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Final Edition

ICPST-35

Scientific Program

**The 35th International Conference of
Photopolymer Science and Technology**

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

June 25-28, 2018

International Conference Hall

Makuhari Messe, Chiba, Japan

(5 minutes walk from JR Kaihin Makuhari Station)

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

In Cooperation with

The Technical Association of Photopolymer, Japan

The Japan Society of Applied Physics

The Chemical Society of Japan

The Society of Polymer Science, Japan

Chiba University

International Conference Schedule

June 25 (Monday) Registration 15:00-17:00 (Room D)

June 25 (Monday) Get Together 17:00-19:00 (Room D)

	June 26 Tuesday	June 27 Wednesday	June 28 Thursday
Lobby	Registration 9:00-17:00	Registration 9:00-17:00	Registration 9:00-15:00
Room A	EUV Lithography Nanobiotechnology p.3	Computational / Analysis Approach For Lithography EUV Lithography PST Award Ceremony p.9	Strategies and Materials for Advanced Packaging, Next Generation MEMS Flexible Packaging Photopolymers in 3-D Printing/Additive Manufacturing p.14
Room B	Advanced Materials for Photonics /Electronic Device and Technology Fundamentals and Applications of Biomimetics Materials and Processes Panel Symposium p.5	Fundamentals and Applications of Biomimetics Materials and Processes Chemistry for Advanced Photopolymer Science Nanoimprint Lithography Outstanding Achievement Award Lecture p.12	Computational / Analysis Approach For Lithography Directed Self Assembly (DSA) Nanobiotechnology p.16
Room C	ポリイミド及び 高温耐熱樹脂- 機能化と応用 Japanese Symposium: Polyimides and High Temperature Polymers -Functionalization and Practical Applications- p.20	光機能性デバイス材料 Japanese Symposium: Photofunctional Materials for Electronic Devices p.22	Chemistry for Advanced Photopolymer Science General Scopes of Photopolymer Science and Technology 193 nm Lithography Extension p.18
Room D	Organic Solar Cells – Materials, Device Physics, and Processes p.7	プラズマ光化学 と高分子表面 機能化 Japanese Symposium: Plasma Photochemistry and Functionalization of Polymer Surface レジスト除去技術 Japanese Symposium: Resist Removal Technology p.23	レジスト除去技術 Japanese Symposium: Resist Removal Technology 一般講演 Japanese Symposium: General Scopes of Photopolymer Science and Technology p.25

June 26, Tuesday

Room A (Room 301)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

Opening Session		Published conference paper
10:00-10:15	Chairperson: Haruyuki Okamura, Osaka Prefecture University	
	Opening Remarks Minoru Tsuda, President of the Society of Photopolymer Science & Technology (SPST)	
	Overview of Scientific Program ICPST-35 Masayuki Endo, Chairperson of the Program Committee ICPST-35	
EUV Lithography		
10:15-11:05	Chairperson: Takeo Watanabe, University of Hyogo	
(10:15-10:40)	A-44 Novel EUV Resist Materials for 7 nm Node and Beyond [Invited] (25 min.) Hajime Furutani, Michihiro Shirakawa, Wataru Nihashi, Kyohei Sakita, Hironori Oka, Mitsuhiro Fujita, Tadashi Omatsu, Toru Tsuchihashi, Nishiki Fujimaki, and Toru Fujimori, FUJIFILM	31 (2) 201
(10:40-11:05)	A-52 Synthesis and Property of Tannic Acid Derivatives and Their Application for Extreme Ultraviolet Laser Lithography System [Invited] (25 min.) Hiroto Kudo (1), Shizuya Ohori (1), Hiroya Takeda (1), Hiroki Ogawa (1), Takeo Watanabe (2), Hiroki Yamamoto (3), and Takahiro Kozawa (4), Kansai University (1), University of Hyogo (2), National Institutes for Quantum and Radiological Science and Technology (3), Osaka University (4)	31 (2) 221
11:05-11:15	Break	
Nanobiotechnology		
11:15-12:50	Chairpersons: Kyohei Okubo, Tokyo University of Science and Takanori Ichiki, The University of Tokyo	
(11:15-11:40)	A-2 Bioresponsive Polyzwitterion that Recognizes Tumorous pH for a Construction of Tumor-targeted Carriers [Invited] (25 min.) Hiroyasu Takemoto, Tokyo Institute of Technology	
(11:40-12:00)	A-3 Microfluidic Model for Optical Detection of Nanoparticles in Whole Blood Hiroaki Takehara, Yukihiro Kanda, and Takanori Ichiki, The University of Tokyo	31 (1) 59
(12:00-12:25)	A-15 Polymer Nanocomplex for Near Infrared Biophotonics [Invited] (25 min.) Kohei Soga (1, 2), Masao Kamimura (1, 2), and Masakazu Umezawa (1), Department of Materials Science and Technology, Tokyo University of Science (1), Imaging Frontier Center, Tokyo University of Science (2)	
(12:25-12:50)	A-5 Borono-lectin Based Engineering for Smart Drug Delivery Applications [Invited] (25 min.) Akira Matsumoto, Tokyo Medical and Dental University	
12:50-13:50	Lunch	

Continue to the following page

June 26, Tuesday

Room A (Room 301)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

- 13:50-15:00 Chairpersons: Akira Matsumoto, Tokyo Medical and Dental University and Hiroaki Takehara, The University of Tokyo
- (13:50-14:10) **A-7** Sub-100 nm Scale Nanoarray Platform for Single Exosome Analysis
Kyohei Okubo (1), Hiromi Kuramochi (1), Akiko Iwaya (1), Takanori Ichiki (1, 2), The University of Tokyo (1), Innovation center of Nano Medicine (iCONM) (2)
- (14:10-14:35) **A-8** Photo-induced pH Jump Reactions for Biomedical Systems [Invited] (25 min.)
Mitsuhiro Ebara, National Institute for Materials Science (NIMS)
- (14:35-15:00) **A-10** Design of a Sacrificial Template to Fabricate Collagen Hydrogels with a Microchannel Structure [Invited] (25 min.)
Masaya Yamamoto (1), Takumi Kosaba (1), Nobuyuki Morimoto (1), Mitsunobu R. Kano (2), Tohoku University (1), Okayama University (2)
- 15:00-15:25 Break
- 15:25-17:20 Chairpersons: Hiroaki Takehara, The University of Tokyo and Hiroyasu Takemoto, Tokyo Institute of Technology
- (15:25-15:50) **A-11** Polymer-nanobiotechnology for Utilization of Proteins Toward Biomedical Applications [Invited] (25 min.)
Akihiro Kishimura, Faculty of Engineering, Kyushu University
- (15:50-16:10) **A-12** Development of DNA Aptamer Screening System Based on High-density Microarray Platform
Jain Ankita (1), Shingo Ueno (1, 2), Shusuke Sato (2), and Takanori Ichiki (1, 2), Department of Bioengineering, The University of Tokyo (1), Innovation Center of NanoMedicine (iCONM) (2)
- (16:10-16:30) **A-13** Fluorescence-based ATP Detection Method for Measurement on a Microwell Array Chip
Shingo Ueno (1, 2), Shusuke Sato (1, 2), Mika Shioya (1), and Takanori Ichiki (1, 2), Innovation Center of NanoMedicine (iCONM) (1), The University of Tokyo (2)
- (16:30-16:55) **A-14** Surface Modification of Silica Nanoparticles Using 4-aryloxy Boron Dipyromethene (BODIPY) Enhances Skin Permeation [Invited] (25 min.) **31 (1) 71**
Takaki Amamoto and Masaru Kato, Showa University
- (16:55-17:20) **A-4** Near-infrared Light Triggered Theranostics Based on Polymer Modified Nanophosphors [Invited] (25 min.)
Masao Kamimura (1, 2) and Kohei Soga (1, 2), Department of Materials Science and Technology, Tokyo University of Science (1), Imaging Frontier Center (IFC), Tokyo University of Science (2)
- 17:20-18:00 Break
- 18:00-20:00 **Panel Symposium in English: “EUV Resist Sensitization and Roughness Improvement: Can We Get Both?” at Room B (Room 302)**

