

2nd International Workshop on Phase Interfaces for Highly Efficient Energy Utilization  
-For dramatic advancement of energy utilization efficiency-

Schedule: 7:30-19:00 on November 26(Mon.)  
7:30-19:00 on November 27(Tues.)  
7:30-12:00 on November 28(Wed.)  
\* 19:00-21:00, November 25(Sun): Ice breaking Dinner

Venue: Baltimore Marriott Inner Harbor at Comden Yard (MD, USA)  
Meeting room: Stadium 1-4 on the second floor  
Registration fee: \$200 (or JPY23,000. We only accept cash.)

	AM		PM1	PM2
Monday Nov. 26	<p>8:10-8:30 <b>Scope of the Workshop</b> <b>Welcome Speech</b></p> <p>8:30-11:30 <b>Session1</b> State of the Art In Situ Analysis Techniques for Solid/Liquid Interfaces</p> <p>11:30-11:50 <b>Short Presentation for</b> <b>Posters</b></p>	<p>11:50-13:00</p> <p><b>Lunch</b> and <b>poster session</b></p>	<p>13:00-15:45 <b>Session2</b> Frontiers of Theoretical and Information Sciences for Phase Interfaces</p>	<p>16:00-18:30 <b>Session3</b> Frontiers of Multiscale/ Multiphysics Phenomena in energy Devices</p>
Tuesday Nov. 27	<p>8:30-11:30 <b>Session4</b> Nanoscale thermal &amp; mass transport measurements and their bionics</p> <p>11 : 30-11 : 40 <b>Group Photograph</b></p>	<p>11:40-13:00</p> <p><b>Lunch</b> and <b>poster (to see)</b></p>	<p>13:00-16:30 <b>Session5</b> Interfacial issues in polymer electrolyte fuel cells</p>	
Wednesday Nov. 28	<p>8:30-11:30 <b>General Discussion</b> for this workshop</p> <p>11:30-11:45 <b>Closing Remarks</b></p>			

**November 26(Mon.)**

**8:10 - 8:20 Scope of the Workshop**

**Prof. Katsunori Hanamura, Tokyo institute of Technology**

**8:20 - 8:30 Welcome speech**

**Prof. Larry A. Nagahara,**

Associate Dean of Research, Johns Hopkins University

**8:30-11:30 Session 1 Organizer: Dr. Takuya Masuda, NIMS, Japan**

**“State of the Art In Situ Analysis Techniques for Solid/Liquid Interfaces“**

In conjunction with the recent advances of optics, electronics, nanomaterials, and synchrotron radiation facilities, various tools and techniques have been developed for observing interfacial processes in situ in real time with an atomic/molecular scale. Those state of the art in situ analysis techniques will be presented as well as their future perspectives.

8:30-8:40 Session Introduction ,Dr. Takuya Masuda, NIMS, Japan

8:40-9:10 Dr. Uta Hejral, Lund University, Sweden

“High Energy Surface X-Ray Diffraction from Surfaces and Nanoparticles in Operando Catalysis

9:10-9:40 Dr. Tetsuro Shirasawa, AIST, Japan

“Energy dispersive surface x-ray diffraction for real-time monitoring of interface phenomena”

9:40-10:10 Dr. Luis Velarde, University at Buffalo, The state university of New York

“Probing the Interplay between Electronic Structure and Vibrations at Surfaces and Buried Interfaces”

10:10-10:40 Dr. Satoshi Nihonyanagi, Riken, Japan

“Phase-resolved Interface-selective Spectroscopy of Applied Interfaces”

10:40-11:10 Dr. Slavo Nemsak, Lawrence Berkeley National Laboratory, USA

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11:10-11:30 Session Discussion Chair: Dr. Takuya Masuda, NIMS, Japan

**11:30-11:50 Short Presentation for Posters**

**11:50-13:00 Lunch & Poster Session**

**13:00-15:45 Session 2 Organizer: Dr. Michihisa Koyama, NIMS, Japan**

**“Frontiers of Theoretical and Information Sciences for Phase Interfaces”**

Along with the development in theory, computer, and computer science, theoretical method has been developing rapidly. In addition, materials genome initiative has triggered a big movement in materials informatics. So far, we can see many examples in understanding and predicting properties of bulk materials. In this session, the focus of the session includes, but not limited to, the applications examples of theoretical and information sciences in phase interfaces for highly efficient energy utilization to discuss the future direction.

13:00-13:25 Dr. Masato Kobayashi

“ Calculation, analysis, and prediction for catalyst and surface adsorption systems with informatics techniques and automated reaction path search”

13:25-13:50 Dr. Tim Mueller

“The use of machine learning and informatics to design material interfaces”

13:50-14:15 Dr. Masayuki Karasuyama

“Machine Learning based Efficient Exploration of Crystal Interface Structures”

14:15-14:40 Dr. Ian McCue

“Morphological Instability in Topologically Complex Electrocatalytic Nanostructures: Data Mining, Simulation, and Theory”

14:40-15:00 Dr. Michihisa Koyama

“Bridging a Gap between Discrete Simulations and Observables”

15:00-15:45 Discussion: Challenges in Phase Interface Studies

**16:00-18:30 Session 3      Organizer: Dr. Keisuke Nagato, University of Tokyo**  
**“Frontiers of Multiscale/ Multiphysics Phenomena in energy Devices”**

16:00-16:10 Dr. Keisuke Nagato, University of Tokyo  
“Introduction of this session”

[Chairperson: Dr. Y. Kuroda, Yokohama National University]

