



東亞研究型大學協會
東アジア研究型大学協会
동아시아연구중심대학협의회
The Association of East Asian Research Universities



東京工業大学
Tokyo Institute of Technology

Activity Report

**The 6th AEARU Energy and Environmental
Workshop**

**- Next generation solar cells as a solution to
energy challenges -**

August 26 – 27, 2016

Organized by
the School of Materials and Chemical Technology
Tokyo Institute of Technology



Overview

The 6th AEARU Energy and Environmental Workshop was conducted on August 26 and 27, 2016 on two campuses of Tokyo Institute of Technology, Japan.

A total of 31 researchers and students from Tokyo University, Kyoto University, University of Tsukuba, Tsinghua University, University of Science and Technology of China, the Hong Kong University of Science and Technology, Fudan University, Seoul National University, Korea Advanced Institute of Science and Technology, Nanyang Technological University, and Tokyo Institute of Technology participated in the workshop. Dr. Joey Luther, Senior Scientist of the National Renewable Energy Laboratory, USA served as the keynote speaker.

The workshop focused on solar energy-related technologies and next-generation solar cells, including dye-sensitized solar cells, perovskite solar cells, and organic film solar cells, which allow the utilization of sunlight to create energy for a sustainable world.

The workshop was a great success in bringing together leading researchers and graduate students from East Asian universities to share presentations and discussions on the latest solar energy technology research and its applications for sustainable development.

Organizing Committee

Professor Yuji Wada

Professor Ryoji Kanno

Professor Ikuyoshi Tomita

Assistant Professor Shuntaro Tsubaki

(School of Materials and Chemical Technology, Tokyo Institute of Technology)



Workshop Program

Thursday, August 25 (Futakotamagawa Excel Hotel Tokyu)

Time	Program
	Arrival Hotel Check-in
18:00	Welcome Dinner (30 th Floor Restaurant)

Day 1 Friday, August 26 (Multi-purpose Digital Hall, 2nd Floor, West Building 9)

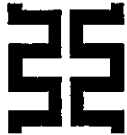
Time	Program
08:10	Bus departure from the hotel to Ookayama Campus
09:00-09:20	Registration
09:20-09:30	Opening Remarks Dr. Yoshinao MISHIMA, President, Tokyo Institute of Technology
09:30-10:30	Keynote Address Dr. Joey LUTHER, National Renewable Energy Laboratory, USA "The Future Generation of Photovoltaics Employing Low-Cost, High Efficiency, Solution-Processed Active Layers"
10:30-10:45	Break (Media Hall)
10:45-11:55	Session 1 ·Dr. Takaya KUBO, The University of Tokyo "Solution-Processable Hybrid Solar Cells based on Colloidal Quantum Dots" ·Dr. Atsushi WAKAMIYA, Kyoto University "Our Chemical Approaches towards Highly Efficient Perovskite Solar Cells"
11:55-12:55	Lunch (Collaboration Room)
12:55-14:40	Session 2 ·Dr. Hong LIN, Tsinghua University " Working from Both Sides: Composite Metallic Semitransparent Top Electrode for High Performance Perovskite Solar Cells" ·Dr. Hidetoshi MATSUMOTO, Tokyo Institute of Technology "Polymer Semiconductor Nanofiber Network for Efficient Organic Photovoltaics" ·Dr. Byungha SHIN, Korea Advanced Institute of Science and Technology "Effects of Post-synthesis Thermal Conditions on Methylammonium Lead Halide Perovskite: Band Bending at Grain Boundaries and Its Impact on Solar Cell Performance"