June 26, Tuesday

Room B (Room 302)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

Advanced Materials for Photonic / Electronic Device and Technology

- 10:15-11:15 Chairpersons: Tsuneaki Sakurai, Kyoto University and Takashi Yamashita, Tokyo University of Technology
- (10:15-10:35) **A-17** Photoinduced Phase Transition of Hybrid Films of Azobenzene-based Photochromic Amorphous Molecular Materials and Poly(vinyl acetate) **31 (1) 81**
Hideyuki Nakano, Ryoji Ichikawa, and Yuto Doi, Muroran Inst. Tech.
- (10:35-10:55) **A-18** Synthesis of Photocleavable Block Copolymers for UV Induced Foaming **31 (5) 647**
Podchara Rattanakawin (1), Kai Yamamura (1), Weijia Fan (2), Kenji Yoshimoto (1), Masahiro Ohshima (1), and Shigeru Yamago (2), Department of Chemical Engineering, Kyoto University (1), Institute for Chemical Research, Kyoto University (2)
- (10:55-11:15) **A-19** Study on Electron-beam-induced Reactions of Methyl α -Allyloxymethyl Acrylic Polymer **31 (1) 85**
Yuji Hosaka (1), Takafumi Kondoh (2), Tomoko Gowa Oyama (1), Tomoya Uchida (3), Mitsumasa Taguchi (1), Yoichi Yoshida (2), and Masakazu Washio (3), National Institutes for Quantum and Radiological Science and Technology (QST) (1), Osaka University (2), Waseda University (3)
- 11:15-11:25 Break
- 11:25-12:45 Chairpersons: Yuji Hosaka, Quantum and Radiological Science and Technology (QST) and Hideyuki Nakano, Muroran Institute of Technology
- (11:25-11:45) **A-20** Polymerized Nanowires via High-Energy Charged Particle Irradiation of 9,9'-spirobi[9H-fluorene] Derivatives
Shugo Sakaguchi (1), Tsuneaki Sakurai (1), Masaki Sugimoto (2), Tetsuya Yamaki (2), Atsuya Chiba (2), Yuichi Saito (2), and Shu Seki (1), Department of Molecular Engineering, Kyoto University (1), Takasaki Advanced Radiation Research Institute, National Institutes for Quantum and Radiological Science and Technology (2)
- (11:45-12:05) **A-21** Transient Optical–Microwave Spectroscopy for Electron Mobility Assessment in Solids and Solutions: A Comprehensive Approach **31 (1) 91**
Wakana Matsuda (1), Tsuneaki Sakurai (1), Goutam Ghosh (2), Suhrit Ghosh (2), and Shu Seki (1), Department of Molecular Engineering, Kyoto University (1), Indian Association for the Cultivation of Science (2)
- (12:05-12:25) **A-22** Effect and Properties of Thermal Base Generators on the Hardening of Glycol-Lignin Hybrid Materials **31 (1) 101**
Ayumi Kobayashi (1), Fumiya Kobayashi (1), Atsushi Shiraishi (2), Takeo Ebina (3), Ryo Ishii (3), Takashi Nakamura (3), Tatsuhiko Yamada (4), Thi Thi Nge (4), and Takashi Yamashita (1), Tokyo University of Technology (1), San-Apro (2), National Institute of Advanced Industrial Science and Technology (AIST) (3), Forestry and Forest Products Research Institute (4)
- (12:25-12:45) **A-23** Mechanism of Photo Base Generators based on DBU by the Transient Absorption Measurement **31 (1) 107**
Ayumi Kobayashi (1), Yuta Endo (1), Atsushi Shiraishi (2), and Takashi Yamashita (1), Tokyo University of Technology (1), San-Apro (2)
- 12:45-14:00 Lunch

Continue to the following page

June 26, Tuesday

Room B (Room 302)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

Fundamentals and Applications of Biomimetics Materials and Processes

- 14:00-15:35 Chairpersons: Atsushi Sekiguchi, Litho Tech Japan, Tomoki Nishino, Ritsumeikan University, and Masatsugu Shimomura, Chitose Institute of Science and Technology
- (14:00-14:45) **Keynote Lecture A-24** Biomimetics Sustainable Innovation Based On Biodiversity
Masatsugu Shimomura, Chitose Institute of Science and Technology
- (14:45-15:10) **A-25** Secret of Lotus Leaf: Importance of Double-Roughness Surface Structure for Wetting [Invited] (25 min.)
Hiroyuki Mayama, Asahikawa Medical University
- (15:10-15:35) **A-26** Large-area Duplication of *Morpho*-color Material using Flexible Substrate **31 (1) 113**
[Invited] (25 min.)
Akira Saito (1, 2), Junpei Ohga (1), Midori Fukihara (1), and Yuji Kuwahara (1, 2),
Osaka University (1), RIKEN (2)
- 15:35-18:00 Break

Panel Symposium in English: "EUV Resist Sensitization and Roughness Improvement: Can We Get Both?"

18:00-20:00 Seiji Nagahara, Tokyo Electron, and Tomoki Nagai, JSR

Panel Symposium: "EUV Resist Sensitization and Roughness Improvement: Can We Get Both?"

Panelists: Anna Lio (Intel), Patrick Naulleau (Lawrence Berkeley National Laboratory), Takahiro Kozawa (Osaka University), Robert L. Brainard (SUNY Polytechnic Institute), Toru Fujimori (FUJIFILM), Danilo De Simone (imec), Takeo Watanabe (University of Hyogo)

Sensitization of EUV resist is helpful for reducing cost of EUV lithography by increasing throughput. The symposium will deal with the possibility of breakage of sensitivity and roughness trade-off relationship with the magic of chemistry.

June 26, Tuesday

Room D (Room 304)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

*** Organic Solar Cells - Materials, Device Physics, and Processes ***

- 10:15-11:45 Chairpersons: Itaru Osaka, Hiroshima University and Akinori Saeki, Osaka University
(10:15-10:40) **A-27** Impact of Side Chain Engineering and Molecular Weight Control of Polymer Acceptors in All-Polymer Solar Cells [Invited] (25 min.)
Bumjoon Kim, Korea Advanced Institute of Science and Technology
- (10:40-11:05) **A-28** Synthesis, Properties, and Photovoltaic Characteristics of Donor-Acceptor Copolymers Based on Tetrafluoro-substituted Benzodioxocyclohexene-annelated Thiophene [Invited] (25 min.) **31 (2) 145**
Yutaka Ie, Yota Kishimoto, Koki Morikawa, Makoto Karakawa, and Yoshio Aso, Osaka University
- (11:05-11:25) **A-29** Novel Wide Band Gap Benzodithiophene Homopolymers and Their Photovoltaic Performance
Donghong Yu, Aalborg University
- (11:25-11:45) **A-30** Synthesis of Poly(3-butylthiophene) with Trisiloxane End-Group and Its Surface Segregation Behavior in Thin Films **31 (2) 151**
Fanji Wang (1, 2), Kazuhito Hashimoto (2), Hiroshi Segawa (3, 4), and Keisuke Tajima (1), RIKEN Center for Emergent Matter Science (CEMS) (1), Graduate School of Engineering, The University of Tokyo (2), Research Center for Advanced Science and Technology, The University of Tokyo (3), Graduate School of Arts and Sciences, The University of Tokyo (4)
- 11:45-13:00 Lunch
- 13:00-14:35 Chairpersons: Hideo Ohkita, Kyoto University and Yutaka Ie, Osaka University
(13:00-13:25) **A-31** Interfacial Charge Transfer Limiting Performance of Perovskite Solar Cells **31 (5) 633**
[Invited] (25 min.)
Maning Liu (1), Masaru Endo (2), Ai Shimazaki (2), Atsushi Wakamiya (2), and ○ Yasuhiro Tachibana (1, 3), RMIT University (1), Kyoto University (2), Osaka University (3)
- (13:25-13:50) **A-32** T Photoconductivity of Pb-Sn Perovskite Induced by UV Pump and IR Push Pulses [Invited] (25 min.) **31 (2) 157**
Kento Yamada and ○ Akinori Saeki, Osaka University
- (13:50-14:15) **A-33** Surface-Induced Controls of Organic Semiconductors in Thin Films [Invited] (25 min.)
Seiichiro Izawa (1), Tomohiro Mayumi (1, 2), Kyohei Nakano (1), Kaori Suzuki (1), Yujiao Chen (1), Tomoka Kikitsu (1), Daisuke Hashizume (1), Tomoyuki Koganezawa (3), Kazuhito Hashimoto (2), and ○ Keisuke Tajima (1), RIKEN Center for Emergent Matter Science (CEMS) (1), Graduate School of Engineering, The University of Tokyo (2), Japan Synchrotron Radiation Research Institute (JASRI) (3)
- (14:15-14:40) **A-34** Time-Resolved EPR Study on Singlet Fission and Subsequent Triplet Dissociation Dynamics [Invited] (25 min.) **31 (2) 163**
Hiroki Nagashima (1), Shuhei Kawaoka (2), Seiji Akimoto (3), Takashi Tachikawa (1, 3), Yasunori Matsui (2), Hiroshi Ikeda (2), and ○ Yasuhiro Kobori (1, 3), Molecular Photoscience Research Center, Kobe University (1), Department of Applied Chemistry, Graduate School of Engineering, Osaka Prefecture University (2), Department of Chemistry, Graduate School of Science, Kobe University (3)
- 14:40-14:50 Break

Continue to the following page

June 26, Tuesday

Room D (Room 304)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

- 14:50-16:00 Chairpersons: Hideo Ohkita, Kyoto University and Kazuhiro Marumoto, University of Tsukuba
- (14:50-15:15) **A-35** High-Performance Ternary Organic Solar Cells [Invited] (25 min.)
Yanming Sun, Beihan University
- (15:15-15:40) **A-36** LUMO Levels of Non-Fullerene Acceptors for Organic Solar Cells [Invited] (25 min.)
Hiroyuki Ichikawa (1), Ai Sugie (1), Weining Han (1), and ○Hiroyuki Yoshida (1, 2), Graduate School of Engineering, Chiba University (1), Molecular Chirality Research Center, Chiba University (2)
- (15:40-16:00) **A-37** Efficient Ternary Blend Solar Cells With Small Energy Loss
Masahiko Saito and Itaru Osaka, Department of Applied Chemistry, Hiroshima University
- 16:00-16:10 Break
- 16:10-17:20 Chairpersons: Itaru Osaka, Hiroshima University and Hiroyuki Yoshida, Chiba University
- (16:10-16:35) **A-38** Imide-Functionalized Polymer Semiconductors for Efficient Organic Solar Cells [Invited] (25 min.)
Xugang Guo, South University of Science and Technology of China
- (16:35-17:00) **A-39** Investigation of Charge Accumulation States in Polymer Solar Cells using Light-Induced Electron Spin Resonance Spectroscopy [Invited] (25 min.) **31 (2) 169**
Masaki Yabusaki (1) and ○Kazuhiro Marumoto (1, 2), Division of Materials Science, University of Tsukuba (1), Tsukuba Research Center for Energy Materials Science (TREMS), University of Tsukuba (2)
- (17:00-17:20) **A-40** Visible Sensitization for Non-Fullerene Polymer Solar Cells Using a Wide Bandgap Polymer **31 (2) 177**
Yanbin Wang (1), ○Hyung Do Kim (2), Biaobing Wang (1), and Hideo Ohkita (2), Changzhou University (1), Kyoto University (2)
- 17:20-18:00 Break

