Multiple-angle Incidence Resolution Spectrometry

SHIMADA, Toru, Faculty of Education, Hirosaki University

**Host in JURC** HASEGAWA, Takeshi

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

Elucidating Mechanism of the Structural Phase Transition Transforming Optical Properties of Photo-functional Organic Crystals

AMIMOTO, Kiichi, Graduate School of Education, Hiroshima University

**Host in JURC** SATO, Naoki

Photoconduction Behavior of Radical Dissociative Photochromic Compounds in the Thin-Film State

KATOH, Keiichi, Graduate School of Science, Tohoku University

**Host in JURC** MURDEY, Richard

## EXPANDING SUBJECTS

### (ON-DEMAND FROM RELATED COMMUNITIES)

Intense THz Emission for Nonlinear Interaction Physics

NAGASHIMA, Takeshi, Faculty of Science and Engineering, Setsunan University

**Host in JURC** HASHIDA, Masaki

Search for Four Wave-mixing in the Vacuum

HONMA, Kensuke, Graduate School of Science, Hiroshima University

**Host in JURC** SAKABE, Shuji

Synthesis and Entanglement Relaxation of Jellyfish-shaped Polymers  
TAKANO, Atsushi, Graduate School of Engineering, Nagoya University

**Host in JURC** WATANABE, Hiroshi

Elucidation of Anisotropic Charge Transport Mechanism in Organic/Inorganic Hybrid Perovskite Single Crystal

SAEKI, Akinori, Graduate School of Engineering, Osaka University

**Host in JURC** WAKAMIYA, Atsushi

Exploration of Exotic Phenomena Emerged at Oxide Heterointerface by Transmission Electron Microscopy

Aso, Ryotaro, The Institute of Scientific and Industrial Research, Osaka University

**Host in JURC** KAN, Daisuke

Magnetic and Electric Properties of Complex Iron Oxide Thin Films

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

**Host in JURC** SAITO, Takashi

Mechanisms of Cs Adsorption in Soil and Uptake Behavior of Cs in Agricultural Plants

FUJIMURA, Shigeto, NARO Tohoku Agricultural Research Center

**Host in JURC** TOKUDA, Yomei

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

The Control of the Antiphase Boundary and the Magnetotransport Property in Ferrimagnetic Spinel Ultrathin Films

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

**Host in JURC** ONO, Teruo

Discovery and Modulation of New Cellular Functions of Vitamin D

NAGASAWA, Kazuo, Faculty of Engineering, Tokyo University of Agriculture and Technology

**Host in JURC** UESUGI, Motonari

Mechanistic Studies of Microbial Degradation of Unsaturated Aliphatic Organohalogen Compounds

KURATA, Atsushi, Faculty of Agriculture, Kinki University

**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

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

Melting Kinetics of Polymer Crystals by Ultra-fast-scan Calorimetry  
TODA, Akihiko, Graduate School of Integrated Arts and Sciences, Hiroshima University  
**Host in JURC KAJI, Hironori**

Structure and Function of Polymer for Solar Cell  
SATO, Toshifumi, Graduate School of Engineering, Hokkaido University  
**Host in JURC KAJI, Hironori**

Synthesis and Structural Elucidation of Unsaturated Silicon Compounds  
MATSUO, Tsukasa, Faculty of Science and Engineering, Kinki University  
**Host in JURC TOKITOH, Norihiro**

Elucidation of Properties of Unsymmetrically-Substituted Disilynes  
IWAMOTO, Takeaki, Graduate School of Science, Tohoku University  
**Host in JURC TOKITOH, Norihiro**

Synthesis and Structure of Aromatic Compounds Containing a Heavier Group 16 Element  
NAGAHORA, Noriyoshi, Department of Chemistry, Faculty of Science, Fukuoka University  
**Host in JURC SASAMORI, Takahiro**

Study on the Chemical Bonding of Hypervalent Group 15 and 16 Element Compounds Using Precise X-Ray Analysis  
MINOURA, Mao, Faculty of Science, Rikkyo University  
**Host in JURC TOKITOH, Norihiro**

Experimental Electron Density Distribution Analysis of Heavier Main Group Element Compounds  
HASHIZUME, Daisuke, Center for Emergent Matter Science, RIKEN  
**Host in JURC TOKITOH, Norihiro**

Fabrication of Metal Nanowires and Nanomeshes and Their Catalytic Activity  
KAWAI, Takeshi, Faculty of Engineering, Tokyo University of Science  
**Host in JURC KURATA, Hiroki**

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

Band Structures of Near-field Coupled Metal Particle Arrays  
SANNOMIYA, Takumi, Interdisciplinary School of Science and Engineering, Tokyo Institute of Technology  
**Host in JURC KURATA, Hiroki**

