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**ICPST-38**

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*Scientific Program*

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**The 38th International Conference of  
Photopolymer Science and Technology**

**Materials & Processes for  
Advanced Lithography, Nanotechnology  
and Phototechnology**

**June 15-16, 2021**

**Online Conference**

**Sponsored and Organized by  
The Society of Photopolymer Science and Technology (SPST)**

*In Cooperation with*  
*The Technical Association of Photopolymer, Japan*  
*The Chemical Society of Japan*  
*The Society of Polymer Science, Japan*  
*Chiba University*  
*Endorsed by*  
*The Japan Society of Applied Physics*

## Live online conference

(Japan standard time)

**June 15, Tuesday**

### **\*Opening Session\***

21:00-21:10 Chairperson: Minoru Tsuda, Conference Chair of ICPST-38

#### **Opening Remarks**

Takeo Watanabe, Symposium Chair of EUV Lithography, the Symposium of most contributing to Journal of Photopolymer Science and Technology, **33** (2020)

### **\*Plenary Session\***

21:10-21:55 Chairpersons: Takeo Watanabe, University Hyogo and Tomoki Nagai, JSR

#### **Plenary Lecture A-1 Development of Materials Informatics Platform**

Yasumitsu Orii, Hiroyuki Toda, Shuichi Hirose, Masakazu Kobayashi, NAGASE

### **\*Panel Symposium I: "EUV Lithography toward 10 nm and below"\***

21:55-23:30 Chairperson: Takeo Watanabe, University of Hyogo

#### **Panel Symposium: "EUV Lithography toward 10 nm and below**

**– Prospect of Achievement for Both Highly Sensitive and low LWR EUV Resist –"**

**Panelist:** Toru Fujimori (*Fujifilm*), Danilo De Simone (*IMEC*), Florian Gstrein (*Intel*), Makoto Muramatsu (*TEL*)

**Organizer:** Takeo Watanabe and Shinji Yamakawa (*Univ. of Hyogo*), Taku Hirayama (*HOYA*), Hiroaki Oizumi (*Gigaphoton*), Hiroto Kudoh (*Kansai Univ.*)

EUV lithography is started to use for production of 7-nm logic device. In this panel symposium, highly sensitive and low LWR resist is required for future nodes. The prospect of the achievement for those characteristics are discussed by the panelists which are the experts in this field.

**June 16, Wednesday**

### **\*Panel Symposium II: "Biomimetics: Learn from Nature"\***

21:30-23:30 Chairperson: Hiroyuki Mayama, Asahikawa Medical University, Atsushi Sekiguchi, Litho Tech Japan, Osaka Prefecture University

#### **Panel Symposium: "Biomimetics: Learn from Nature"**

Various functions, for example, adhesion, superhydrophobicity, self-cleaning, antifouling and low friction, can be seen on the surfaces of plants, insects, spiders, geckoes, and aquatic animals with different surface structures. The scales of these surface structures are widely distributing from nm to  $\mu\text{m}$ . In this panel symposium, we will discuss challenging topics in the interdisciplinary area between nature-created technology, microfabrication technique and applications.

#### **Panelist:**

Prof. Stanislav Gorb, Kiel University "Biological Adhesion as an Inspiration for Biomimetics"

Takahiko Hariyama, Hamamatsu University "NanoSuit for Biomimetic Innovation"

Kaoru Uesugi, Ibaraki University "Force Measurement for Elucidating Functions of Surface Micro-structures of Living Things"

Fujio Tsumori, Kyushu University "Fabrication of Biomimetic Functional Surfaces; (1) Hierarchical Structure and (2) Ciliated Surface"

Atsushi Hozumi, National Institute of Advanced Industrial Science and Technology (AIST)

"Development of Self-Healable Superhydrophobic and Superhydrophilic Materials"

Shigeru Deguchi, Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

"Biomimetics for Sustainable Use of Marine Bioresources in Circular Economy"

## On demand streaming conference

June 15, Monday — July 14, Wednesday

### \*Nanobiotechnology\*

**A-2** Design of a Hairpin DNA-Gold Nanoparticle Monoconjugate with a Single-Dye Molecule for Targetable Molecular Beacon Strategies [Invited]

Akane Mukaida (1), Rihito Adachi (1), Yoshitsugu Akiyama (2), Masao Kamimura (1), (1) Department of Materials Science and Technology, Graduate School of Industrial Science and Technology, Tokyo University of Science, (2) Faculty of Industrial Science and Technology, Tokyo University of Science

**A-3** Experimental Evaluation and Modeling of Adsorption Phenomena of Nanoliposomes on Poly(dimethylsiloxane) Surfaces

Sylvan Sunny Koyagura (1), Virendra Majarikar (1), Hiroaki Takehara (1,2), Takanori Ichiki (1,2), (1) The University of Tokyo, (2) Innovation Center of NanoMedicine (iCONM)

**A-4** Near-Infrared Afterglow Ceramic Fluorophore Coupled with Dyes in Polymer Matrix

Shengjie Fang, Masakazu Umezawa, Kyohei Okubo, Kohei Soga, Tokyo University of Science

**A-5** Photopolymerization Triggered by Upconversion Emission for Hydrophobic Shell Coating on Lanthanide-Doped NaYF<sub>4</sub> Nanoparticle Surface

Kyohei Okubo, Takaya Yamada, Hikaru Haraguchi, Masao Kamimura, Masakazu Umezawa, Kohei Soga, Tokyo University of Science

**A-6** Characterization of Bipolar Electrospinning and Its Application to Nanofiber Assembly

Naoya Takahashi(1), Hiroaki Takehara(1,2), Takanori Ichiki(1,2), (1) The University of Tokyo, (2) Innovation Center of NanoMedicine (iCONM)

**A-7** Effects of Physico-chemical Treatments on Interconnections among PLGA 50:50 Electrospun Nanofibers

Afraz Khan (1), Yuki Hadano (1), Hiroaki Takehara (1,2), Takanori Ichiki (1,2), (1) The University of Tokyo, (2) Innovation Center of NanoMedicine (iCONM)

**A-8** Microfabrication process of metal wires on poly(L-lactide)(PLLA) substrates using laser ablation

Kazuki Shimada (1), Hiroaki Takehara (1,2), Takanori Ichiki (1,2), (1) The University of Tokyo, (2) Innovation Center of NanoMedicine (iCONM)

**A-9** Elastoplastic finite element analysis of polymer microneedles with high aspect ratio

Mizuki Inada (1), Yukihiro Kanda (1), Hiroaki Takehara (1, 2), Takanori Ichiki (1, 2), (1) The University of Tokyo, (2) Innovation Center of NanoMedicine (iCONM)