Time	Program
14:40-14:50	Break (Media Hall)
14:50-16:00	Session 3 ·Dr. Takashi SAGAWA, Kyoto University "Band-gap Tuning of Nanostructured ZnO and/or Ag-In-Zn-S for Hybrid Inorganic-Organic Solar Cells" ·Dr. Manabu IHARA, Tokyo Institute of Technology "Plasmonic and Si Nanostructured Solar Cells"
16:00-16:10	Break (Media Hall)
16:10-17:20	Session 4 ·Dr. Shinichiro FUSE, Tokyo Institute of Technology "Elucidating the Structure-Property Relationships of Donor- π -Acceptor Dyes for DSSCs through Rapid Library Synthesis" ·Dr. Yuji WADA, Tokyo Institute of Technology "Perovskite Solar Cells Created in the Research of Dye-sensitized Solar Cells -- Similarities and Differences"
17:45-19:45	Reception (Collaboration Room)
19:50	Bus departure to the hotel

Day 2 Saturday, August 27 (Lounge, Suzukake Hall)

Time	Program
9:00	Bus departure from the hotel to Suzukakedai Campus
10:00-10:50	Poster session
11:00-12:00	Lab tour (Kanno Lab., Tomita Lab.)
12:00-12:15	Poster Award Ceremony and Closing Remarks Dr. Yuji WADA
12:15-13:30	Farewell Lunch
13:40	Bus departure to the hotel



AEARU 11th WEB Technology and Computer Science Workshop
- Computer Science and Data Science

September 20-21, 2016

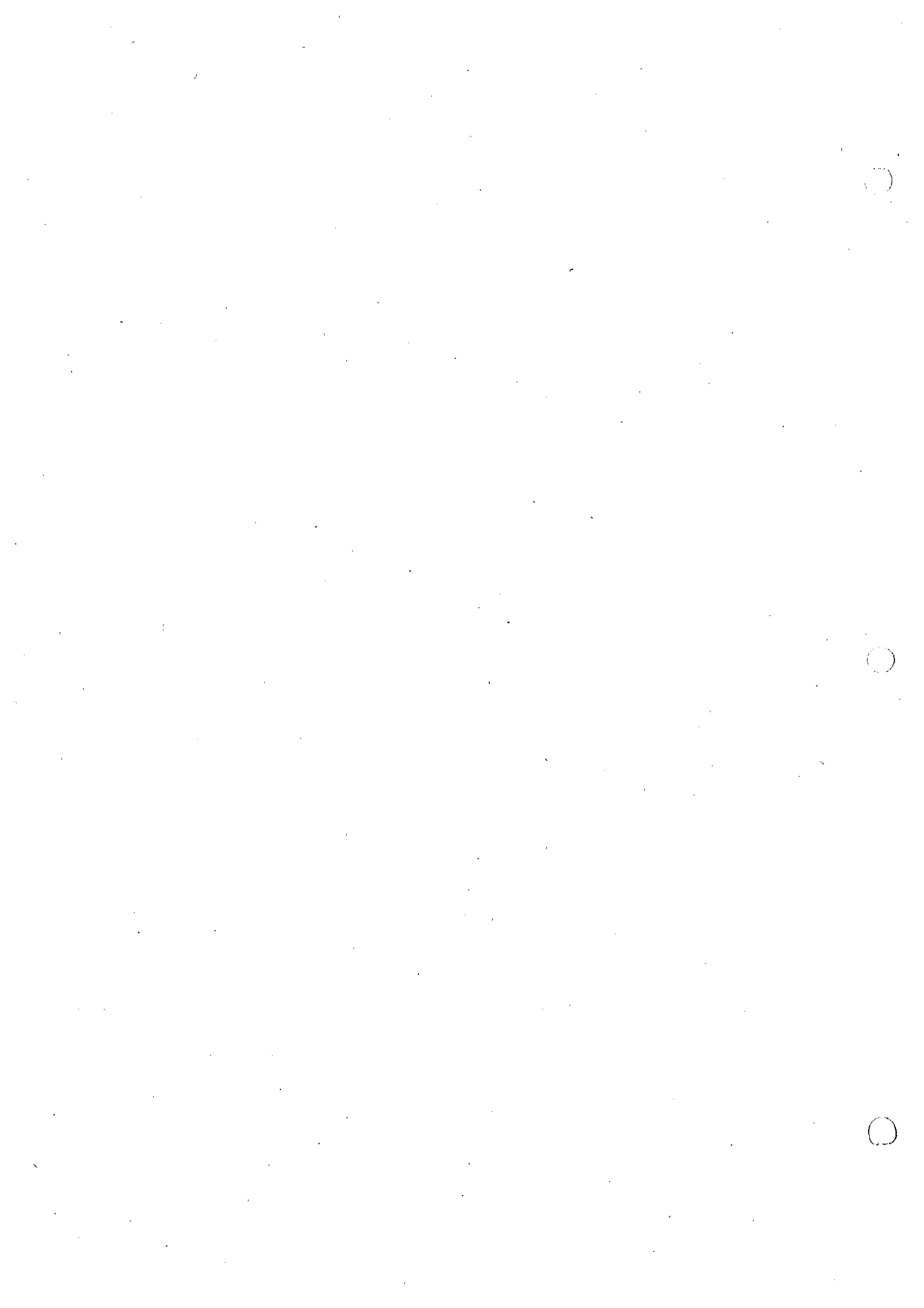
Qatar Science Campus Hall, Aobayama-Campus, Tohoku University, Japan