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

Study on Novel Bimetal Nanoclusters by Using High-resolution Mass Spectrometry  
NEGISHI, Yuichi, Department of Applied Chemistry, Tokyo University of Science  
**Host in JURC NAKAMURA, Masaharu**

## **SUBJECTS ENCOURAGING JOINT PROGRAM**

The Eleventh International Workshop for East Asian Young Rheologists  
TAKAHASHI, Yoshiaki, Institute for Materials Chemistry and Engineering, Kyushu University  
**Host in JURC WATANABE, Hiroshi**

Analysis of Organic Device Materials Using Ultrasensitive Solid-state DNP-NMR  
GAËL, De Paëpe, Laboratoire de Resonances Magnetiques, Service de Chimie Inorganique et Biologique, CEA Grenoble  
**Host in JURC KAJI, Hironori**

Investigations of Oxygen Ion Transport by Synchrotron X-ray  
MIZUMAKI, Masaichiro, Japan Synchrotron Radiation Research Institute, SPring-8  
**Host in JURC ICHIKAWA, Noriya; SHIMAKAWA, Yuichi**

Korea-Japan Interdisciplinary Collaboration in Chemical Biology and Pharmaceutical Sciences  
YOUNGJOO, Kwon, Ewha Womans University, College of Pharmacy  
**Host in JURC FUTAKI, Shiroh**

# JURC Publications (Selected Examples)

(until 31 May 2015)

**Molecular Interplays Involved in the Cellular Uptake of Octaarginine on Cell Surfaces and the Importance of Syndecan-4 Cytoplasmic V Domain for the Activation of Protein Kinase C $\alpha$**   
Nakase, I.; Osaki, K.; Tanaka, G.; Utani, A.; Futaki, S., *Biochem. Biophys. Res. Commun.*, **446**(4), 857-862 (2014).

## Abstract

Arginine-rich cell-penetrating peptides (CPPs) are promising carriers for the intracellular delivery of various bioactive molecules. However, many ambiguities remain about the molecular interplays on cell surfaces that ultimately lead to endocytic uptake of CPPs. By treatment of cells with octaarginine (R8), enhanced clustering of syndecan-4 on plasma membranes and binding of protein kinase C $\alpha$  (PKC $\alpha$ ) to the cytoplasmic domain of syndecan-4 were observed; these events potentially lead to the macropinocytic uptake of R8. The cytoplasmic V domain of syndecan-4 made a significant contribution to the cellular uptake of R8, whereas the cytoplasmic C1 and C2 domains were not involved in the process.

**Relaxation Transition in Glass-forming Polybutadiene as Revealed by Nuclear Resonance X-ray Scattering**

Kanaya, T.; Inoue, R.; Saito, M.; Seto, M.; Yoda, Y., *J. Chem. Phys.*, **140**, [144906-1]-[044906-5] (2014).

## Abstract

We investigated the arrest mechanism of molecular motions in a glass forming polybutadiene near the glass transition using a new nuclear resonance synchrotron X-ray scattering technique to cover a wide time range ( $10^{-9}$  to  $10^{-5}$  s) and a scattering vector  $Q$  range ( $9.6$ – $40$  nm $^{-1}$ ), which have never been accessed by other methods. Owing to the wide time and  $Q$  ranges it was found for the first time that a transition of the  $\alpha$ -process to the slow  $\beta$ -process (or the Johari-Goldstein process) was observed in a  $Q$  range higher than the first peak in the structure factor  $S(Q)$  at the critical temperature  $T_c$  in the mode coupling theory. The results suggest the important roles of hopping motions below  $T_c$ , which was predicted by the recent extended mode coupling theory and the cooperative motions due to the strong correlation at the first peak in  $S(Q)$  in the arrest mechanism.

**Dielectric and Viscoelastic Behavior of Star-Branched Polyisoprene: Two Coarse-Grained Length Scales in Dynamic Tube Dilution**

Matsumiya, Y.; Masubuchi, Y.; Inoue, T.; Urakawa, O.; Liu, C.-Y.; van Ruymbeke, E.; Watanabe, H., *Macromolecules*, **47**, 7637-7652 (2014).