***Panel Symposium in English: "EUV Resist Sensitization and Roughness Improvement: Can We Get Both?" * at Room B (Room 302)**

June 27, Wednesday

Room A (Room 301)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

Computational /Analysis Approach For Lithography

9:00-9:45 Chairpersons: Kenji Yoshimoto, Kyoto University and Tomoki Nagai, JSR Corporation

(9:00-9:45) **Keynote Lecture A-41** Field-Theoretic Approaches to Directed Self-Assembly
Glenn H. Fredrickson (1), Kris T. Delaney (2), Corinne Carpenter (3), and Jimmy Liu (3), Materials Research Laboratory, Department of Chemical Engineering, and Department of Materials, University of California, Santa Barbara (1), Materials Research Laboratory, University of California, Santa Barbara (2), Materials Research Laboratory and Department of Chemical Engineering, University of California (3)

9:45-9:50 Break

EUV Lithography

9:50-12:00 Chairpersons: Takeo Watanabe, University of Hyogo and Christopher Ober, Cornell University

(9:50-10:35) **Keynote Lecture A-42** The Early Days of R&D on EUV Lithography and Future Expectations **31 (2) 193**
Tsuneyuki Haga, NTT Advanced Technology

(10:35-11:00) **A-43** Inside EUV Resists [Invited] (25 min.)
Anna Lio, Intel

(11:00-11:20) **A-45** The Role of Underlayers in EUV Lithography **31 (2) 209**
Pieter Vanelderren, Danilo De Simone, and Geert Vandenberghe, IMEC

(11:20-11:40) **A-46** High-Aspect-Ratio-Transmission Grating of EUV-IL using DDR Process for 10nm EUV Resist Evaluation **31 (2) 215**
Mana Yoshifuji, Shota Niihara, Tetsuo Harada, and Takeo Watanabe, University of Hyogo

(11:40-12:00) **A-47** Measurements and Analysis of Stochastic Effects in EUV Resists
Greg Denbeaux, Kavin Thiruveragan, Steven Grzeskowiak, Chang H. Shin, and Robert L. Brainard, SUNY Polytechnic Institute

12:00-13:00 Lunch

13:00-14:30 Chairpersons: Taku Hirayama, Merck Performance Materials Ltd. and Anna Lio, Intel

(13:00-13:25) **A-48** EUV Patterning Research at Berkeley Lab [Invited] (25 min.)
Patrick Naulleau, Berkeley Lab

(13:25-13:50) **A-49** Resist Stochastic Defectivity Challenges For 7nm and Next Generation Lithography [Invited] (25 min.)
Craig Higgins, Amrit Narasimhan, Arjun Singh, Daniel Schmidt, and Tim Brunner, GLOBALFOUNDRIES

(13:50-14:10) **A-50** The Path to Better Understanding Stochastics in EUV Photoresist [Invited] **31 (5) 651**
Danilo De Simone, Yannick Vesters, Ashish Rathore, Ivan Pollentier, Pieter Vanelderren, John Petersen, and Geert Vandenberghe, IMEC

(14:10-14:30) **A-51** The Considerations of Stochastic Noise in EUV Patterning
Hidetami Yaegashi, Kyohei Koke, and Arisa Hara, Tokyo Electron

Continue to the following page

June 27, Wednesday

Room A (Room 301)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

- 14:30-14:40 Break
- 14:40-16:05 Chairpersons: Hiroto Kudo, Kansai University and Patrick Naulleau, LBNL
- (14:40-15:00) **A-53** Multi-Trigger Resist for EUV Lithography [Invited] **31 (2) 227**
A. P. G. Robinson (1, 2), Y. Vesters (3, 4), A. McClelland (2), D. De Simone (3), C. Popescu (1, 5), G. Dawson (1), J. Roth (6), W. Theis (5), and G. Vandenberghe (3), School of Chemical Engineering, University of Birmingham (1), Birmingham Research Park (2), IMEC (3), KU Leuven (4), School of Physics and Astronomy, University of Birmingham (5), Nano-C (6)
- (15:00-15:20) **A-54** Characterization Studies on Metal-based EUV Resist Film Properties **31 (5) 663**
[Invited]
Julius Joseph Santillan and Toshiro Itani, Evolving nano process Infrastructure Development Center (EIDEC)
- (15:20-15:45) **A-55** Mechanisms and Reactivity of EUV Photoresists Containing Antimony, Bismuth, Tellurium and Tin [Invited] (25 min.) **31 (2) 233**
Michael Murphy, Jacob Sitterly, Steven Grzeskowiak, Greg Denbeaux, and Robert L. Brainard, SUNY Polytechnic Institute
- (15:45-16:05) **A-56** Tin-Oxo Cages as Photoresists: Interactions with Soft X-Rays **31 (2) 243**
Jarich Haitjema (1), Thomas Schlatholter (2), Lianjia Wu (1), Laurent Nahon (3), Alexandre Giuliani (3), Ronnie Hoekstra (1, 3), Sonia Castellanos (1), and Fred Brouwer (1, 4), Advanced Research Center for Nanolithography (1), Rijksuniversiteit Groningen (2), Synchrotron SOLEIL (3), University of Amsterdam (4)
- 16:05-16:15 Break
- 16:15-18:00 Chairpersons: Julius Joseph Santillan, EIDEC and Danilo De Simone, IMEC
- (16:15-16:35) **A-57** Dual-tone Application of a Tin Oxo Cage Photoresist Under E-beam and EUV Exposure **31 (2) 249**
Yu Zhang (1), Jarich Haitjema (1), Milos Baljovic (2), Michaela Vockenhuber (2), Dimitrios Kazazis (2), Thomas A. Jung (2), Yasin Ekinici (2), Sonia Castellanos (1), and Albert M. Brouwer (1, 3), Advanced Research Center for Nanolithography (1), Paul Scherrer Institut (2), University of Amsterdam (3)
- (16:35-17:00) **A-58** Role of Metal Sensitizers for Sensitivity Improvement in EUV Chemically Amplified Resist [Invited] (25 min.)
Hiroki Yamamoto (1, 2), Yannick Vesters (3, 4), Jing Jiang (3), Danilo De Simone (3), Stefan de Gendt (3, 4), Geert Vandenberghe (3), and Takahiro Kozawa (2), National Institutes for Quantum and Radiological Science and Technology (1), Osaka University (2), IMEC (3), KU Leuven (4)

Continue to the following page

June 27, Wednesday

Room A (Room 301)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

- (17:00-17:20) **A-59** In-Situ Measurement of Outgassing Generated from EUV Metal Oxide Nanoparticles Resist During Electron Irradiation **31 (2) 257**
Seiji Takahashi (1), Yoichi Minami (1), Yoko Matsumoto (1), Hiroko Minami (1), Atsushi Sekiguchi (1), and Takeo Watanabe (2), Litho Tech Japan (1), University of Hyogo (2)
- (17:20-17:40) **A-60** The Challenges of Highly Sensitive EUV Photoresists **31 (2) 261**
Christopher K. Ober (1), Vasiliki Kosma (1), Hong Xu (1), Kazunori Sakai (2), and Emmanuel P. Giannelis (1), Cornell University (1), JSR (2)
- (17:40-18:00) **A-61** New Approach of Overcoming Shot Noise Problems, the Most Critical Item of EUV Lithography Now
Seiichi Tagawa and Akihiro Oshima, Osaka University
- 18:00-18:05 Break

PST Award Ceremony

- 18:05-18:20 Chairperson: Haruyuki Okamura, Osaka Prefecture University
Report on the Selection of the Photopolymer Science and Technology Award 2018
Minoru Tsuda, President of the Society of Photopolymer Science and Technology

The Photopolymer Science and Technology Award 181100, The Outstanding Achievement Award 2018
Susumu Fujimori, Tokyo University of Science
The Photopolymer Science and Technology Award 182100, The Best Paper Award 2018
Yusuf Yagci, Gorkem Yilmaz, and Mustafa Ciftci, Istanbul Technical University
The Photopolymer Science and Technology Award 182200, The Best Paper Award 2018
Chen-Gang Wang, Feifei Li, and Atsushi Goto, Nanyang Technological University

- 18:30-20:00 **Conference Banquet at Room E (Room 103, 1F)**

June 27, Wednesday

Room B (Room 302)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

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

- 9:00-10:40 Chairpersons: Atsushi Sekiguchi, Litho Tech Japan, Tomoki Nishino, Ritsumeikan University, and Masatsugu Shimomura, Chitose Institute of Science and Technology
- (9:00-9:20) **A-62** Study of the Antifouling Polymer Sheet which used Biomimetics Technique **31 (1) 121**
Atsushi Sekiguchi (1), Yoko Matsumoto (1), Hiroko Minami (1), Tomoki Nishino (2), Hiroshi Tanigawa (2), Kazuki Tokumaru (3), and Fujio Tsumori(3), Litho Tech Japan (1), Ritsumeikan University (2), Kyushu University (3)
- (9:20-9:40) **A-63** Antifouling Technology of Metamaterial Structure Using Biomimetic Technology **31 (1) 129**
Tomoki Nishino (1), Hiroshi Tanigawa (1), and Atsushi Sekiguchi (2), Ritsumeikan University (1), Litho Tech Japan (2)
- (9:40-10:00) **A-64** Biomimetic Design Inspired by Sharkskin Denticles and Modeling of Diffuser for Fluid Control **31 (1) 133**
Mariko Miyazaki (2), Yuji Hirai (1), Hiroshi Moriya (2), Masatsugu Shimomura (1), Akihiro Miyauchi (3), and Hao Liu (4), Chitose Institute of Science and Technology (1), Hitachi (2), Tokyo Medical Dental University (3), Chiba University (4)
- (10:00-10:20) **A-65** 3D Printing System of Magnetic Anisotropy for Artificial Cilia **31 (1) 139**
Seiji Azukizawa (1), Kazuki Tokumaru (1), Kentaro Kudo (1), Kazunari Shinagawa (2), and Fujio Tsumori (2), Department of Mechanical Engineering, Graduate School of Kyushu University (1), Department of Mechanical Engineering, Kyushu University (2)
- 10:20-10:30 Break