As of September 2nd, 2016

Tuesday, 20 September	
09:45-10:20	Registration
<i>Chair: Prof. Jinhee Chun, Graduate School of Information Sciences, Tohoku University</i>	
10:20-10:30	Opening Remarks President Susumu Satomi, Tohoku University, Japan
10:30-10:45	Group Photo
10:45-11:30	Keynote Talk Prof. Masaru Kitsuregawa, Director General, National Institute of Informatics, Japan / The University of Tokyo, Japan <i>Title: Big data towards societal benefits rather than commercial profits</i>
11:30-12:00	Prof. Shan-Hung Wu , Department of Computer Science, National Tsing Hua University, Taiwan <i>Title: Big data behind small apps</i>
12:00-12:30	Prof. Jyh-Shing Roger Jang , Department of Computer Science and Information Engineering, National Taiwan University, Taiwan <i>Title: An overview of music information retrieval</i>
12:30-14:00	Lunch
<i>Chair: Prof. Akira Suzuki, Graduate School of Information Sciences, Tohoku University</i>	
14:00-14:30	Prof. Wei Xu , Institute for Interdisciplinary Information Sciences, Tsinghua University, China <i>Title: Making our cloud computing infrastructure smarter</i>
14:30-15:00	Prof. Hee-Kap Ahn , Department of Computer Science and Engineering, Pohang University of Science and Technology, South Korea <i>Title: Geometric algorithms on imprecise and streaming data</i>
15:00-15:30	Prof. Takahiro Hara , Graduate School of Information Science and Technology, Osaka University, Japan <i>Title: People as sensors: Technologies and platform for social media mining</i>

15:30-16:00	Coffee Break
16:00-17:00	Poster Presentation
19:00-21:00	Reception <i>Venue: Floor 21 Room "Ginga," Hotel Metropolitan Sendai, 1-1-1 Chuo, Aoba-ku, Sendai</i>
Wednesday, 21 September	
09:30-10:00	Registration
<i>Chair: Prof. Shun Kataoka, Graduate School of Information Sciences, Tohoku University</i>	
10:00-10:30	Prof. Hisashi Kashima , Graduate School of Informatics, Kyoto University, Japan <i>Title: Crowdsourcing for big data analysis</i>
10:30-11:00	Prof. Kentaro Inui , Graduate School of Information Sciences, Tohoku University, Japan <i>Title: Computational models of commonsense reasoning for natural language discourse understanding</i>
11:00-11:30	Prof. Srinivasa Rao Satti , Department of Computer Science and Engineering, College of Engineering, Seoul National University, South Korea <i>Title: Space-efficient graph algorithms</i>
11:30-13:00	Lunch
<i>Chair: Dr. Yuichi Kawamoto, Graduate School of Information Sciences, Tohoku University</i>	
13:00-13:30	Prof. James Kwok , Department of Computer Science and Engineering, The Hong Kong University of Science and Technology, Hong Kong <i>Title: Big machine learning</i>
13:30-14:00	Prof. Xavier Defago , Department of Computer Science, Tokyo Institute of Technology, Japan <i>Title: Intrusion-tolerance and dynamic faults in the internet of things</i>
14:00-14:30	Prof. Lingyang Song , School of Electrical Engineering and Computer Science, Peking University, China <i>Title: Full-Duplex Cognitive Radio for future wireless Networks</i>
14:30-15:00	Coffee Break