## Abstract

cis-Polyisoprene (PI) chain has the type A dipole parallel along the backbone so that its large-scale (global) motion results in not only viscoelastic but also dielectric relaxation. Utilizing this feature of PI, this paper examined dielectric and viscoelastic behavior of star PI probe chains (arm molecular weight  $10^{-3}M_a = 9.5$ – $23.5$ , volume fraction  $v_1 = 0.1$ ) blended in a matrix of long linear PI ( $M = 1.12 \times 10^6$ ). The constraint release (CR)/dynamic tube dilation (DTD) mechanism was quenched for those dilute probes entangled with the much longer matrix, as evidenced from coincidence of the frequency dependence of the dielectric and viscoelastic losses of the probe in the blend. Comparison of the probe data in the blend and in monodisperse bulk revealed that the star probe relaxation is retarded and broadened on blending and the retardation/broadening is enhanced exponentially with  $M_a$ . This result in turn demonstrates significant CR/DTD

contribution to the dynamics of star PI in bulk. The magnitude of retardation was quantitatively analyzed within the context of the tube model, with the aid of the dielectrically evaluated survival fraction of the dilated tube,  $\phi'(t)$ , and the literature data of CR time,  $\tau_{CR}$ . In the conventional molecular picture of partial-DTD, the tube is assumed to dilate laterally, but not *coherently* along the chain backbone. The corresponding *lateral* partial-DTD relationship between  $\phi'(t)$  and the normalized viscoelastic relaxation function  $\mu(t)$ ,  $\mu(t) = \phi'(t)/\beta(t)$  with  $\beta(t)$  being the number of entanglement segments per laterally dilated segment (that was evaluated from the  $\phi'(t)$  and  $\tau_{CR}$  data), held for the  $\mu(t)$  and  $\phi'(t)$  data of star PI in bulk. Nevertheless, the observed retardation of the star probe relaxation on blending was *less significant* compared to the retardation expected for the arm motion (retraction) along the laterally dilated tube in bulk PI. This result suggests that the relaxation time of the probe in bulk is governed by the longitudinal partial-DTD that occurs *coherently* along the chain backbone. In fact, the magnitude of retardation evaluated from the  $\phi'(t)$  and  $\tau_{CR}$  data on the basis of this *longitudinal* partial-DTD picture was close to the observation. These results strongly suggest that the star PI chains in monodisperse bulk have two different coarse-grained length scales: the diameter of laterally dilated tube that determines the modulus level and the diameter of longitudinally dilated tube that reflects the path length for the arm retraction and determines the relaxation time. Thus, the star PI chains in bulk appear to move along the longitudinally dilated tube that wriggles in the laterally dilated tube. This molecular scenario is consistent with the previous finding for bulk linear PI [Matsumiya et al. *Macromolecules* 2013, 46, 6067].

**Synthesis and Properties of Butterfly-Shaped Expanded Naphthofuran Derivatives**

Nakanishi, K.; Sasamori, T.; Kuramochi, K.; Tokitoh, N.; Kawabata, T.; Tsubaki, K., *J. Org. Chem.*, **79**, 2625-2631 (2014).

## Abstract

The construction of dinaphtho[2,1-*b*;2',3'-*d*]furan-6-ol was developed via a dehydration reaction involving two molecules of 2,3-dihydroxynaphthalene in the presence of a strong acid. Starting from the dinaphthofuran, a variety of butterfly shaped derivatives were synthesized. The optical properties of these compounds were investigated with special attention to the dihedral angle formed by adjacent dinaphthofuran rings and/or the sizes of the fused aromatic rings.

**Interface Magnetism of Co $_2$ FeGe Heusler Alloy Layers and Magnetoresistance of Co $_2$ FeGe/MgO/Fe Magnetic Tunnel Junctions**

Tanaka, A. M.; Maezaki, D.; Ishii, T.; Okubo, A.; Hiramatsu, R.; Ono, T.; Mibu, K., *J. of Appl. Phys.*, **116**, [163902-1]-[163902-5] (2014).

## Abstract

The interface magnetism between Co $_2$ FeGe Heusler alloy layers and MgO layers was investigated using  $^{57}\text{Fe}$  Mössbauer spectroscopy. Interface-sensitive samples, where the  $^{57}\text{Fe}$  isotope was used only for the interfacial atomic layer of the Co $_2$ FeGe layer on the MgO layer, were prepared using atomically controlled alternate deposition. The  $^{57}\text{Fe}$  Mössbauer spectra of the interface-sensitive samples at room temperature were found similar to those of the bulk-sensitive Co $_2$ FeGe films in which the  $^{57}\text{Fe}$  isotope was distributed throughout the films. On the other hand, the tunnel magnetoresistance effect of magnetic tunnel junctions with Co $_2$ FeGe layers as the ferromagnetic

electrodes showed strong reduction at room temperature. These results indicate that the strong temperature dependence of the tunneling magnetoresistance of magnetic tunnel junctions using Heusler alloy electrodes cannot be attributed simply to the reduction of the magnetization at the interfaces between the Heusler alloy and insulator layers.