*** Chemistry for Advanced Photopolymer Science ***

- 10:30-11:20 Chairpersons: Yusuf Yagci, Istanbul Technical University and Haruyuki Okamura, Osaka Prefecture University
- (10:30-10:55) **A-67** Photopolymerization as Potential Tools for Materials Synthesis [Invited] (25 min.)
Marco Sangermano, Politecnico di Torino
- (10:55-11:20) **A-68** Controlled Radical Polymerization in Photo-curing toward Unique Graded Nanostructures [Invited] (25 min.)
Takeo Suga, Kaname Takata, Hiroyo Sumida, and Hiroyuki Nishide, Waseda University
- 11:20-12:00 Chairpersons: Marco Sangermano, Politecnico di Torino and Takeo Suga, Waseda University
- (11:20-11:40) **A-69** Multi-mode Polymerizations Involving Photoinduced Radical Polymerization
Görkem Yılmaz and Yusuf Yagci, Istanbul Technical University
- (11:40-12:00) **A-70** Visible Light-Induced Living Radical Polymerization for the Facile Fabrication of Concentrated Polymer Brushes and Complex Patterned Surfaces
Chen-Gang Wang and Atsushi Goto, Nanyang Technological University
- (12:00-12:20) **A-114** Effect of Oxygen from Air on Shrinkage of UV Curing Resin Measured using Laser Displacement Method **31 (4) 497**
Kentaro Taki and Ryuui Yamada, Kanazawa University
- 12:20-13:20 Lunch

Continue to the following page

June 27, Wednesday

Room B (Room 302)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

Nanoimprint Lithography

- 13:20-15:15 Chairperson: Yoshihiko Hirai, Osaka Prefecture University
- (13:20-14:05) **Keynote Lecture A-71** Progression of Nanoimprint Technology from 2D to 3D Products: Biomedical and Robotic Applications
Hong Yee Low, Singapore University of Technology and Design
- (14:05-14:35) **A-72** Creation of Functional Surface by Informatics and Biomimetics [invited] (30 min.) **31 (2) 267**
Akihiro Miyauchi, Tokyo Medical and Dental University
- (14:35-14:55) **A-73** Fabrication of Complex 3D Nanoimprint Mold by using Control of Dose and Acceleration Voltage Electron Beam Lithography **31 (2) 271**
Kohei Goto and Jun Taniguchi, Tokyo University of Science
- (14:55-15:15) **A-74** Evaluation of UV Nanoimprinting and Multilayer Lift-off Process Using Spin-on-glass for Nanogap Electrode Array **31 (2) 277**
Kyohei Hashiguchi (1, 2), Kenta Suzuki (2), Hiroshi Hiroshima (2), Yasuhisa Naitoh (2), and Hiroshi Suga (1), Chiba Institute of Technology (1), National Institute of Advanced Industrial Science and Technology (2)
- 15:15-15:30 Break
- 15:30-17:30 Chairpersons: Jun Mizuno, Waseda University and Jun Taniguchi, Tokyo University of Science
- (15:30-15:50) **Outstanding Achievement Award Lecture**
A-75 Pattern Fabrication by Molded Mask Methods
Susumu Fujimori, Tokyo University of Science
- (15:50-16:10) **A-76** Non-residual Layer Transfer of High Viscosity Ultraviolet Photocurable Resin Using Liquid Transfer Technique **31 (2) 283**
Hiroki Ueda and Jun Taniguchi, Tokyo University of Science
- (16:10-16:30) **A-77** Transfer Printing by Use of Delayed UV Cure Resin for Fabricating Multilayer Structures **31 (5) 657**
Takenori Yamamoto, Masaaki Yasuda, Yoshihiko Hirai, and Hiroaki Kawata, Osaka Prefecture University
- (16:30-16:50) **A-78** Reduction of Defect on Imprinted UV Curable Resin with Volatile Solvents using Gas Permeable Mold Derived from Cellulose **31 (2) 289**
Kento Mizui, Kazuho Kurematsu, Shinya Nakajima, Makoto Hanabata, and Satoshi Takei, Toyama Prefectural University
- (16:50-17:10) **A-79** Filling Behavior and Mold Release Force in UV Nanoimprinting Using PDMS Mold in Different Atmosphere **31 (2) 295**
Kenta Suzuki, Sung-Won Youn, and Hiroshi Hiroshima, National Institute of Advanced Industrial Science and Technology (AIST)
- (17:10-17:30) **A-80** Comparison of Mold Release Properties of Biomass Gas Permeable Templates using Acrylic Monomer RPBGPTUAM
Kazuho Kurematsu, Satoshi Takei, Shinya Nakajima, Kento Mizui, Soichiro Takamatsu, Daiki Hirata, and Makoto Hanabata, Toyama Prefectural University
- *Flexible Packaging***
- (17:30-17:50) **A-91** Lateral Patterning of Porous Polyimide Film Prepared Under High-pressure CO₂ and UV Light **31 (4) 473**
Kentarō Taki (1), Masataka Kawaseki (2), Tatsuki Isawa (1), and Akira Mizoguchi (2), Kanazawa University(1), Sumitomo Electric (2)
- 17:50-18:05 Break
- 18:05 -18:20 ***PST Award Ceremony* at Room A (Room 301)**
- 18:30-20:00 **Conference Banquet at Room E (Room 103, 1F)**

June 28, Thursday

Room A (Room 301)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

Strategies and Materials for Advanced Packaging, Next Generation MEMS

- 9:00-10:50 Chairpersons: Sanjay Malik, FUJIFILM Electronic Materials and Takumi Ueno, Shinshu University
- (9:00-9:20) **A-81** Introduction to the Current Trends in LSI Packaging: Application of Photopolymers
Takumi Ueno (1), Sanjay Malik (2), Shinshu University (1), FUJIFILM Electronic Materials U.S.A (2)
- (9:20-10:05) **Keynote Lecture A-82** Material Trends for Fan-out Wafer and Panel Level Packaging
Tanja Braun (1), Karl-Friedrich Becker (1), Ole Hoelck (1), Steve Voges (2), Ruben Kahle (1), Markus Wöhrmann (1), Lars Boettcher (1), Michael Töpper (1), R. Aschenbrenner (1), and K.-D. Lang (2), Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (IZM) (1), Technical University Berlin (2)
- (10:05-10:30) **A-83** Next Generation Photosensitive Dielectric Materials for Advanced Packaging Applications [Invited] (25 min.) **31 (4) 451**
Takeharu Motobe, Tetsuya Enomoto, Noriyuki Yamazaki, and Masayuki Ohe, Hitachi Chemical DuPont MicroSystems
- (10:30-10:50) **A-84** Surface Wettability Controllable Polyimides Having Various Photo-reactive Groups by Photo-irradiation [Invited] **31 (4) 457**
Yusuke Tsuda, Tatsuya Koga, Tatsuya Shimogawa, Ryosuke Shiki, and Daichi Sakata, Kurume National College of Technology
- 10:50-11:00 Break
- 11:00-12:00 Chairpersons: Tanja Braun, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (IZM) and Yusuke Tsuda, Kurume National College of Technology
- (11:00-11:20) **A-85** Laser Based Direct Exposure to Photo Materials Used in Advanced Semiconductor Package [Invited] **31 (4) 463**
Hiroshi Matsui, Yoshinao Norimitsu, Tasuya Nagao, and Shota Majima, SCREEN Semiconductor Solutions
- (11:20-11:40) **A-86** Ultra-fine Cu Wiring Surrounded by Electroless-Plated Ni: Effective Structure for High Insulation Reliable Wiring Applicable to Panel Level Fabrication
Masaya Toba, Kazuyuki Mitsukura, Yoshinori Ejiri, Tomonori Minegishi, and Kazuhiko Kurafuchi, Hitachi Chemical
- (11:40-12:00) **A-87** Novel Chemically Amplified Resist using Photodeprotectable N-Alkoxybenzyl Aromatic Polyamide **31 (4) 467**
Kenichi Iwashita (1), Ryosuke Suzuki (2), Hironobu Katoh (2), Yoshihiro Ohta (2), and Tsutomu Yokozawa (2), Hitachi Chemical (1), Kanagawa University (2)
- 12:00-13:10 Lunch

Flexible Packaging

- 13:10-14:45 Chairpersons: Kuniharu Takei, Osaka Prefecture University and Sanjay Malik, FUJIFILM Electronic Materials
- (13:10-13:35) **A-88** Development of Printed Nanofilms for Bio-Integrated Devices [Invited] (25 min.)
Toshinori Fujie (1, 2), Waseda University (1), JST PRESTO (2)
- (13:35-14:00) **A-89** Ultraflexible/stretchable Organic Solar Cells: Toward Wearable Electronic Systems [Invited] (25 min.)
Kenjiro Fukuda (1), Hiroaki Jinno (1, 2), and Takao Someya (1, 2), RIKEN (1), University of Tokyo (2)