<i>Chair: Prof. Hasitha Muthumala Waidyasooriya, Graduate School of Information Sciences, Tohoku University</i>	
15:00-15:30	Prof. Xiaoyang Sean Wang , School of Computer Science, Fudan University, China <i>Title: Query optimization techniques for large-scale exploratory text analysis</i>
15:30-16:00	Prof. Toshiyuki Amagasa , Center for Computational Sciences, University of Tsukuba, Japan <i>Title: GPU-Accelerated big data processing</i>
16:00-16:30	Prof. Xiaoliang Wang , Department of Computer Sciences and Technology, Nanjing University, China <i>Title: Fine-grained human activity recognition using signal based mobile sensing</i>
16:30-16:40	Closing Remarks Prof. Takeshi Tokuyama, Dean, Graduate School of Information Sciences, Tohoku University, Japan





Poster Session

No.	Title
2016EEW-01	<p>SO₂ Removal with Simultaneously Improved Solar-to-H₂ Energy Conversion</p> <p>Jin Han, Liwu Zhang</p> <p><i>Department of Environmental Science and Engineering, Handan Rd. 220 Fudan University, Shanghai.</i></p>
2016EEW-02	<p>Multi-cation Functionalized Anion Exchange Membrane for Fuel Cell Applications</p> <p>Yubin He, Liang Wu, Yuan Zhu, Xiaolin Ge Tongwen Xu</p> <p><i>CAS Key Laboratory of Soft Matter Chemistry, Collaborative Innovation Center of Chemistry for Energy Materials, School of Chemistry and Material Science, University of Science and Technology of China, Hefei 230026, P.R. China</i></p>
2016EEW-03	<p>Developing a Prediction Model of Carbon Emissions for the Urban National Economy and Social Development Plan based on System Dynamics: A Case Study of Shanghai City</p> <p>Lili Du, Haijun Zhao, Weichun Ma</p> <p><i>Department of Environmental Science & Engineering, Fudan University, Shanghai, China, 200433</i></p>
2016EEW-04	<p>Improvement of Photovoltaic Performance of Antimony Sulfide or Selenide-based Hybrid Inorganic-Organic Solar Cells</p> <p>Kentaro Murakawa ^a, Mayumi Yukawa ^{a,b}, Akinobu Hayakawa ^{a,b}, Kan Hachiya ^a, Takashi Sagawa ^a</p> <p>^a <i>Graduate School of Energy Science, Kyoto University, Kyoto 606-8501, Japan</i></p> <p>^b <i>Sekisui Chemical Co., Ltd., Shimamoto, Osaka 618-0021, Japan</i></p>
2016EEW-05	<p>Effects of a Molecular Monolayer Modification of NiO Nanocrystal Layer Surfaces on Perovskite Crystallization and Interface Contact towards Faster Hole Extraction and Higher Photovoltaic Performance</p> <p>Yang Bai ^a, Hin-Lap Yip ^{b*}, Shihe Yang ^a</p> <p>^a <i>Department of Chemistry, The Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong</i></p> <p>^b <i>Institute of Polymer Optoelectronic Materials and Devices, State Key Laboratory of Luminescent Materials and Devices, South China University of Technology</i></p>