### \*Directed Self Assembly (DSA)\*

**Keynote Lecture A-10** A New Technology for Back-illuminated Complementary Metal Oxide Semiconductor Image Sensor Integrated by Directed Self Assembly Process

Itaru Oshiyama, Takushi Shigetoshi, Isao Mita, Nobuto Sumitani, Takashi Oinoue, Suguru Saito, Tatsuya Okawa, Yoshiki Ebiko, Kaito Yokochi, Yoshiaki Kitano, Yoshiya Hagimoto, Tomoyuki Hirano, Hayato Iwamoto, Sony Semiconductor Solutions Corporation

**Keynote Lecture A-11** Next-Generation Directed Self-Assembly for Moore's Law Scaling [Invited]

Florian Gstrein, Intel Corporation

**A-12** Self-Assembly of Carbohydrate-based Block Copolymers : Highly Nanostructured Thin Films [Invited]

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Redouane Borsali, University Grenoble Alpes - CNRS

**A-13** Development of Directed Self-Assembly Process toward High Volume Manufacturing [Invited]

Hyo Seon Suh, Imec

**A-14** Recent Progress on DSA at CEA-Leti [Invited]

Guido Rademaker, Aurélie Le Penec, Marie-Line Pourteau, Tommaso Giammaria, Khatia Benotmane, Hanh Pham, Maria-Gabriëla Gusmão Cacho, Ahmed Gharbi, Maxime Argoud, Nicolas Posseme, Raluca Tiron, Univ. Grenoble-Alpes, CEA, Leti

**A-15** Defect Mitigation in Sub-20 nm Patterning with High-Chi Silicon Containing Block Copolymers [Invited]

Jan Doise (1), Jai Hyun Koh (2), Ji Yeon Kim (2), Qingjun Zhu (2), Natsuko Kinoshita (2), Hyo Seon Suh (1), Paulina Rincon Delgadillo (1), Geert Vandenberghe (1), C. Grant Willson (2), Christopher J. Ellison (3), (1) Imec, (2) University of Texas at Austin, (3) University of Minnesota

**A-16** Multi-functional Top-Coats Strategy for DSA of High- $\chi$  Block Copolymers [Invited]

Xavier Chevalier (1), Cindy Gomes Correia (2), Gwenaëlle Pound-Lana (3), Philippe Bézard (3) (4), Matthieu Sérégé (3), Camille Petit-Etienne (3), Guillaume Gay (3), Gilles Cunge (3), Benjamin Cabannes-Boué (2), Célia Nicolet (1), Christophe Navarro (1), Ian Cayrefourcq (1)(5), Marcus Müller (6), Georges Hadziioannou (2), Ilias Iliopoulos (7), Guillaume Fleury (2), Marc Zelsmann (3), (1) ARKEMA, (2) Univ. Bordeaux, (3) Univ. Grenoble Alpes, CNRS, CEA/LETI Minatec, (4) IMEC, (5) I-TEN SA, (6) Georg-August Universität Göttingen, Institute for Theoretical Physics, (7) Laboratoire PIMM, Arts et Métiers Institute of Technology, CNRS, Cnam, HESAM Université

**A-17** Electric-Field Directed Orientation in Fluorine-Containing Block Copolymer Films [Invited]

Du Yeol Ryu, Seongjun Jo, Seungbae Jeon, Taesuk Jun, and Hui Il Jeon, Department of Chemical & Biomolecular Engineering, Yonsei University

### **\*Computational / Analytical Approach for Lithography Processes\***

**A-18** EUV Stochastics: CD variability and Pattern Failures [Invited]

Peter De Bisschop, imec

**A-19** Stochastic Photoresist Defect Formation: An In Silico Investigation [Invited]

Lawrence S. Melvin III, Hironobu Taoka, Ulrich Welling, Wolfgang Demmerle, Hans-Jurgen Stock, Synopsys

**A-20** Resist thickness dependence of latent images in chemically amplified resists used for electron beam lithography [Invited]

Takahiro Kozawa (1) and Takao Tamura (2), (1) Osaka University, (2) NuFlare Technology, Inc.

**A-21** Tight-Binding Quantum Chemical Molecular Dynamics Simulations on Atomistic Mechanism of Plasma Etching Processes [Invited]

Momoji Kubo, Institute for Materials Research, Tohoku University

**A-22** Computational Study of Stochastic Effects in Extreme Ultraviolet Lithography [Invited]

Masaaki Yasuda, Masanori Koyama, Kyohei Imai, Masamitsu Shirai, Yoshihiko Hirai, Osaka Prefecture University

**A-23** Multiscale polymer simulations with automated coarse-graining technique and quantum annealing [Invited]

Kenji Yoshimoto, Toray

**A-24** Stochastic Simulation of Development Process in Electron Beam Lithography

Bunta Inoue (1), Masanori Koyama (1), Atsushi Sekiguchi (2), Masamitsu Shirai (1), Yoshihiko Hirai (1), Masaaki Yasuda (1), (1) Osaka Prefecture University,

(2) Litho Tech Japan

**A-25** Computational lithography for 3-dimensional fine photolithography using sophisticated built-in lens mask

Tomoaki Osumi, Akio Misaka, Kou Stochastic Simulation of Development Process in Electron Beam Lithography  
University

### \*EUV Lithography\*

**Keynote Lecture A-26** Fundamental Evaluation of Resist on EUV Lithography at NewSUBARU Synchrotron Light Facility (50 min)

Takeo Watanabe, Tetsuo Harada, Shinji Yamakawa, University of Hyogo

**A-27** The Research and Development Progress of the High Power LPP-EUV Light Source

Koichiro Koge, Hirokazu Hosoda, Shinji Nagai, Yoshifumi Ueno, Takashi Sukanuma, Takayuki Yabu, Tatsuya Yanagida, Yutaka Shiraishi, Hiroaki Nakarai, Hakaru Mizoguchi, Gigaphoton

**A-28** High-NA EUV Lithography Exposure Tool: Providing High Contrast to Resist [Invited] (30 min)

Gijsbert Rispens, Jan van Schoot, Ruben Maas, Eelco van Setten, Kars Troost, Rudy Peeters, Sjoerd Lok, Jo Finders, ASML

**A-29** Progress and Outlook towards High-NA EUV Materials

Jara G. Santaclara (1), Gijsbert Rispens (1), Joost Bekaert (2), Arame Thiam (2), Mark Maslow (1), Rik Hoefnagels (1), (1)ASML, (2)IMEC