Continue to the following page

June 28, Thursday

Room A (Room 301)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

- (14:00-14:25) **A-90** Flexible, Stretchable, and Deformable Devices for Neural Interfaces [Invited]
(25 min.)
Takeshi Kawano, Toyohashi University of Technology
- 14:25-14:35 Break
- *Photopolymers in 3-D Printing/Additive Manufacturing***
- 14:35-15:55 Chairpersons: Robert Allen, IBM and Akira Watanabe, Tohoku University
- (14:35-15:15) **Keynote Lecture A-92** Printing with Light: Additive Manufacturing of Ultralightweight Multi-functional Metamaterials (40 min.)
Xiaoyu "Rayne" Zheng, Huachen Cui, Ryan Hensleigh, and Hongshun Chen, Department of Mechanical Engineering, Macromolecules Innovation Institute, Virginia Polytechnic Institute and State University
- (15:15-15:55) **Keynote Lecture A-93** Materials Overview for 2-Photon 3D Printing Application (40 min.) **31 (3) 425**
Christopher K. Ober, Cornell University
- 15:55-16:05 Break
- 16:05-17:25 Chairpersons: Robert Allen, IBM and Takumi Ueno, Shinshu University
- (16:05-16:25) **A-94** Reactive Monolayers in Directed Additive Manufacturing – Area Selective Atomic Layer Deposition [Invited] **31 (3) 431**
Rudy J. Wojtecki (1), Anuja DeSilva (2), Noah Frederick Fine Nathel (1), Hosadurga Shobha (1), Noel Arellano (1), Alexander Friz (1), and Greg Wallraff (1), IBM Almaden Research Center (1), Albany Nanotech (2)
- (16:25-16:45) **A-95** Novel Fabrication of Three-Dimensional Homogeneous Microporous Polyimide Membrane [Invited] **31 (3) 437**
Tsukasa Sugawara (1), Jun Koshiyama (1), and Akira Kawai (2), TOKYO OHKA KOGYO (1), Nagaoka University of Technology (2)
- (16:45-17:05) **A-96** In-Process Measurement of Resin's Gradient Boundary in Evanescent- Wave-Based Nano-Stereolithography Using Reflection Contrast Interference in Critical Angle Deqing Kong (1), Masaki Michihata (2), Kiyoshi Takamasu (3), and Satoru Takahashi (2), Department of Advanced Interdisciplinary Studies, the University of Tokyo (1), Research Center for Advanced Science and Technology, the University of Tokyo (2), Department of Precision Engineering, the University of Tokyo (3) **31 (3) 441**
- (17:05-17:25) **A-97** Conductive Micropatterns Prepared by Laser-Induced Reduction of Graphene Oxide [Invited] **31 (3) 447**
Akira Watanabe (1), Jinguang Cai (2), Sayaka Ogawa (1), Eiji Aoyagi (3), and Shun Ito (3), Institute of Multidisciplinary Research for Advanced Materials, Tohoku University (1), Institute of Materials, China Academy of Engineering Physics (2), Institute for Materials Research, Tohoku University (3)
- 17:25-17:30 **Closing Remarks: Robert Allen, IBM**

Computational /Analysis Approach For Lithography

- 9:30-11:10 Chairpersons: Takahiro Kozawa, Osaka University and Tomoki Nagai, JSR Corporation
- (9:30-9:50) **A-98** Utilizing Roughness Power Spectral Density Variables to Guide Resist Formulation and Understand Impact of Frequency Analysis Through Process [Invited]
Charlotte Cutler (1), Choong-Bong Lee (1), James W. Thackeray (1), Chris A. Mack (2), John Nelson (1), Jason DeSisto (1), Mingqi Li (1), Emad Aqad (1), Xisen Hou (1), Tomas Marangoni (1), Joshua Kaitz (1), and Rochelle Rena (1), Dow Electronic Materials (1), Fractilia, LLC (2)
- (9:50-10:10) **A-99** Mechanism of Defect Formation in DSA Process [Invited]
Kenji Yoshimoto (1, 2), Alvin Chandra (3), Ryuichi Nakatani (3), Teruaki Hayakawa (3), Mikihiro Takenaka (4, 5), and Tsukasa Azuma (6), Center for the Promotion of Interdisciplinary Education and Research, Kyoto University (1), Department of Chemical Engineering, Graduate School of Engineering, Kyoto University (2), Department of Organic and Polymeric Materials, Tokyo Institute of Technology (3), Institute for Chemical Research, Kyoto University (4), Structural Materials Science Laboratory, SPring-8 Center, RIKEN Harima Institute Research (5), Evolving Nano-process Infrastructure Development Center (EIDEC) (6)
- (10:10-10:30) **A-100** Relationship between Resolution Blur and Shot Noise in Line Edge Roughness Formation of Chemically Amplified Resists Used for Extreme Ultraviolet Lithography [Invited] **31 (2) 183**
Takahiro Kozawa (1), Julius Joseph Santillan (2), and Toshiro Itani (2), Osaka University (1), Evolving Nano Process Infrastructure Development Center (EIDEC) (2)
- (10:30-10:50) **A-101** Computational Study of Pattern Formation in UV Nanoimprint Lithography [Invited] **31 (2) 189**
Masaaki Yasuda, Masanori Koyama, Reo Sakata, Masamitsu Shirai, Hiroaki Kawata, and Yoshihiko Hirai, Department of Physics and Electronics, Osaka Prefecture University
- (10:50-11:10) **A-102** Simulation Assisted Separation Of Stochastic Effects In EUV Lithography And Their Contribution To Line Edge Roughness And Defectivity [Invited]
Ulrich Welling (1), Hironobu Taoka (2), Balint Meliorisz (1), Thomas Muelders (1), Hans-Juergen Stock (1), Wolfgang Demmerle (1), (1) Synopsys GmbH, Germany, (2) Nihon Synopsys G.K., Japan
- 11:10-11:25 Break
- *Directed Self Assembly (DSA)***
- 11:25-12:50 Chairpersons: Tsukasa Azuma, EIDEC and Seiji Nagahara, Tokyo Electron Ltd.
- (11:25-12:10) **Keynote Lecture A-103** DSA Status and Challenges for High Volume Manufacturing
Chandra Sarma and Paul Nyhus, INTEL
- (12:10-12:30) **A-104** Ordering and Orientation using High-Molecular-Weight Block Copolymer Self-assembly [Invited] **31 (4) 479**
Sungmin Park, Yeongsik Kim, and Du Yeol Ryu, Department of Chemical and Biomolecular Engineering, Yonsei University
- (12:30-12:50) **A-105** Review of High Chi Approaches for 10 nm Node and Beyond [Invited]
Kui Xu (1), Mary Ann Hockey (1), Douglas Guerrero (1), Kaumba Sakavuyi (1), Xavier Chevalier (2), Christophe Navarro (2), Célia Nicolet (2), Ian Cayrefourcq (2), Cindy Gomes Correia (2), Anne Paquet (2), Fumi Ariura (3), Guillaume Fleury (4), Marc Zelsmann (5), Piilippe Bézard (5), Ahmed Gharbi (6), Raluca Tiron (6), and Laurent Pain (6), BREWER Science Inc. (1), ARKEMA France (2), ARKEMA K.K (3), LCPO Université Bordeaux-CNRS (4), Univ. Grenoble Alpes (5), CEA-LETI (6)

Continue to the following page

June 28, Thursday

Room B (Room 302)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

***Directed Self Assembly (DSA) ***

- 12:50-13:50 Lunch
- 13:50-15:30 Chairpersons: Teruaki Hayakawa, Tokyo Institute of Technology and Takehiro Seshimo, Tokyo Ohka Kogyo
- (13:50-14:10) **A-106** Carbohydrate Block Copolymer Self-Assembly: Highly Nanostructured Thin Films [Invited]
Redouane Borsali, University Grenoble Alpes
- (14:10-14:30) **A-107** Silicon-containing Block Copolymers for DSA: New Process and Materials Developments [Invited]
Christopher J. Ellison (1), C. Grant Willson (2), Jan Doise (3), Paulina Rincon Delgadillo (3), and Geert Vandenberghe (3), University of Minnesota (1), University of Texas at Austin (2), IMEC (3)
- (14:30-14:50) **A-108** Ultra-Fast Directly Self-Assembly Materials at Mild Temperature for Sub-5 nm Patterning Application **31 (4) 483**
Xuemiao Li and Hai Deng, Department of Macromolecular Science, Fudan University
- (14:50-15:10) **A-109** Block Copolymer Lithography at 3D, Flexible Surfaces Enabled by Graphene Based Substrates
Sang Ouk Kim, KAIST
- (15:10-15:30) **A-110** Toward Defect-free Assembly: Kinetics of Defect Annihilation in Directed-Self Assembly
Paul Nealey (1), Jiajing Li (1), Jiaxing Ren (1), Jonathan Raybin (1), Steven Sibener (1), Juan de Pablo (1), Paulina Rincon-Delgadillo (2), Hyo Seon Suh (2), and Su-Mi Hur (3), University of Chicago (1), IMEC (2), Chonnam National University (3)
- 15:30-15:40 Break
- *Nanobiotechnology ***
- 15:40-17:20 Chairpersons: Kanjiro Miyata and Aya Mizutani Akimoto, The University of Tokyo
- (15:40-16:05) **A-1** Smart Oligonucleotide Delivery by Polymer Nanotechnology [Invited] (25 min.)
Kanjiro Miyata, The University of Tokyo
- (16:05-16:30) **A-6** Polymeric Microfiber Membrane Technology as Liquid Biopsy Assay [Invited] **31 (1) 65**
(25 min.)
Madoka Takai, Carlton Hoy, Akifumi Yoshihara, The University of Tokyo
- (16:30-16:55) **A-9** Development of Hydrogel Surface Science for Biomedical Applications [Invited] (25 min.)
Aya Mizutani Akimoto, The University of Tokyo
- (16:55-17:20) **A-16** Tuning the Mechanical Properties of Bioinspired Catechol Polymers by Incorporating Dual Metal Ions [Invited] (25 min.) **31 (1) 75**
Hirotaka Ejima (1, 2), Akio Oba (2), and Naoko Yoshie (2), Department of Materials Engineering, The University of Tokyo (1), Institute of Industrial Science, The University of Tokyo (2)
- 17:20-17:25 Break
- 17:25-17:30 **Closing Remarks: Robert Allen, IBM at Room A (Room 301)**