No.	Title
2016EEW-06	<p>Impact of Passivation on Luminescence Properties of Ce³⁺ Doped Lu₃Al₅O₁₂</p> <p>H. Koizumi^a, Y. Murayama^a, Y. Cho^{a,b}, M. M. Islam^a, J. Watabe^c, S. Sugiyama^c, T. Sekiguchi^{a,b}, T. Sakurai^a, K. Akimoto^a</p> <p>^a Institute of Applied Physics, Tsukuba Univ., 1-1-1 Tennodai, Tsukuba, Ibaraki 305-8573, Japan</p> <p>^b Nano Device Characterization Group, MANA, National Institute for Materials Science (NIMS), 1-1 Namiki, Tsukuba, Ibaraki 305-0044, Japan</p> <p>^c Nemoto Lumi-Materials Co., Ltd., 4-1 Shinmachi, Hiratsuka-shi, Kanagawa 254-0076, Japan</p>
2016EEW-07	<p>Recent Progress of B-doped p-BaSi₂/n-Si Heterojunction Solar Cells</p> <p>Ryota Takabe, Suguru Yachi, Kaoru Toko, and Takashi Suemasu</p> <p>Institute of Applied Physics, University of Tsukuba, Tsukuba, Ibaraki 305-8573, Japan</p>
2016EEW-08	<p>Enhanced Photoelectrochemical Water Splitting Efficiency of Hematite Electrodes with Solution Metal Ions Functioning as <i>in situ</i> Homogenous Surface Passivation/Cocatalysts</p> <p>Cheng Lin^a, Yu-Jung Cheng^a, TsingHai Wang^{a,b}, Chu-Fang Wang^a</p> <p>^a Department of Biomedical Engineering and Environment Sciences,</p> <p>^b Nuclear Science & Technology Development Center, National Tsing Hua University, Hsinchu, Taiwan</p>
2016EEW-09	<p>The Legislation and Policy Instruments for Supporting BIPV Deployment: A Comparative Point between Examples from Taiwan and the EU</p> <p>Yang-Jung Ho</p> <p>Institute of Law for Science and Technology, National Tsing Hua University, Hsinchu City, Taiwan</p>
2016EEW-10	<p>Reservoir Characterization of Channel Gas Reservoirs with an Aquifer Using EnKF with Facies Ratio Update, DCT, and PFR</p> <p>Sungil Kim, Jonggeun Choe</p> <p>Department of Energy Systems Engineering, Seoul National University, Seoul, 08826, South Korea</p>