**A-30** Challenges in Pushing EUV Lithography to the Atomic Scale [Invited] (30 min)

Patrick Naulleau, Berkeley Lab

**A-31** Photoresist Readiness for N3/N2 Double Patterning in EUV lithography [Invited] (30 min)

Danilo De Simone, Stefan Decoster, IMEC

**A-32** Novel EUV Resist Materials with Improved Stochastics - A Progress Report [Invited] (30 min)

Florian Gstrein, Intel Corporation

**A-33** The Status of Stochastic Issues in EUV Lithography, Photon Stochastic and Chemical Stochastic [Invited] (30 min)

Toru Fujimori, FUJFILM

**A-34** Randomness of Polymer Microstructure in the Resist Film as Shot Noise [invited] (30 min)

Makoto Muramatsu(1), Satoru Shimura(2), Arisa Hara(2), Advanced Technology Development Department, (1)Tokyo Electron Kyushu, Process Technology Department, (2)Tokyo Electron Kyushu

**A-35** Surface Variation Characterization on Chemical Amplified Photoresist for Extreme Ultraviolet Lithography Stochastic Effects

Eric C. Liu, Amir Hegazy, Hyeonseon Choi, Robert Brainard, Gregory Denbeaux, State University of New York, Polytechnic Institute

**A-36** Affinity Analysis of PAG in the Thin Film of Chemical Amplification Resist  
Ako Yamamoto (1), Shinji Yamakawa (1), Seiji Yasui (2), Takeo Watanabe (1), Tetsuo Harada (1), (1) University of Hyogo, (2) San-Apro Ltd.

**A-37** New Approaches to EUV Photoresists: Expanding the Polymer Toolbox [Invited] (30 min)

Jingyuan Deng (1), Florian Kaefer (2), Sean Bailey (2), Yusuke Otsubo (2,3), Christopher K. Ober (2), Department of Chemistry and Chemical Biology, (1)Cornell University, Department of Materials Science & Engineering, (2)Cornell

University, (3)JSR

**A-38** Multi-Trigger Resist for EUV Lithography [Invited] (30 min)

C. Popescu (1), G. O'Callaghan (1), A. McClelland (1), J. Roth (2), T. Lada (2), T. Kudo (3), R. Dammel (3), M. Moinpour (3), Y. Cao (3), A.P.G. Robinson (1), (1)Irresistible Materials, (2)Nano-C, (3)EMD Performance Materials

**A-39** EUV Photochemistry of  $\alpha$ -Substituted Antimony Carboxylate Complexes [Invited] (30 min)

Michael Murphy, Maximilian Weires, Nitinkumar S. Upadhyay, Philip Schuler, Shaheen Hasan, Greg Denbeaux, Robert L. Brainard, SUNY Polytechnic Institute

**A-40** Development of Negative-Type Molecular Ion Resist Materials using Polarity Change by EUV Exposure

Kohei Fujisawa (1), Hiroyuki Maekawa (1), Hiroto Kudo (1), Kazumasa Okamoto (2), Takahiro Kozawa (2), (1)Kansai University, (2)Osaka University

**A-41** Progress in EUV Photoresists for High-Resolution Patterning

Yusuke Otsubo (1,2), Hong Xu (1), Emmanuel P. Giannelis (1), Christopher K. Ober (1), (1)Cornell University, (2)JSR

**A-42** Study on Irradiation Effects by Femtosecond-pulsed Extreme Ultraviolet in Resist Materials [Invited] (30 min)

Hiroki Yamamoto, Yuji Hosaka, Masahiko Ishino, Thanh-Hung Dinh, Masaharu Nishikino, Yasunari Maekawa, National Institutes for Quantum and Radiological Science and Technology (QST)

**A-43** A Holistic Approach to Understanding the Ultrafast Molecular Dynamics of Resist During EUV Exposure: An Introduction to imec's AttoLab for Ultrafast Kinetics and Sub-20 nm Pitch Lithography [Invited] (25 min)

John Petersen (1), Kevin M. Dorney (1), Fabian Holzmeier (1), Esben W. Larsen (1), Thomas Nuytten (1), Dharendra P. Singh (1), Michiel van Setten (1), Pieter Vanelderden (1), Clayton Bargsten (2), Seth L. Cousin (2), Daisy Raymondson (2), Eric Rinard (2), Rod Ward (2), Henry Kapteyn (2,3), Stefan Böttcher (4), Oleksiy Dyachenko (4), Raimund Kremzow (4), Marko Wietstruk (4), Geoffrey Pourtois (1), Paul van der Heide (1), (1)IMEC, (2)KM Labs, (3)University of Colorado Boulder and NIST, (4)SPECS GmbH

**A-44** Evolution of Secondary Electrons Emission During EUV Exposure in Photoresists

Roberto Fallica(1), Stefano Nannarone(2), Nicola Mahne(2), Andrea Marco Malvezzi(2), Danilo De Simone(1), (1)IMEC, (2)CNR-IOM synchrotron beamline BEAR (Elettra synchrotron)

**A-45** The Measurement of the Refractive Index  $n$  and  $k$  Value of the EUV Resist by EUV Reflectivity Measurement Method

Yosuke Ohta (1), Jun Sekiguchi (1), Shota Niihara (2), Tetsuo Harada (2), Takeo Watanabe (2), (1)Litho Tech Japan, (2)University of Hyogo

**A-84** Polymerizable Olefins Groups in Antimony EUV Photoresists

Michael Murphy, Nitinkumar S. Upadhyay, Munsaf Ali, James Passarelli, Jodi Grzeskowiak, Maximilian Weires, Robert L. Brainard, SUNY Polytechnic Institute

### \*Nanoimprint Lithography\*

**A-46** Resin Deformation Analysis in UV Imprint Considering UV Shrinkage, Thermal Deformation, and Thermochemical Kinetics [Invited] (30 min.)