16:10-16:40 Dr. Chao Wang, Johns Hopkins University, USA  
“Design, synthesis, and functionalization of new materials with nanoscale architectures”  
(Tentative title)

16:40-17:10 Dr. Takuya Tujiguchi, Kanazawa University  
“Mass transport in direct liquid fuel cells”

[Chairperson: Dr. G. Inoue, Kyushu University]]

17:10-17:40 Dr. Gretar Tryggvason, Johns Hopkins University, USA  
“Numerical Simulations of Complex Multiphase Flows”

17:40-18:10 Dr. Takuto Araki, Yokohama National University  
“Multi-physical approach for fuel cells”

18:10-18:30 general Discussion, Coordinator: Dr. Keisuke Nagato

[Poster session]

- 1, Dr. Y. Kuroda, Yokohama National University,  
“Self-Assembling Electrocatalyst for Alkaline Water Electrolysis”
  - 2, Mr. Yifan Liu, Johns Hopkins University  
“Electrochemical Oxidation of Multi-carbon Alcohols: Ethanol, Ethylene Glycol and Glycerol”
  - 3, Mr. Yuxuan Wang, Johns Hopkins University  
“Nanostructured Copper Electrodes for CO<sub>2</sub> and CO Reduction”
  - 4, Mr. Ryota Mochizuki, Kanazawa University  
"Electrode design for direct liquid fuel cells”
  - 5, Mr. Morio Tomizawa, The University of Tokyo  
“Fabrication of anisotropic microstructure for fuel cells”
  - 6, Dr. G. Inoue, Kyushu University  
“Computer aided technology for porous electrode science”
  - 7, Dr. Jiakai Lu, Johns Hopkins University, USA  
"Direct Numerical Simulations and Characterizations of Multiphase Flows with Complex Topology Changes in a Turbulent Channel”
  - 8, Mr. Konosuke Watanabe, Yokohama National University  
“Visualization and multi-physical analysis of two phase flow inside Electrochemical energy devices”
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**November 27(Tues.)**

**8:30-11:30 Session 4**

**Organizer: Dr. Yoshihiro Taguchi, Keio University**

**and Dr. Hajime Okajima, Aoyama Gakuin University**

**“Nanoscale thermal & mass transport measurements and their bionics applications”**

The novel techniques to measure the heat and mass transport phenomena in the micro and nanoscale region are quite essential for understanding metabolic mechanisms in a living cell and developing the bionic devices that precisely control thermal and mass transports as well as material researches. In this session, the prospects related to the sensing techniques and their applications will be discussed for the research collaborations.

8:30-8:35 [Opening remarks]

8:35-8:50 Dr. Hajime Okajima, Aoyama Gakuin University, Japan

“Microscopic temperature measurement of water by Raman spectroscopy” (Tentative)

8:50-9:20 Dr. Eric P. Chiou, UCLA, USA

“Pulse Laser Actuated High-Speed Cell Sorter” (Tentative)

9:20-9:50 Dr. Noriko Hiroi, Sanyo-Onoda City University, Japan

“The possible impact of the temperature inhomogeneity in a living cell and cellular networks” (Tentative)

9:50-10:20 Dr. Vladimir Aksyuk, NIST, USA

“Nanophotonic AFM transducers: measuring thermal conductivity at the nanoscale”

10:20-10:50 Dr. Rintaro Shimada, University of Tokyo, Japan

“Towards quantitative bioimaging of living cells by Raman spectroscopy”

10:50-11:05 Dr. Yoshihiro Taguchi, Keio University, Japan

“Recent development of optical sensors for thermal system design” (Tentative)

11:05-11:25 [Discussion & Conclusion] All speakers of the workshop

11:25-11:30 [Closing remarks]

**11:30-11:40 Group Photograph**

**11:40-13:00 Lunch & Poster session**

**13:00-16:30 Session 5**

**Organizer: Dr. Kenji Miyatake, University of Yamanashi**

**Co-organizer: Dr. Bryan Pivovar, National Renewable Energy Laboratory**

**“Interfacial issues in polymer electrolyte fuel cells”**

In the energy devices such as fuel cells and electrolyzers, electrochemical reaction at nanoparticle catalysts is crucial. The dynamics of the reaction at the interface of the catalyst particles and thin ionomer membranes, however, have not been well-investigated and understood. In this session, fore-front researchers in this field from US and Japan will discuss current status of the subject to find out the clue of the issues. To obtain deeper insight, the interfaces include different scales from subnano to microns.

[Lectures]

Dr. Bryan Pivovar, National Renewable Energy Laboratory, USA

“Advances in alkaline membrane fuel cells and importance of interfaces”

Dr. Dario Dekel, Israel Institute of Technology

“Degradation of anion exchange membrane-cathode electrode during fuel cell operation”

Dr. Yu Seung Kim, Los Alamos National Laboratory, USA

“Surface adsorption at the alkaline anode catalyst/ionomer interfaces”

Dr. Kenji Miyatake, University of Yamanashi

“Effect of structure, morphology, and properties of anion exchange membranes on alkaline fuel cell performance and durability”

Dr. Katsuyoshi Kakinuma, University of Yamanashi

“Highly active and durable PEFC cathode catalyst of Pt supported on SnO<sub>2</sub> nanoparticles with fine-controlled microstructure and interfaces”

[Session Discussion]

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**November 28(Wed.)**

**8:30-11:30 General Discussion    Chairman: Prof. Katsunori Hanamura**

**11:30-11:45 Closing Remarks    Prof. Katsunori Hanamura, Tokyo institute of Technology**

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