No.	Title
2016EEW-11	<p>Fabrication of Sb_2Se_3 Thin Films Using Thermal Evaporation for Photovoltaic Application</p> <p>Giuk Jeong, Jekyung Kim, Byungha Shin</p> <p><i>Department of Materials and Engineering, Korea Advanced Institute of Science and Technology (KAIST), 291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Republic of Korea</i></p>
2016EEW-12	<p>Solution Processable Layered Antimony Perovskites for Photovoltaics</p> <p>Harikesh Padinhare Cholakkal</p> <p><i>ERI@N, Nanyang Technological University, Singapore</i></p>
2016EEW-13	<p>Visible Light Induced Water Reduction by Alternate Stacked Structure of Titanate Nanosheets and Tungstate Nanosheets Position-Selectively Modified with Pt Complex and Ru Complex</p> <p>Fuminao Kishimoto, Masato M. Maitani, Eiichi Suzuki, Yuji Wada</p> <p><i>Department of Applied Chemistry, Tokyo Institute of Technology, 2-12-10-E4-3 Ookayama, Meguro, Tokyo 152-8552, Japan</i></p>
2016EEW-14	<p>Synthesis of π-Conjugated Polymers Possessing Unique Elements-blocks via Tellurium-Lithium Exchange of Tellurophene-containing Polymers</p> <p>Feng Zheng, Hiroki Nishiyama, Shinsuke Inagi, Ikuyoshi Tomita</p> <p><i>Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, Nagatsuta 4259- G1-9, Midori-ku, Yokohama, Kanagawa 226-8502, Japan</i></p>
2016EEW-15	<p>Crystalline Facet Effect of Titanium Dioxide Scaffold on Perovskite Solar Cell</p> <p>Akito Tateyama ^a, Masato Maitani ^{a, b}, Shuntaro Tsubaki ^a, Yuji Wada ^a</p> <p>^a <i>Department of Applied Chemistry, Tokyo Institute of Technology, 2-12-10-E4-3 Ookayama, Meguro, Tokyo 152-8552, Japan.</i></p> <p>^b <i>RCAST, Tokyo University, Komaba, Meguro, Tokyo, Japan</i></p>
2016EEW-16	<p>Distance-depending Photoinduced Electron Transfer at Two-Dimensional Interface in Hetero Stacked Structures of Metal Oxide Nanosheets</p> <p>Taishi Ano, Fuminao Kishimoto, Shuntaro Tsubaki, Masato Maitani, Yuji Wada</p> <p><i>Department of Chemical Science and Engineering, School of Materials and Chemical Technology, Tokyo Institute of Technology, 2-12 Ookayama, Meguro, Tokyo 152-8552, Japan</i></p>



No.	Title
2016EEW-17	<p>Preparation of Functional Organic-inorganic Thin Layers by Sol-gel Reaction of Silane Coupling Reagents Containing Versatile Heterole Units Derived from Organotitanium Intermediates</p> <p>Tsuyoki YAMASHITA ^a, Hiroki NISHIYAMA ^a, Shinsuke INAGI ^a, Seiji WATASE ^b, Kimihiro MATSUKAWA ^b, Ikuyoshi TOMITA ^a</p> <p>^a <i>Tokyo Tech, Interdiscipl. Grad. Sch. Sci. Eng., Nagatsuta-cho 4259-G1-9, Midori-ku, Yokohama 226-8502, Japan</i></p> <p>^b <i>Osaka Mun. Tech. Res. Inst., Morinomiya 1-6-50, Joutou-ku, Osaka 536-8553, Japan</i></p>
2016EEW-18	<p>Sulfide Superionic Conductors for Next-Generation Batteries to Store Renewable Energy</p> <p>Satoshi Hori and Ryoji Kanno</p> <p><i>Department of Chemical Science and Engineering, School of Materials and Chemical Technology, Tokyo Institute of Technology, 4259 Nagatsuda-cho Midori-ku Yokohama 226-8502</i></p>
2016EEW-19	<p>Cross-stacked Superaligned Carbon Nanotube Electrodes for Efficient Hole Conductor-free Perovskite Solar Cells</p> <p>Jianhua Han, Qiang Luo, He Ma, Ye Zhang, Xuewen Yin, Jianbao Li, Kaili Jiang, Hong Lin</p> <p><i>State Key Laboratory of New Ceramics & Fine Processing, School of Materials Science and Engineering, Tsinghua University, Beijing 100084, China</i></p>
2016EEW-20	<p>D-A Polymers Containing Thiazole-Fused Benzothiadiazole Acceptor Unit and Applications to Organic Solar Cells</p> <p>Tomoya Nakamura, Noriko Arakawa, Megumi Hori, Yasuhisa Ishikura, Michihisa Murata, Atsushi Wakamiya*, Yasujiro Murata</p> <p><i>Institute for Chemical Research, Kyoto University, Uji, Kyoto 611-0011, Japan</i></p>
2016EEW-21	<p>Development of CH₃NH₃PbI₃·DMF as a Perovskite Precursor for Highly Efficient Perovskite Solar Cells</p> <p>Masashi Ozaki, Ai Shimazaki, Mina Jung, Yumi Nakaike, Naoki Maruyama, Tomoko Aharen, Alwani Rafieh, Takahiro Sasamori, Norihiro Tokitoh, Atsushi Wakamiya, Yasujiro Murata</p> <p><i>Institute for Chemical Research, Kyoto University, Uji, Kyoto 611-0011, Japan</i></p>