Yuki Onishi (1), Ryunosuke Yamashita (1), Kenji Amaya (1), Yoshihiko Hirai (2)  
(1) Tokyo Institute of Technology, (2) Osaka Prefecture University

**A-47** Impact of Water Treatment Reactor using TiO<sub>2</sub> Coated Micro Pillar Made by UV-NIL

Kazuki Daigo (1), Ryota Akama (1), Noriyuki Unno (2), Shin-ichi Satake (1), ○Jun Taniguchi (1), (1) Tokyo University of Science, (2) Tokyo University of Science, Yamaguchi

**A-48** Self-forming of Moth-eye Nanostructures on UV-cured Polymer using Oxygen Plasma Etching for Anti-reflection Coating

Takao Okabe, Jun Taniguchi, Tokyo University of Science

**A-49** Fabrication of Thin Resin Film with Small Through Holes by Low Temperature Nanoimprint Process

Hiroaki Kawata, Shingo Shimizu, Hideki Tanabe, Masaaki Yasuda, Hisao Kikuta, Yoshihiko Hirai, Osaka Prefecture University

**A-50** Molecular Dynamics Study of Resist Filling Process in UV-nanoimprint Lithography

Hiroki Uchida, Ryosuke Imoto, Takao Okabe, Jun Taniguchi, Tadashi Ando, Tokyo University of Science

**A-51** Molecular Dynamics Study on the Filling Process of Molecular Weight Dispersive Resist into Nanoscale Cavities

Keisuke Nakajima, Ryuhei Yamamura, Yuya Miyashita, Miyashita, Masaaki Yasuda, Yoshihiko Hirai, Osaka Prefecture University

**A-52** Proposal of Hybrid Deep Learning Systems for Process and Material Design in Thermal Nanoimprint Lithography,

Sou Tsukamoto, Kai Kameyama, Hidekatsu Tanabe, Ryuhei Yamamura, Hiroaki Kawata, Masaaki Yasuda, Yoshihiko Hira, Osaka Prefecture University

### \*Photopolymers in 3-D Printing/Additive Manufacturing\*

**Keynote Lecture A-53** Multi-material 3D Printing using Photopolymers (40min)

Shoji Maruo, Yokohama National University

**A-54** Novel Multi-material-multi-photon 3D Printing with Fast In-situ Material Replacement for Wafer-level Applications

Y. Gao, S. Toukabri, Y. Yu, A. Richter, R. Kirchner, TU Dresden, Institute of Semiconductors and Microsystems Technology Chair

**A-55** Flexible and Semi-Transparent Antenna for ISM Band by Direct Laser Writing [Invited]

Ashiqur Rahman, Akira Watanabe, Tohoku University

**A-56** Co-based Micropatterning on Polymer Substrates in Ambient

Atmosphere using Femtosecond Laser Reductive Sintering of Cobalt Oxide Nanoparticles [Invited]

Mizue Mizoshiri (1), Kyohei Yoshidomi (1), Namsrai Darkhanbaatar (1), Evgeniia Khairullina (2), Maxim Panov (2), Ilya I. Tumkin (2), (1) Nagaoka University of Technology, (2) St. Petersburg State University

### \*2D and Stimuli Responsive Materials for Electronics & Photonics\*

~~**A-57** 2D and Stimuli Responsive Materials for Electronics and Photonics: An Overview (15 min.)~~

~~Shu Seki, Kyoto University~~ **Canceled**

**A-58** Photoresponsive Liquid Crystalline Polymer Brush via Block Copolymer Surface Segregation in a Binary Mixture Film

Koji Mukai (1), Mitsuo Hara (1), Takahiro Seki (1), Shusaku Nagano (2), (1) Nagoya University, (2) Rikkyo University

**A-59** Design of Self-assembly in Phospholipid Membrane [Invited]

Noriyuki Uchida, Yunosuke Ryu, Anju Kawakita, Takahiro Muraoka, Tokyo University of Agriculture and Technology

**A-60** Photoinduced Aggregation and Emission Control of an Amphiphilic Azotolane Liquid Crystal

Anna Tamai, Ayumi Kobayashi, Kohei Iritani, Takashi Yamashita, Tokyo University of Technology

**A-61** Properties of Imidazolium-containing Multiblock Amphiphile in Lipid Bilayer Membranes

Miki Mori, Kazushi Kinbara, Tokyo Institute of Technology

**A-62** Reversible Thermal Shape Deformation of Main chain Liquid Crystalline Polymers Composed of Phenylene Bis Benzoate Moieties

Ryoma Amanuma, Ayumi Kobayashi, Kohei Iritani, Takashi Yamashita, Tokyo University of Technology

**A-63** Local Spatial Distribution of Molecularly-oriented J-aggregates on Poly(tetrafluoroethylene) Alignment Layers [Invited]

Tetsuya Aoyama(1), Jian Yu(2), Hee-Soo So(2), Junna Kawaguchi(2), Shinya Matsumoto(1, 2), Masamitsu Ishitobi(3), Hirohito Umezawa(4), Atsuya Muranaka(1), Masanobu Uchiyama(1, 5), Toshihiko Tanaka(1, 4), (1)RIKEN CPR, (2)Yokohama Nat. Univ., (3)ASET Sumitomo Chemical Lab., (4)Nat. Inst. Tech., Fukushima College, (5)Univ. of Tokyo

**A-64** Solution-Processable Free-Standing Thermoelectric Films Using Thermally Cleavable Polythiophene Derivatives [Invited]

Masaki Kawamoto (1-3), Pan He (1,4), Satoshi Shimano (1), Krishnachary Salikolimi (1), Takashi Isoshima (2), Yohei Kakefuda (5), Takao Mori (5), Yasujiro Taguchi (1), Yoshihiro Ito (1,2), (1) RIKEN, Center for Emergent Matter Science, (2) RIKEN Center for Pioneering Research, (3) Graduate School of Science and Engineering, Saitama University, (4) Changchun University of Science and Technology, (5) WPI-MANA, National Institute for Materials Science"

**A-65** Construction of Monolayer with Aggregation-Induced Emission Effect at the Air/Water Interface using Tetraphenylethylene Derivative Having Long Alkyl Chains [Invited]

Kohei Iritani, Yoshitaku Matsubara, Keiji Ikuta, Takashi Yamashita, Tokyo University of Technology

**A-66** Oriented Nanowire Arrays with Phthalocyanine - C<sub>60</sub> Multi-Hetero Junctions

Nobuoka Masaki (1), Koshi Kamiya (1), Shugo Sakaguchi (1), Tsuneaki Sakurai (2) Shu Seki (1), (1) Kyoto University, (2) Kyoto Institute of Technology

**A-67** Electrochromic Devices with 2D Metallo-Supramolecular Polymers

Masayoshi Higuchi, Manas K. Bera, Sanjoy Mondal, National Institute for Materials Science

**\*Strategies and Materials for Advanced Packaging, Next Generation MEMS, Flexible Devices\***

**Keynote Lecture A-68** Enabling Materials for System-in-Package (SiP) (50min)

Tanja Braun (1), Karl-Friedrich Becker (1), Michael Töpfer (1), Martin Schneider-Ramelow (2), (1) Fraunhofer IZM, (2) Technical University of Berlin

**A-69** Material and Process Solutions for Advanced Packaging [Invited]

Kazuyuki Mitsukura, Masaya Toba, Showa Denko Materials

**A-70** Advanced Build-up Materials for Next Generation Package [Invited]

Masahiro Karakawa, Research Institute For Bioscience Products & Fine Chemicals, Ajinomoto Co., Ltd.