June 28, Thursday

Room C (Room 303)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

Chemistry for Advanced Photopolymer Science

- 9:30-11:10 Chairpersons: Kanji Suyama, Osaka Prefecture University and Shota Suzuki, Fujifilm
- (9:30-9:50) **A-111** Photocuring Kinetic Studies of TMPTMA Monomer by Type II Photoinitiators of Different Weight Ratios of 2-Chlorohexaaryl Biimidazole (o-Cl-HABI) and *N*-Phenyl Glycine (NPG) **31 (4) 487**
Yung-Chung Chen and Yuan-Tsung Kuo, National Kaohsiung University of Science and Technology
- (9:50-10:10) **A-112** Novel NIT Derivatives for Photo-Acid Generator Application
Yeong-Beom Lee (1) and Hyun-Yong Cho (1, 2), Heraeus Korea Corporation (1), Bionetix (2)
- (10:10-10:30) **A-113** Development of Photobase Generators Liberating Radicals as well as Bases and Their Application to Hardcoating Materials **31 (4) 493**
Kiwamu Terada (1, 2), Masahiro Furutani (2), and Koji Arimitsu (2), NIPPON KAYAKU (1), Tokyo University of Science (2)
- (10:30-10:50) **A-115** Photo-thermal Dual Curing of Polysilane/diarylfluorene Blends -Fabrication of Films with High and Tunable Refractive Indices- **31 (4) 503**
Haruyuki Okamura (1), Akikazu Matsumoto (1), Keiko Minokami (2), and Shinsuke Miyauchi (2), Osaka Prefecture University (1), Osaka Gas Chemicals (2)
- 10:50-11:05 Break
- 11:05-12:55 Chairpersons: Haruyuki Okamura, Osaka Prefecture University and Hideki Tachi, Osaka Research Institute of Industrial Science and Technology
- (11:05-11:25) **A-116** Cross-linked Polyperoxides for Photoremovable Adhesives [Invited] (25 min.) **31 (4) 511**
Eriko Sato, Chisato Omori, Takashi Nishiyama, and Hideo Horibe, Osaka City University
- (11:25-11:50) **A-117** Multifunctional Methacryloyloximes: Molecules Playing the Role of Monomer, Photoinitiator, and Photolabile Units [Invited] (25 min.) **31 (4) 517**
Kanji Suyama (1) and Hideki Tachi (2), Osaka Prefecture University (1), Osaka Research Institute of Industrial Science and Technology (2)
- (11:50-12:15) **A-118** Three-Dimensional Strain Analysis of Bending Flexible Polymer Films **31 (4) 523**
Norihisa Akamatsu and Atsushi Shishido, Tokyo Institute of Technology
- (12:15-12:35) **A-119** Light-Responsive Trigonal Azobenzene Assemblies **31 (4) 527**
Mina Han, Kongju National University

General Scopes of Photopolymer Science and Technology

- (12:35-12:55) **A-120** Visual Mapping of Strain in Elastic Silicone Polymers Using Fluorescence Energy Transfer **31 (4) 533**
Gil Yeroslavsky, Masao Kamimura, Ryo Inoue, Yasuo Kogo, and Kohei Soga, Tokyo University of Science
- 12:55-14:15 Lunch

Continue to the following page

June 28, Thursday

Room C (Room 303)

English Symposia: Materials & Processes for Advanced Lithography, Nanotechnology and Phototechnology

***193 nm Lithography Extension ***

- 14:15-16:20 Chairpersons: Wang Yueh, Intel and Tsukasa Azuma, EIDEC
- (14:15-14:40) **A-121** Novel Fast Etch Rate BARC for ArF Immersion Lithography [Invited] (25 min.)
Jung June Lee, Jae Yun Ahn, Min Kyung Jang, You Rim Shin, Jae Hwan Sim, and Jae-Bong Lim, Dow Chemical
- (14:40-15:05) **A-122** Novel Gap Filling BARC with High Chemical Resistance [Invited] (25 min.) **31 (4) 547**
Yuto Hashimoto, Shigetaka Otagiri, Hiroto Ogata, Satoshi Kamibayashi, Ryuta Mizuochi, Takahumi Endo, Yuki Endo, and Takahiro Kishioka, Nissan Chemical
- (15:05-15:30) **A-123** Advanced Immersion Top-coat for Defect Improvement [Invited] (25 min.)
Sousuke Ohsawa, Tomohiko Sakurai, Hiromitsu Nakashima, Makoto Tominaga, Tomoki Nagai, and Makoto Shimizu, JSR
- (15:30-15:55) **A-124** Challenges and Progress in Defectivity for Advanced ArF Lithography Process **31 (4) 555**
[Invited] (25 min.)
Naohiro Tango (1), Toru Fujimori (1), Hiderori Takahashi (1), Kazuhiro Marumo (1), Kei Yamamoto (1), Keiyu O (1), Akinori Shibuya (2), Akira Takada (2), and Mitsuhiro Fujita (3), Electronic Materials Research Laboratories, FUJIFILM (1), Synthetic Organic Chemistry Laboratories, FUJIFILM (2), Analysis Technology Center, FUJIFILM (3)
- (15:55-16:20) **A-125** Metalizing Technology of Resist Polymer for Improving Etching Mask Resistance [Invited] (25 min.)
Ryuichi Saito, Yoshihiro Naka, Yuusuke Kasahara, Ryosuke Yamamoto, and Seiji Morita, Toshiba Memory Corporation
- 16:20-17:25 Break
- 17:25-17:30 **Closing Remarks: Robert Allen, IBM at Room A (Room 301)**

June 26, Tuesday

Room C (Room 303)

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

- 10:15-11:30 座長: 岩手大学 大石 好行、横浜国立大学 大山 俊幸
(10:15-10:40) **B1-01** スピロピラン骨格を有するポリイミドの光照射による表面濡れ性の可逆的制御 31 (5) 587
久留米高専 津田 祐輔, 下川 達也
- (10:40-11:05) **B1-02** 表面修飾ナノ粒子含有ポリイミド気体分離膜における表面修飾構造が気体透過特性に与える影響 31 (5) 593
首都大学東京 三上 寛翔, 大澤 梓, 田中 学, 川上 浩良
- (11:05-11:30) **B1-03** ブリルアン散乱による芳香族系ポリイミドにおける圧力誘起の屈折率変化の解析 31 (5) 599
東京工業大学 (1), 岐阜大学 (2) 藤原 瑛右 (1), 大脇 将太 (2), 北 直浩 (2), 山田 健太 (2), 石毛 亮平 (1), 佐々木 重雄 (2), 安藤 慎治 (1)
- 11:30-13:00 昼食休憩
- 13:00-13:50 座長: 茨城大学 森川 敦司, 東京工業大学 柿本 雅明
(13:00-13:25) **B1-04** アニオン型電着機能をもつポリイミドの合成と電着膜物性の解析 31 (5) 607
東京工科大学 (1), 住友精化 (2) 小林 亜由美 (1), 和田 秀信 (1), 山下 昌幸 (2), 坂東 誠二 (2), 山下 俊 (1)
- (13:25-13:50) **B1-05** 光塩基発生剤および酸性現像液を用いた反応現像画像形成法による微細パターン形成 31 (5) 613
横浜国立大学 大山 俊幸, 林 宏美, 所 雄一郎
- 13:50-14:00 休憩
- 14:00-15:00 座長: 東レ 富川 真佐夫
(14:00-15:00) **基調講演 B1-06** IoT/AI 時代における次世代の半導体パッケージング技術
長瀬産業 折井 靖光
- 15:00-16:15 座長: 東京工芸大学 松本 利彦, 久留米高等専門学校 津田 祐輔
(15:00-15:25) **B1-07** 様々な数のフェニレン基を持つ酸二無水物とベンジジンからの剛直ポリイミドの合成とp-フェニレンジアミンからのポリイミドとその性質の比較
茨城大学 森川 敦司, 本澤 朋幸
- (15:25-15:50) **B1-08** ハイパーブランチポリピリジンの合成と電気化学的特性 31 (5) 617
東京工業大学 (1), 旭化成 (2) 難波江 裕太 (1), 古賀 隆志 (1), 船川 明恭 (2), 早川 晃鏡 (1), 柿本 雅明 (1)
- (15:50-16:15) **B1-09** 高屈折率を有する熱可塑性ポリチオシアヌレート合成と特性
岩手大学 史 松炎, 加美山 睦, 芝崎 祐二, 大石 好行
- 16:15-16:30 休憩

次頁に続く

June 26, Tuesday

Room C (Room 303)