Winners of the Best Poster Awards

- 1st Award: **Fuminao Kishimoto**
School of Materials and Chemical Technology,
Tokyo Institute of Technology
- 2nd Award: **Satoshi Hori**
School of Materials and Chemical Technology,
Tokyo Institute of Technology
Masashi Ozaki
Institute for Chemical Research, Kyoto University
- 3rd Award **Harikesh Padinhare Cholakkal**
ERI@N, Nanyang Technological University
Yubin He
School of Chemistry and Material Science,
University of Science and Technology of China
Sungil Kim
Department of Energy Systems Engineering,
Seoul National University



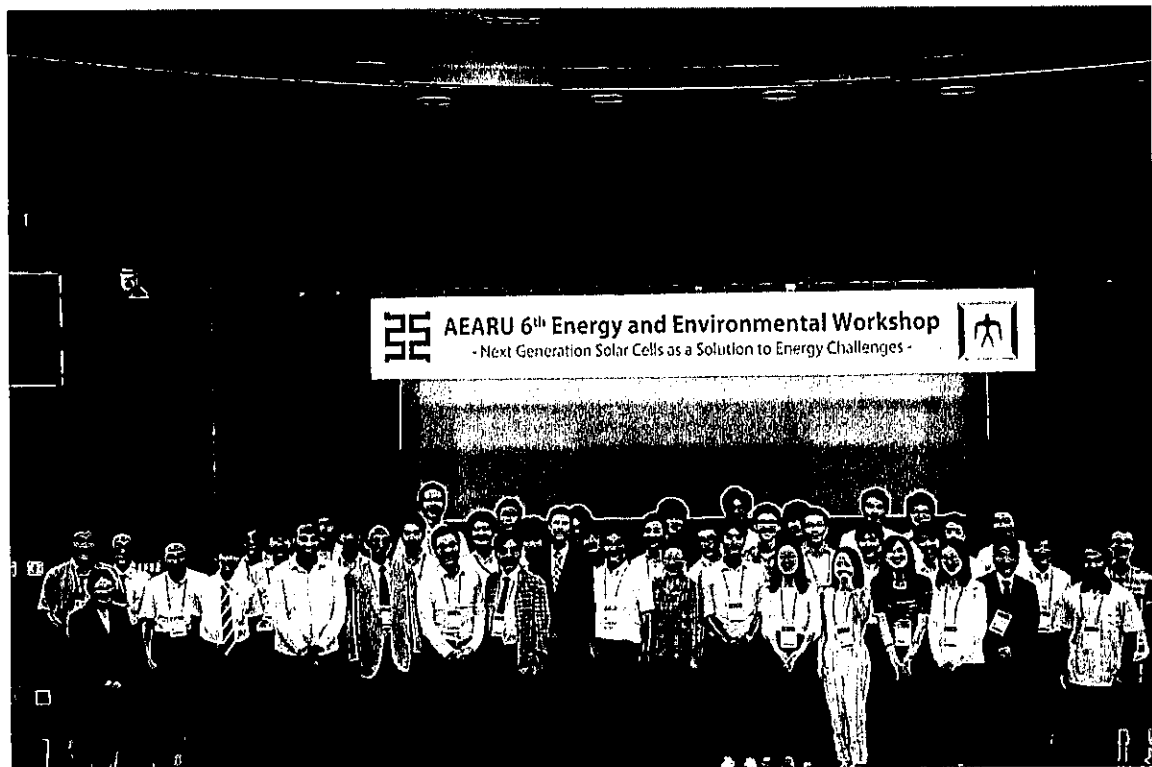
Welcome Dinner

Researchers got to know each other by chatting and enjoying drinks and dinner together at a reception held on the top floor of the hotel. They enjoyed a beautiful view of Mt. Fuji and the Tamagawa river.