**A-71** Mechanistic Analysis using Time-resolved Measurement of



Polycinnamate Film

Kenji Takada, Tatsuo Kaneko, Japan Advanced Institute of Science and Technology

**A-72** Application of Decarboxylation Reactions on Improvement of Dielectric Properties of a Methacrylic Polymer

Bao Li (1), Hiroshi Matsutani (1), Mika Kimura (1), Masato Miyatake (1), Yasuharu Murakami (1), Sadaaki Katoh (2), Akitoshi Tanimoto (2), Xiaodong Ma (3), Xuesong Jiang (3), (1)Showa Denko Materials, (2)SD Materials (Suzhou), (3)Shanghai Jiao Tong University

**A-73** Micropatterning Performance and Physical Characteristics of Water-soluble High Molecular Weight Polysaccharide Photoresist Materials  
Toru Amano (1,2), Makoto Kobayashi (2), Satoshi Takei (1), (1)Toyama Prefectural University, (2)Gunei Chemical Industry

**A-74** Effect of Sugar Chain Binding Mode on Water-soluble Micropatterning Performance and Physical Characteristics

Toru Amano (1,2), Makoto Kobayashi (2), Satoshi Takei (1), (1)Toyama Prefectural University, (2)Gunei Chemical Industry

**A-123** Fabrication of X-ray Collimators by X-ray Lithography Using Synchrotron Radiation

Shunya Saegusa (1), Noriyuki Narukage (2), Yuichi Utsumi (1), Akinobu Yamaguchi (1), (1) University of Hyogo, (2) NINS, National Astronomical Observatory of Japan

**A-75** Design Challenges of Organic Dielectric Materials for Next Generation Packaging Applications [Invited] (25 min.)

Sanjay Malik, FUJIFILM Electronic Materials U.S.A.

**A-76** Reliability Simulation of Redistribution Layer Interface in Fan-out Wafer Level Packaging [Invited] (25 min.)

Yuji Okada(1), Atsushi Fujii(1), Kenta Ono(2), Yoshiharu Kariya(3), (1)Asahi Kasei, (2)Graduate School of Shibaura Institute of Technology, (3)Department of Materials Science and Engineering, Shibaura Institute of Technology

**A-77** Rheological & Adhesion Considerations in Characterization of Organic Dielectric Dry Film for Advanced Packaging Applications

Stephanie Dilocker, Sanjay Malik, Michaela Connell, Binod De & William Reinerth, FUJIFILM Electronic Materials U.S.A.

**A-78** Low Stress and Low Temperature Curable Photosensitive Polyimide  
Yu Shoji, Keika Hashimoto, Yutaro Koyama, Yuki Masuda, Hitoshi Araki, Masao Tomikawa, Toray Industries

**A-79** Effect of Cross-linker on Photosensitive Polyimide to Achieve Full Imidization and Lower Stress for Good Reliability

Ayaka Azuma, Satoshi Abe, Mamoru Sasaki, HD MicroSystems

**A-80** Purification Method for Achieving Low Trace Metals in Ultra-high Purity Chemicals

Mitsuaki Kobayashi (1), Yukihisa Okada (1), Takaaki Shirai (1), Majid Entezarian (2), Robert Giegera (2), (1) 3M Japan Innovation, Purification and Separation Science Division (2) 3M, Purification and Separation Science Division

**\*Chemistry for Advanced Photopolymer Science\***

**A-81** Synthesis and Structure-Activity Relationship of N-Substituted Carbazole Oxime Ester Photoinitiators

Huaqiao Lu, Zhiquan Li, Jiangnan University

**A-82** Suppressed Oxygen Inhibition in UV Curable Formulations Using A Diene as an Additive

Haruyuki Okamura (1), Yuuki Nishijima (2), Daiki Noguchi (2), Takashi Fukumoto (2), Yutaka Suzuki (2), (1) Osaka Prefecture University, (2) Kuraray

**A-83** Synthesis of Photo-degradable Polyphthalaldehyde Macromonomer and

Adhesive Property Changes of its Copolymer with Butyl Acrylate on UV-irradiation  
Hirokazu Hayashi (1), Hideki Tachi (1), Kanji Suyama (2), (1) Osaka Research  
Institute of Industrial Science and Technology, (2) Osaka Prefecture University  
**A-85** Grating Structures Formed by Scanning Wave Photopolymerization of  
Mesogenic Acrylate  
Hirona Nakamura (1), Yoshiaki Kobayashi (1), Megumi Ota (1), Miho Aizawa (2),  
Atsushi Shishido (1), (1) Tokyo Institute of Technology, (2) National Institute of  
Advanced Industrial Science and Technology  
**A-86** Control of Radical Polymerization and Cationic Polymerization in  
Photocurable Resin for 3D Printers  
Kotaro Kobayashi (1), Hirohumi Takamatsu (1), Tatsuo Taniguchi (1), Tatsuo  
Taniguchi (1), Hiroaki Okamoto (2), Takashi Karatsu (1), (1) Chiba University, (2)  
Okamoto Chemical Industry  
**A-87** Effect of using Acrylic and Epoxy Hybrid Cross-linker on the Mechanical  
Strength of Photo-curable Resin 3D-Printing  
Hirofumi Takamatsu (1), Miharuru Ito (1), Tatsuo Taniguchi (1), Hiroaki Okamoto (2),  
Takashi Karatsu (1), (1) Chiba University, (2) Okamoto Chemical Industry  
**A-88** Moving towards Non-toxic, Completely Safe Light-cured Dental Materials:  
Novel Effective Photoinitiators for the Production of Dental Fillings  
Monika Topa (1), Joanna Ortyl (1,2), (1) Cracow University of Technology,  
(2) Photo HiTech Ltd.