**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

- 16:30-17:45 座長: 東京工業大学 安藤 慎治, 日立化成 佐々木 守
(16:30-16:55) **B1-10** 含フッ素芳香族ポリベンゾオキサゾールフィルムの作製と特性
岩手大学 (1), ダイキン工業 (2) 花田 舞結 (1), 芝崎 祐二 (1), 大石 好行 (1),
神原 将 (2), 野口 剛 (2)
- (16:55-17:20) **B1-11** Low Temperature Curable Dielectric Materials with High Reliability **31 (5) 625**
Hitachi Chemical Takuya Komine, Akitoshi Tanimoto, Yu Aoki, Mika Kimura, Yoshimi
Hamano, and Mamoru Sasaki
- (17:20-17:45) **B1-12** 感光性ポリイミドを用いたパネルレベルファンアウト用再配線構造の作成 **31 (5) 629**
東レ 増田 有希, 橋本 啓華, 荘司 優, 小山 祐太郎, 富川 真佐夫

June 27, Wednesday

Room C (Room 303)

Japanese Symposium: Photofunctional Materials for Electronic Devices

日本語シンポジウム：光機能性デバイス材料

- 10:00-11:20 座長：高分子学会フェロー 長谷川 悦雄, JST 木原 尚子
(10:00-10:20) **B3-01** 反応性メソゲンをを用いたリバースモード素子における駆動電圧：液晶の紫外線吸収による影響 31 (3) 301
秋田大学 山口 留美子, 佐々木 亮輔, 井上 洸一
- (10:20-10:40) **B3-02** ピリジル基を末端に有するN-ベンジリデンアニリンを用いた光反応性高分子液晶複合体 31 (3) 305
兵庫県立大学 近藤 瑞穂, 児島 大二郎, 川月 喜弘
- (10:40-11:00) **B3-03** 共役系色素ドーブ液晶を用いる光配向材料
埼玉工業大学 木下 基, 古川 元行, 持田 哲郎, 横倉 悠人, 撰津 魁, 唯岡 俊希, 佐藤 悠貴
- (11:00-11:20) **B3-04** ビスマス集積 dendrimer の発光特性 31 (3) 311
東京工業大学 JST-ERATO 神戸 徹也, 今岡 享稔, 山元 公寿
- 11:20-13:00 昼食休憩
- 13:00-13:45 座長：愛知工業大学 森 竜雄, 高分子学会フェロー 長谷川 悦雄
(13:00-13:45) **基調講演 B3-05** 有機EL素子の長寿命化技術：発光層と逆構造有機EL素子の設計指針 31 (3) 315
NHK 放送技術研究所 深川 弘彦
- 13:45-14:00 休憩
- 14:00-15:00 座長：NHK 技術研究所 深川弘彦, JST 木原尚子
(14:00-14:20) **B3-06** 脱水素型クロスカップリング反応によるオクタフルオロビフェニル系高分子の開発と有機ELへの応用 31 (3) 323
物質・材料研究機構 (1), 筑波大学 (2) 安田 剛 (1), 青木 英晃 (2), 桑原 純平 (2), 神原 貴樹 (2)
- (14:20-14:40) **B3-07** アルキルアンモニウム塩を界面層に用いたペロブスカイト量子ドットLEDの開発 31 (3) 329
山形大学 江部 日南子, 高橋 佳人, 佐藤 純, 千葉 貴之, 大久 哲, 城戸 淳二
- (14:40-15:00) **B3-08** 環境制御卓上型スプレー装置の開発と有機薄膜太陽電池作製の最適化 31 (3) 335
愛知工業大学 (1), 旭サナック (2), 岩手大学 (3) 森 竜雄 (1), 小林 義典 (2), 明永 裕樹 (2), 清家 善之 (1), 宮地 計二 (2), 西川 尚男 (3)
- 15:00-15:10 休憩
- 15:10-16:30 座長：JST 木原 尚子, 高分子学会フェロー 長谷川 悦雄
(15:10-15:30) **B3-09** メタロ超分子ポリマーを用いたタッチ式エレクトロクロミックデバイス 31 (3) 343
物質・材料研究機構 吉田 健文, 樋口 昌芳
- (15:30-15:50) **B3-10** ファジーな階層構造による単一電極多色エレクトロクロミズム 31 (3) 349
山形大学大学院理工学研究科 (1), 山形大学理学部 (2), 東北大学多元物質科学研究所 (3) 萱場 裕貴 (1), 北條 健太 (1), 小野 健太 (1), 石崎 学 (2), 金井 塚 勝彦 (2), 近藤 慎一 (2), 栗原 正人 (2), 三ツ石 方也 (3), 松井 淳 (2)
- (15:50-16:10) **B3-11** 対極反応材料導入による高速応答、高耐久性を有する電気化学的な発光および発色制御素子 31 (3) 353
国立産業技術総合研究所 (1), 千葉大学大学院工学研究院 (2) 金澤 賢司 (1), 中村 一希 (2), 植村 聖 (1), 小林 範久 (2)
- (16:10-16:30) **B3-12** 有機・無機固体発光素子の高効率化に寄与する透明酸化物ベース全方向反射鏡構造 31 (3) 363
パナソニック株式会社 エコソリューションズ社 (1), 大阪大学大学院理工学研究科 (2) 山江 和幸 (1,2), 福島 博司 (1), 岩橋 友也 (1), 安田 正治 (1), 藤本 公三 (2)

June 27, Wednesday

Room D (Room 304)

Japanese Symposium: Plasma Photochemistry and Functionalization of Polymer Surface

日本語シンポジウム プラズマ光化学と高分子表面機能化

- 9:30-11:30 座長：静岡大院工 永津 雅章, 埼玉工大院 矢嶋龍彦
(9:30-10:00) **B2-01** メタクリル酸系双性イオン高分子のプラズマ誘起反応
岐阜薬大 (1), 松山大薬 (2), 中部学院大 (3) 笹井 泰志 (1), 中牟田 皓平 (1),
土井 直樹 (1), 山内 行玄 (2), 葛谷 昌之 (3), 近藤 伸一 (1)
- (10:00-10:30) **B2-02** SUS表面に対するプラズマCVD法による微細構造化 SiO:CH 膜堆積
千葉工大 (1), 千葉工大院 (2), 関東学院大 (3) 井上 泰志 (1), 相原 巧 (2), 高
井 治 (3)
- (10:30-11:00) **B2-03** 絶縁基板上でのエレクトロスプレー堆積に対するコロナ放電の影響
東京大工研マテリアル工 (1), ナノ医療イノベーションセンター (2) 橋本 光平
(1), 一木 隆範 (1, 2)
- (11:00-11:30) **B2-04** 原子状水素によるポリマー表面へのメゾスコピック構造形成及び表面特性 **31 (3) 369**
の評価
大阪市立大 (1), 香川高専 (2) 松尾 朱莉 (1), 高木 誠司 (1), 西山 聖 (1), 山
本 雅史 (2), 佐藤 絵理子 (1), 堀邊 英夫 (1)
- 11:30-12:15 昼食休憩
12:15-13:45 座長：東京大 一木 隆範, 近畿大工 井原 辰彦
(12:15-12:45) **B2-05** プラズマ表面処理した細胞培養用のポリマーの細胞毒性
名城大 (1), 大阪市大 (2), 高知大学 (3), サウスオーストラリア大学 (4), 高知工科
大 (5) 呉 準席 (1, 2), 福原 秀雄 (3), アンドレスズリ (4), 伊藤 昌文 (1),
白藤 立 (2), 井上 啓二 (3), 八田 章光 (4, 5)
- (12:45-13:15) **B2-06** 交流高電圧メタンプラズマCVD法を用いたePTFE製人工血管内面への **31 (3) 373**
DLCコーティング技術
岡山理大 (1), ストローブ (2), 岡山大 (3) 中谷 達行 (1), 今井 裕一 (2), 藤井
泰宏 (3), 合山 尚志 (3), 大澤 晋 (3)
- (13:15-13:45) **B2-07** 長尺平行平板型誘電体バリア放電プラズマを用いたフッ素樹脂の表面化学 **31 (3) 379**
修飾
静岡大電工研 (1), 静岡大総科技 (2), ヤシ農業科学獣医学大学 (3), クメタ製作所
(4) 永津 雅章 (1, 2), 杉山 和也 (2), Iuliana Motrescu (3), Mihai Alexandru
Ciolan (1), 荻野 明久 (2), 河村 尚寿 (4)
- 13:45-14:00 休憩
14:00-16:00 座長：千葉工大 井上 泰志, 岡山理大 中谷達行
(14:00-14:30) **B2-08** カーボンフェルトとマイクロ波を利用する急速高温加熱と炭素繊維強化プ
ラスチックの分解
埼玉工大院 (1), 羽生田鉄工所 (2) 鈴木 明裕 (1), 松峯 拓郎 (2), 羽生田 大陸
(2), 多田 晃 (2), 矢嶋 龍彦 (1)
- (14:30-15:00) **B2-09** プラズマを利用して構築したリン脂質膜を用いる高分子ナノフィルム開発 **31 (3) 385**
の基礎研究
岐阜薬大 (1), 松山大薬 (2), 中部学院大(3) 近藤 伸一 (1), 笹井 泰志 (1), 土井
直樹 (1), 山内 行玄 (2), 葛谷 昌之 (3)
- (15:00-15:30) **B2-10** 大豆の発芽と生長におよぼす大気圧プラズマ照射効果
近畿大工 井原 辰彦, 森下 はるか, 馬場 淳也
- (15:30-16:00) **B2-11** 酸素プラズマ中の中性活性酸素種による医療用滅菌器開発の現状 **31 (3) 389**
九州大総理工 林 信哉, 西川 達也, リャオ ユーシャン

June 27, Wednesday

Room D (Room 304)