1st DAY – Lectures

The participants appreciated the concentrated lectures that covered a broad scope of energy issues.





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2nd DAY – Poster Session & Lab Tours

Students exchanged ideas and results during the poster session. Researchers on the Suzukakedai Campus opened their labs to the workshop participants.





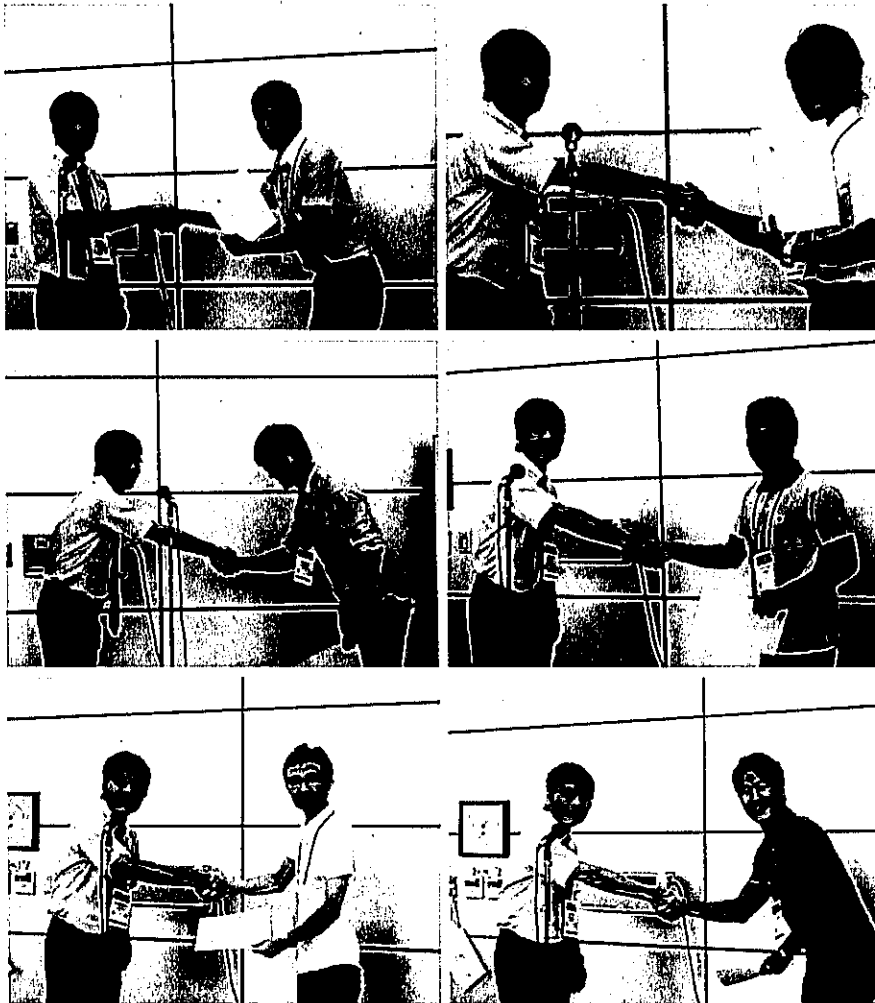
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Best Poster Awards





Expenses for the AEARU 6th Energy and Environmental Workshop

Revenue

AEARU Sponsorship	USD 10,000
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Expenses

Accommodations	USD 3,279
Welcome Dinner	USD 3,254
Lunch and Coffee Breaks	USD 1,173
Bus Rental Fee	USD 1,602
Best Poster Awards	USD 174
Student Helpers	USD 351
Consumables	USD 58
Mail and postage	USD 109

Total Expenses	USD 10,000
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