#### **\*Organic and Hybrid Materials for Photovoltaic and Optoelectronic Devices\***

**A-89** Halide Perovskite Artificial Synapses and Quantum Emitters [Invited] (30  
min.)  
Hao-Wu Lin, National Tsing Hua University  
**A-90** Spray-Coating Process for Perovskite Solar Cells Application [Invited] (30  
min.)  
Cheng-Liang Liu, National Taiwan University  
**A-91** Top Thermal Annealing Effect on 2D/3D Lead Halide Perovskite:  
Anisotropic Photoconductivity and Vertical Gradient of Dimensionality [Invited]  
(30 min.)  
Rei Shimono, Yoshiyuki Murakami, Ryosuke Nishikubo, ○Akinori Saeki,  
Osaka University  
**A-92** Metal Halide Hybrid Perovskites for High-Performance LED and Laser  
Devices [Invited] (30 min.)  
Toshinori Matsushima, Chihaya Adachi, Kyushu University  
**A-93** Photoinduced Charge Carrier Dynamics of Semiconductor Nanocrystals for  
Photovoltaic Application [Invited] (30 min.)  
Safna Ravindi Padmaperuma (1), Samuel Chan (1), Hanming Liu (1), Ryosuke  
Nakamura (2), ○Yasuhiro Tachibana (1,2), (1) RMIT University, (2) Osaka  
University  
**A-94** The Benefits of Ionic Liquids for High Efficiency and Stable Perovskite  
Solar Cells  
Md. Shahiduzzaman, Tetsuya Taima, Kanazawa University  
**A-95** Application of NiO Biosynthetic as Thin Film Hole Transporting Layer for  
Inverted Perovskite Solar Cells  
Ersan Y. Muslih, Md. Shahiduzzaman, Tetsuya Taima, Kanazawa University  
**A-96** Toward Efficient and Stable Perovskite Solar Cells by Using Double-Sided  
CsI Intercalation Into MAPbI<sub>3</sub> Framework  
LiangLe Wang (1), Md. Shahiduzzaman (2), Masahiro Nakano (3), Tetsuya Taima  
(1,2,3), (1) Graduate School of Frontier Science Initiative, Kanazawa University, (2)  
Nanomaterials Research Institute, Kanazawa University, (3) Graduate School of  
Natural Science and Technology, Kanazawa University  
**A-97** Surface and Interface Electronic Structure of Quasi-2D Perovskite

Abduheber Mirzehmet (1), Tomoki Ohtsuka (2), Syed A. Abd. Rahman (2), Takumi Aihara (2), Muhammad Akmal Kamarudin (3), Shahrir Razey Sahamir (3), Shuzi Hayase (3), Tomoki Yuyama (2), Peter Krüger (4,5), Hiroyuki Yoshida (4,5), (1) Electronics and Photonics Research Institute, The National Institute of Advanced Industrial Science and Technology (AIST), (2) Graduate School of Science and Engineering, Chiba University, (3) Info-Powered Energy System Research Center (i-PERC), The University of Electro-Communications, (4) Graduate School of Engineering, Chiba University, (5) Molecular Chirality Research Center, Chiba University

**A-98** Effect of 2-Propanol Immersing on Organohalide Perovskite Layer in Perovskite Solar Cells Fabricated by Two-Step Method

○Daiki Okawa, Yoshiyuki Seike, Tatsuo Mori, Aichi Institute of Technology

**A-99** Molecular Design of High-Performance Materials for Non-Fullerene Organic Solar Cells [Invited] (30 min.)

He Yan, Hong Kong University of Science and Technology (HKUST)

**A-100** Materials and Devices Towards High-Performance Organic Solar Cells and Photodetectors [Invited] (30 min.)

Fei Huang, South China University of Technology

**A-101** Formation of Stable Heterojunction by Sequential Solution Deposition of Organic Semiconductors [Invited] (30 min.)

Ka Yeon Ryu, ○Kyungkon Kim, Ewha Womans University

**A-102** Exciton Binding Energy of Organic Solar Cell Materials [Invited] (30 min.)

Hiroyuki Yoshida (1,2), Ai Sugie (3), Kosuke Terado (3), Kyohei Nakano (4), Keisuke Tajima (4), Itaru Osaka (5), (1) Graduate School of Engineering, Chiba University, (2) Molecular Chirality Research Center, Chiba University, (3) Graduate School of Science and Engineering, Chiba University, (4) CEMS, RIKEN, (5) Graduate School of Engineering, Hiroshima University

**A-103** Photon Upconversion at Organic Semiconductor Interface [Invited] (30 min.)

Seiichiro Izawa, Institute for Molecular Science

**A-104** Thick-Film Polymer Solar Cells with Excellent Fill Factor

Tsubasa Mikie, Itaru Osaka, Hiroshima University

**A-105** Synthesis, Properties, and Photovoltaic Characteristics of Arch- and S-Shaped Naphthobisthiadiazole-Based Acceptors

Seihou Jinnai, Shreyam Chatterjee, Yutaka Ie, Osaka University

**A-106** Improved Hole-Transporting Properties in Conjugated Polymers Mixed with Polystyrene as an Insulating Polymer

Yuya Horiuchi, Midori Koshiro, Hyung Do Kim, Hideo Ohkita, Kyoto University

**A-124** Analyses of Charge Accumulation of PTzBT Ternary Polymer Solar Cells Using ESR Spectroscopy [Invited] (30min.)

Dong Xue, ○Kazuhiro Marumoto, University of Tsukuba

### **\*Fundamentals and Applications of Biomimetics Materials and Processes\***

**Keynote Lecture A-107** Observe Living/Wet Organisms with a Scanning Electron Microscope by NanoSuit Method (30 min.)

Takahiko Hariyama, Yasuharu Takaku, Chiyo Senoh, Hideya Kawasaki, Hamamatsu University School of Medicine

~~**A-108** From Insect Wings to Biomimetic Applications [Invited] (25 min.)~~

~~Hamed Rajabi, Kiel University **Canceled**~~

**A-109** Self-Healable Superhydrophobic and Superhydrophilic Materials [Invited] (25 min.)

Atsushi Hozumi, National Institute of Advanced Industrial Science and Technology (AIST)

**A-110** A study on Ant Colony Optimization

Tomohisa Takimi, Digital Strategy Department, Yamato Holdings

**A-111** Effect of Microstructure Inspired by Living Organism on Biofilm Growth Suppression,

Mariko Miyazaki (1), Akihiro Miyauchi (2), (1) Hitachi, (2) Tokyo Medical and Dental University

**A-112** The pre-settlement behaviors of barnacles on antifouling microtopographic surfaces

Takayuki Murosaki (1), Yasuyuki Nogata (2), Yuji Hirai (3), (1) Asahikawa Medical University, (2) Central Research Institute of Electric Power Industry, (3) Chitose Institute of Science and Technology

**A-113** Direct Observation of Gastropod's Locomotion for Soft Robot Application  
Kazuki Maeda (1), Fujio Tsumori (2), (1) Department of Mechanical Engineering, Kyushu University, (2) Department of Aeronautics and Astronautics, Kyushu University