Japanese Symposium: Resist Removal Technology

日本語シンポジウム: レジスト除去技術

- 16:15-17:15 座長: 金沢大学 石島 達夫, 香川高等専門学校 山本 雅史, 大阪工業大学
神村 共住
- (16:15-16:35) **B4-01** 化学増幅ポジ型厚膜レジストにおける溶解抑制剤の開発 31 (3) 399
大阪市立大学大学院 外川 雄介, 西山 聖, 佐藤 絵理子, 堀邊 英夫
- (16:35-16:55) **B4-02** オゾンマイクロバブル処理によるポリビニルアルコールの分解 (招待講演)
産業技術総合研究所 (1), 千葉工業大学 (2), 大阪市立大学 (3) 高橋 正好 (1), 中
塚 涼 (2), 堀邊 英夫 (3)
- (16:55-17:15) **B4-03** Measurement of Lateral Removal Force for a Baking Polymer Particle on a Glass Plate (招待講演) 31 (3) 403
静岡大学 (1), 荏原製作所 (2) 真田 俊之 (1), 徳田 絵夢 (1), 岩田 太 (1), 高
東 智佳子 (2), 福永 明 (2), 檜山 浩國 (2)

June 28, Thursday

Room D (Room 304)

Japanese Symposium: Resist Removal Technology

日本語シンポジウム: レジスト除去技術

- 9:30-10:50 座長: 産業技術総合研究所 高橋 正好, 静岡大学 真田 俊之
(9:30-9:50) **B4-04** オゾンマイクロバブルを用いたポリアクリル酸水溶液の分解 31 (3) 413
大阪市立大学大学院 宮崎 輝実, 西山 聖, 佐藤 絵理子, 堀邊 英夫
- (9:50-10:10) **B4-05** レーザー照射を用いたレジスト剥離現象の時間分解解析 (招待講演)
大阪工業大学工学部 (1), 大阪工業大学ロボティクス&デザイン工学部 (2), 大阪大
学 (3), 大阪市立大学大学院 (4) 神村 共住 (1), 布 晃輔 (1), 梅田 悠史 (1),
船本 裕介 (1), 西岡 直樹 (1), 島 大地 (1), 倉前 宏行 (2), 中村 亮介 (3),
堀邊 英夫 (4)
- (10:10-10:30) **B4-06** 酸素を微量添加した水素ラジカルを用いたKrF/ArFレジスト用ベースポリマ
ーの除去 31 (3) 419
香川高等専門学校 (1), 静岡大学 (2), 大阪市立大学大学院 (3) 山本 雅史 (1), 砂
田 拓人 (1), 滝 智洋 (1), 鹿間 共一 (1), 長岡 史郎 (1), 梅本 宏信 (2), 堀
邊 英夫 (3)
- (10:30-10:50) **B4-07** マイクロ波励起の水プラズマを用いたフォトリソレジスト膜除去処理における
発光強度の経時変化 (招待講演)
金沢大学 石島 達夫, 北野 卓也, 鈴木 宏明, 相澤 洸, 塩田 有波, 田中
康規, 上杉 喜彦
- 10:50-11:05 休憩

June 28, Thursday

Room D (Room 304)

Japanese Symposium: General Scopes of Photopolymer Science and Technology

日本語シンポジウム：一般講演

- 11:05-12:05 座長：千葉大学 高原 茂, 東京理科大学 有光 晃二
(11:05-11:25) **B4-08** ポリ酢酸ビニル膜中に分散させた 1-アセチルアミノピレンの発光挙動 31 (4) 559
室蘭工業大学 高橋 宏輝, 中野 英之
- (11:25-11:45) **B4-09** セルロース誘導体のリオトロピック・コレステリック液晶の光重合による反 31 (4) 563
射色の消失
東京理科大学 理学部第一部 応用化学科 (1), 東京理科大学大学院 総合化学研究
科 (2), 東京理科大学大学院 理学研究科 (3) 府川 将司 (1), 鈴木 花菜 (2), 鈴
木 達也 (3), 障子 雄介 (1), 石田 豪 (2), 木下 大樹 (2), 古海 誓一 (1,2,3)
- (11:45-12:05) **B4-10** 架橋性セルロース誘導体の合成とコレステリック液晶特性の評価
東京理科大学大学院総合化学研究科 (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 (3) 鈴木 花菜 (1), 府川 将司 (2), 鈴木 達
也 (3), 障子 雄介 (2), 石田 豪 (1), 木下 大樹 (1), 古海 誓一 (1,2,3)
- 12:05-13:05 昼食休憩
13:05-14:05 座長：東京理科大学 有光晃二、室蘭工業大学 中野 英之
(13:05-13:25) **B4-11** エレクトロスピンニング法により作製した光架橋性ポリビニルアルコール 31 (4) 569
ファイバーにおけるポリヨウ素錯体の生成挙動
千葉大学 (1), マラヤ大学 (2) 藤澤 翔 (1), 柏井 大樹 (1), 山本 真澄 (1),
PdedramAzari (2), Khaw Ying Ying (2), Gan Seng Neon (2), 高原 茂 (1)
- (13:25-13:45) **B4-12** アダマンタン骨格を有した高感度光超強酸発生剤 31 (5) 643
千葉大学融合理工学府先進理化学専攻 (1), 千葉大学工学研究院融合理工学府/工
学部 (2) 山本 真澄 (1), 高原 茂 (2)
- (13:45-14:05) **B4-13** 光インプリントリソグラフィにおけるガス透過金属板のガス透過性評価 31 (4) 575
富山県立大学 (1), 三光合成 (2) 杉野 直人 (1, 2), 中島 信也 (1), 水井 研登
(1), 花畑 誠 (1), 竹井 敏 (1)
- 14:05-14:20 休憩
14:20-15:20 座長：室蘭工業大学 中野 英之, 千葉大学 高原 茂
(14:20-14:40) **B4-14** 電子線描画による Si-Si 結合の酸化挙動 31 (4) 581
東京応化工業 (1), 東京理科大学 (2) 野田 国宏 (1,2), 瀬下 武広 (1), 鈴木 一
生(1), 三隅 浩一 (1), 塩田 大 (1), 菊池 駿 (2), 有光 晃二 (2)
- (14:40-15:00) **B4-15** 発光性有機色素を含有したポリスチレン微粒子の精密合成とフォトニック 31 (4) 581
結晶への応用
東京理科大学理学部第一部応用化学科 (1), 東京理科大学大学院総合化学研究科
(2), 東京理科大学大学院理学研究科 (3) 土屋 沙織 (1), 石井 敦子 (2), 大西 耀
(2), 山田 陽平 (3), 佐藤 龍 (1), 小池 尊 (1), 古海 誓一 (1,2,3)
- (15:00-15:20) **B4-16** コロイド結晶への応用を目指した高分子ハイドロゲル微粒子の合成と評価
東京理科大学 理学部第一部 応用化学科 (1), 東京理科大学大学院 理学研究科 (2),
東京理科大学大学院 総合化学研究科 (3) 小池 尊 (1), 山田 陽平 (2), 大西 耀
(3), 佐藤 龍 (1), 土屋 沙織 (1), 石井 敦子 (3), 古海 誓一 (1,2,3)
- 15:20-17:25 休憩
17:25-17:30 **Closing Remarks: Robert Allen, IBM at Room A (Room 301)**

Registration for Overseas Participants

Registration fee of whole conference including banquet is ¥ 35,000 yen until May 31, 2018 and ¥50,000 yen after June 1, 2018.

All the participants including speakers are requested to register in [Conference → Registration] at SPST Homepage before May 31, 2018.

Conference Office:

The 35th International Conference of Photopolymer Science and Technology (ICPST-35)
c/o Prof. Takashi Karatsu,
Department of Applied Chemistry
Chiba University
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Banquet

Banquet will be open at 18:30 on June 27, 2018.

Language & Presentation

English is used for presentations in English Symposia and Panel Symposium, "EUV Resist Sensitization and Roughness Improvement: Can We Get the Best of Both Worlds?". Japanese and English are used for presentations in Japanese Symposia.

Each presentation will not be longer than 20 minutes including discussion except for the notified lectures.

A liquid-crystal display (LCD) projector operating with Windows 7-10 compatible PC (PowerPoint) is available at every room. All the speakers are requested to bring their files in a USB memory to the audio visual assistant of their presentation rooms in advance. The files stored in different media can be transferred to a USB memory. Speakers may connect their own PC (including Macintosh) to projectors when they request.

Accommodation

You can make directly reserve rooms at the web site (<http://www.spst-photopolymer.org/conference/accommodation/>).

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参加登録方法 講演者を含む全参加者はフォトポリマー学会のホームページ (<https://www.spst-photopolymer.org/japanese-top-日本語ページ/参加登録/>) より登録ください。参加費支払は原則として郵便振替により行ってください。特別な事情があるときは振替口座への送金(ゆうちょ銀行あて)またはクレジットカードを利用して支払うことができます。

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懇親会

6月27日(水) 18時20分より 当日参加費 6,000円

講演言語 国際シンポジウム、国際セッション(一般講演)、著者および講演題目が共に英語で記載されている講演は英語で行い、それ以外の講演は日本語で行います。

発表形式 PC 駆動プロジェクター(PowerPoint)が全ての講演会場に用意されています。発表者は発表当日のなるべく早い時間に各会場のプロジェクター担当者に USB メモリーに入れた講演ファイルを渡してください。

ホテル案内

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アドバンスドリソグラフィ、ナノテクノロジー、
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—材料とプロセスの最前線—

平成30年6月25日（月）～28日（木）

幕張メッセ国際会議場

（JR 海浜幕張駅下車徒歩5分）

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