**A-114** Soft Actuator with DN-gel Dispersed with Magnetic Particles

Shutaro Shigetomi (1), Fujio Tsumori (2), (1)Department of Mechanical Engineering, Kyushu University, (2)Department of Aeronautics and Astronautics, Kyushu University

**A-115** Glass Microchannel Formation by Mycelium

Daiki Sato (1), Fujio Tsumori (2), (1)Department of Mechanical Engineering, Kyushu University, (2)Department of Aeronautics and Astronautics, Kyushu University

**A-116** Finite Element Analysis of Advanced Imprint Process to Multilayered Material

Kazuki Tokumaru (1), Tsuyoshi Miyata (1), Fujio Tsumori (2), (1)Department of Mechanical Engineering, Kyushu University, (2)Department of Aeronautics and Astronautics, Kyushu University

**A-117** Formation of Microstructure on Poly(methyl methacrylate) Film using Atmospheric Pressure Low Temperature Plasma

Masashi Yamamoto (1), Youichiro Mori (1), Takuya Kumagai (1), Atsushi Sekiguchi (2), Hiroko Minami (3), Hideo Horibe (4), (1)National Institute of Technology, Kagawa College, (2)Osaka Prefecture University, (3)Litho Tech Japan, (4)Osaka City University

**A-118** Water-repellency Function of Water Strider by Curvature Shape of Micro-hairs

Kaoru Uesugi, Ibaraki University

**A-119** Free-Energy Description of Pinning Effect in Wetting Phenomena of Rough Surface

Hiroyuki Mayama, Asahikawa Medical University

**A-120** The Development of Bile Duct Stent Having Antifouling Properties by using Atmosphere Pressure Cold Plasma

Atsushi Sekiguchi(1,3,5), Masashi Yamamoto(2), Takuya Kumagai(2), Youichiro Mori(2), Hiroko Minami(3), Masayasu Aikawa(4), Hideo Horibe(5), (1)Osaka Prefecture University, (2)National Institute of Technology, Kagawa College, (3)Litho Tech Japan, (4)Saitama Medical University, (5)Osaka City University

### **\*General Scopes of Photopolymer Science and Technology\***

**A-121** Solvent-dependent Assembled Structures of Azobenzene-based Chromophores

Y. Tokumura (1), O.M. Han (2), (1)Tottori University, (2)Kongju National University

**A-122 Photo-induced Hydrolytic Degradation of Itaconic Acid based Bionylon Composites**

Maninder Singh, Huaiyu Wang, Mohammad Asif Ali, Kenji Takada, Maiko Okajima, ○Tatsuo Kaneko, (1)Osaka Prefecture University, (2)National Institute of Technology, Kagawa College, (3)Litho Tech Japan, (4)Saitama Medical University, (5)Japan Advanced Institute of Science and Technology

**\*Japanese Symposium: Polyimides and High Temperature Polymers**

**-Functionalization and Practical Applications-\***

**\*日本語シンポジウム: ポリイミド及び高温耐熱樹脂機能化と応用\***

**B1-01** ナフタレン骨格を有する共重合ポリイミドの発光特性および酸二無水物間の励起エネルギー移動の解析

(1) 東京工業大学, (2) JFEケミカル 土井 真里奈 (1), 武藤 江一朗 (1), 奈良 麻優子 (1), 梁 乃強 (1), 佐野 浩介 (2), 森 浩章 (2), 石毛 亮平 (1), 安藤 慎治 (1)

**B1-02** 低誘電特性を有するパーフルオロアルキレン含有ポリイミド  
岩手大学 遠藤 由樹, 塚本 匡, 芝崎 祐二, 大石 好行

**B1-03** トリアジン系表面修飾剤を用いる高屈折率熱可塑性ナノコンポジット

(1) サムスン日本研究所, (2) 岩手大学 菊地 智幸 (1) (2), 宮崎栄吾 (1), 山田幸香 (1), 神谷亮介 (1), 宮尾宙 (1), 加藤敏彦 (1), 大石好行 (2)

**B1-04** 先端パッケージにおける半導体樹脂材料

住友ベークライト 楠木 淳也, 鶴川 健, 羽田 英夫

**基調講演 B1-05** 感光性耐熱材料の発展の歴史と展開 (60分)

東レ 富川 真佐夫

**B1-06** ブロック共重合体を鋳型とした架橋型ポリイミドの自己組織化とポーラスフィルムの創製

東京工業大学 駒村 貴裕, 難波江 裕太, 早川 晃鏡

**B1-07** ポリイミド膜を用いたブロック共重合体のマイクロ相分離配向制御

東京工業大学 前田 颯, 難波江 裕太, 早川 晃鏡

**B1-08** 気体分離膜のスキン層内における粒子凝集に対する溶媒蒸発に伴う相分離の影響

東京都立大学 東 しおり, 山登 正文, 川上 浩良

**B1-09** Biomolecule-guided Design for Self-standing Nano-membranes Having Superhigh Toughness and Transparency

Japan Advanced Institute of Science and Technology Tatsuo Kaneko, Yasuyoshi Funahashi, Kenji Takada, Yohei Yoshinaka

**B1-10** 加熱によるポリアミド酸ゲルの側鎖にアミノ基を有するポリイミド溶液への変換

茨城大学 椎名義勝, 大貫翔太, 森川敦司

**B1-11** 連結したプロトン伝導パスを有するナノファイバーフレームワーク複合電解質膜の作製と燃料電池特性評価

東京都立大学 小椋 隆廣, 鈴木 千翔, 田中 学, 川上 浩良

**B1-12** ポリアミド酸フィルムの低温イミド化に有効な熱塩基発生剤

(1) 東京応化, (2) 岩手大学 引田 二郎 (1, 2), 田所 恵典 (1), 伊熊 直彦 (1), 塩田 大 (1), 塚本 匡 (2), 芝崎 祐二 (2), 大石 好行 (2)

**\*Japanese Symposium: Resist Removal, Etching and Cleaning Technology\***

**\*日本語シンポジウム: レジスト除去、エッチング、洗浄技術\***

**B2-01** 減圧水蒸気下におけるマイクロ波励起プラズマを用いたフォトリジスト膜除去プロセス中の発光分光スペクトルの経時変化 (招待講演)

(1) 金沢大学、(2) 米倉製作所 北野卓也(1)、○石島達夫(1)、鈴木宏明(1)、相澤 洸(1, 2)、塩田有波(1)、田中康規(1)、上杉喜彦(1)

**B2-02** マイクロ波励起水蒸気プラズマにおけるフォトレジストアッシング除去速度の面内均一性の改善

金沢大学 相澤 洸、島田大伸、櫻井 匡、中野裕介、田中康規、上杉喜彦、石島達夫

**B2-03** オゾン水の生成と紫外吸収分光法による分析 (招待講演)

高知工科大学 八田章光、滝野結公

**B2-04** Effect of Dilute Sulfuric Acid on Photoresist Removal by Ozone Microbubbles [Invited]

Tohoku University, (2) Osaka City University, (3) Ebara Corporation, (4) Dan-Takuma Technologies ○Masayoshi Takahashi (1), Hideo Horibe (2), Katsumi Tatera (3), Shinsuke Miyazaki (4), Yasuyuki Shirai (1), Shigetoshi Sugawa (1)

**B2-05** オゾンマイクロバブル水を用いた有機物分解に及ぼすpHの影響

大阪市立大学 辻本和輝、堀邊英夫

**B2-06** 化学増幅型3成分ノボラックレジストの新規溶解抑制剤合成によるレジスト特性向上

大阪市立大学 明知慎也、堀邊英夫

**B2-07** グリセリンを配合した現像液のノボラックレジストの溶解性

(1) 阪本薬品工業、(2) 大阪市立大学 梶田舜平(1)、宮路由紀子(1)、堀邊英夫(2)

**B2-08** タングステン加熱触媒体で活性化したH<sub>2</sub>/O<sub>2</sub>混合ガスを用いたPAC量の異なるノボラックレジストの除去

(1) 香川高等専門学校、(2) 静岡大学、(3) 大阪市立大学 秋田航希(1)、十川翔太(1)、十亀龍星(1)、山本雅史(1)、長岡史郎(1)、梅本宏信(2)、堀邊英夫(3)

**B2-09** 高速イメージングを用いたレジスト剥離過程の観察 (招待講演)

(1) 大阪工業大学、(2) 大阪大学レーザー科学研究所、(3) 大阪大学、(4) 埼玉大学、(5) 大阪市立大学 神村共住(1)、西岡直樹(1)、小泉敦司(1)、松本祐樹(1)、丸井春輝(1)、吉村政志(2)、兼松泰男(3)、中村亮介(4)、堀邊英夫(5)

**B2-10** Protrusion Formation of Polymer Surface by Atomic Hydrogen Annealing [Invited]

University of Hyogo Akira Heya, Koji Sumitomo

**B2-11** PVAローラーブラシ洗浄におけるブラシ変形と再汚染 (招待講演)

(1) 静岡大学、(2) 荏原製作所 保坂篤紀(1)、宮木 翼(1)、水嶋祐基(1)、濱田聡美(2)、小篠諒太(2)、福永 明(2)、○真田俊之(1)

## \*Japanese Symposium: General Scopes of Photopolymer Science and Technology\*

### \*日本語シンポジウム: 一般講演\*

**B2-12** Electrical and Optical Model of Reverse Mode Liquid Crystal Cells with Low Driving Voltage

Akita University Rumiko Yamaguchi, Koichi Inoue

**B2-13** Preparation and applications of a polysilane-allyl methacrylate copolymer

(1) Nara National College of Technology, (2) Osaka Gas Chemicals Fumiya Kato (1), ○Yukihito Matsuura (1), Masanobu Okita (2), Tomoharu Tachikawa(2)

**B2-14** 光配向性高分子液晶フィルムの光不活性化とその場反応による複屈折の制御

兵庫県立大学 則定優之介、近藤瑞穂、川月喜弘

**B2-15** 感光性白色加飾コーティング剤で利用されるランダム構造を有するシロキサンオリゴマー

東レ 諏訪 充史, 岡沢 徹, 小林 秀行

**B2-16** ベンジリデンアニリン系アモルファス分子材料—有機酸複合膜の発光特性

室蘭工大 塚田 琢真, 北村 侑也, 中野 英之

**B2-17** アミノ酸から誘導される含ジスルフィド硬化剤の合成とアニオンUV硬化材料への応用

福井工業高等専門学校 古谷 昌大, 前野 華子, 田中 新

**B2-18** 架橋鎖長の異なる高分子ナノフィルムの形状評価

- (1) 岐阜薬科大学、(2) 岐阜医療科学大学、(3) 松山大学、(4) 中部学院大学 近藤 伸一(1)、土井 直樹(1)、笹井 泰志(2)、山内 行玄(3)、葛谷 昌之(4)

**B2-19** せん断配向技術を用いて作製したフレキシブルなコロイド結晶フィルムによるレーザー発振

- (1) 東京理科大学、(2) 物質・材料研究機構、(3) 富士化学 岩田 直人(1)、佐藤 龍(1)、澤田 勉(2)、不動寺 浩(2)、今井 宏起(3)、川中 智司(3)、内田 文生(3)、古海 誓一(1)

**B2-20** ヒドロキシプロピルセルロース誘導体が形成するコレステリック液晶の粘弾性挙動

東京理科大学 荻原 裕己、岩田 直人、古海 誓一

**B2-21** ポリ(N-ビニルカプロラクタム)を用いたコロイド結晶ゲル膜の創製

- (1) 東京理科大学 理学部第一部 応用化学科、(2) 東京理科大学大学院 理学研究科 化学専攻 金田 隆希(1)、関 雄太郎(2)、岩田 直人(1)、古海 誓一(1)(2)

**B2-22** 高分子鎖で表面修飾したコロイド微粒子のせん断配向挙動

- (1) 東京理科大学 理学部第一部 応用化学科、(2) 東京理科大学大学院 理学研究科 化学専攻 小原 舞美(1)、関 雄太郎(2)、岩田 直人(1)、古海 誓一(1)(2)

**B2-23** 完全にエーテル化したヒドロキシプロピルセルロース誘導体の合成と光学特性

- (1) 東京理科大学 理学部第一部 応用化学科、(2) 東京理科大学大学院 理学研究科 化学専攻 馬場 蓉(1)、斎藤 聖奈(2)、岩田 直人(1, 2)、古海 誓一(1, 2)

**B2-24** グルコースを高精度で検知できる高分子ハイドロゲル微粒子分散液の創製

- (1) 東京理科大学 理学部第一部 応用化学科、(2) 東京理科大学大学院 理学研究科 化学専攻 川 達也(1)、柴田 遥介(2)、岩田 直人(1)、古海 誓一(1, 2)

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第38回  
国際フォトポリマーコンファレンス

アドバンスドリソグラフィ、ナノテクノロジー、  
フォトテクノロジー  
－材料とプロセスの最前線－

2021年6月15日(火)～16日(水)  
オンライン会議

主催： フォトポリマー学会 (SPST)

協賛： フォトポリマー懇話会 日本化学会 高分子学会 千葉大学

後援： 応用物理学会