

# 3<sup>rd</sup> NGRC Program

11/7(Tues.) Conference Site: Kansai Seminar House, Check-in 15:00-22:00

11/8(Wed.)14:00-15:30 Evaluation Meeting on “AEM Water Electrolysis” Project

PI: Hiroshi Ito(AIST)

Takayuki Homma, M. Kunimoto & Y. Fukunaka (Waseda Univ.)

Mikito Ueda & Hisayoshi Matsushima (Hokkaido Univ.)

Evaluation Committee: Prof. Kenichiro Ota(Yokohama National Univ.)

Prof. Toshiyuki Nohira(Kyoto Univ.)

Prof. Tom Fuller(GIT)

Dr. Robert Kostecki(LBNL)

Prof. Shannon Boettcher (Oregon)

Prof. Shioji Masahiro(Kyoto Univ.)

NGRC participants are welcome to join this meeting.

## 3<sup>rd</sup> Nucleation and Growth Research Conference

---Electrochemical/Materials Processing for Energy Conversion & Storage Systems  
toward Carbon Circulation Society---

11/8(Wed.) 16:00-20:00 3<sup>rd</sup> NGRC Registration Desk

18:30-21:00 3<sup>rd</sup> NGRC Get-Together Party

11/9(Thur.)

8:00-8:30 3<sup>rd</sup> NGRC Registration

8:30-8:35 Welcome Address: T. Nohira(Kyoto)

8:35-8:55 Welcome Remarks to the 3<sup>rd</sup> NGRC

“Electrochemical & Solid State Science and Technology”

Yue Kuo(Past President of ECS: Texas A & M)

8:55-9:15 “History of GRC and ECS Electrodeposition Focus Issue”

Tom Moffat(NIST), Y. Shirley Meng(Chicago & UCSD),

Timo Jacob(Ulm), T. Nohira & Y. Fukunaka(Kyoto)

<Carbon Circulation Society Research Session>

9:15-9:35 “In situ Near-Field IR Spectroscopy of Local Processes at Electrode/Electrolyte Interfaces in Batteries”,  
Robert Kostecki, Jonathan Larson, Andrew Dopilka(LBNL)

9:35-9:55 “Transport Challenges in Fuel Cells and Electrolyzers”  
Thomas. F Fuller(GIT)

9:55-10:15 “Pure Water Alkaline-Membrane Electrolysis: Catalyst Fundamentals to Performance, Durability, and Interface Design”  
Shannon W. Boettcher(Oregon)

10:15-10:45 Coffee Break

10:45-11:15 “Discovering and Designing Better Battery Materials for Energy Storage(tentative)”  
Y. Shirley Meng(Chicago & UCSD)\*\*\*\*\*

11:15-11:45 “Interface Engineering and Nano-structuring for Electrochemical Energy Conversion and Storage Devices”  
Turgut Gur(ECS Former President; Stanford)

11:45-12:15 “Operando Studies of Cu Surface Restructuring during Electrochemical CO<sub>2</sub> Reduction”  
Olaf Magnussen(Kiel)

12:15-12:45 “Controlling CO<sub>2</sub> Reduction and Methanol Oxidation Reactivity Using Electrodeposited Alloy and Polymer-modified Electrodes”  
Andrew A. Gewirth(UIUC)

12:45-14:00 Lunch

<Electrochemical/Materials Processing for Space Engineering Session>

14:00-14:30 “Releasing the Bubbles: Efficient and Stable Hydrogen and Oxygen Production in Microgravity”  
Katarina Brinkert(Warwick)

- 14:30-15:00 “Ice Nucleation in Space” or “Nucleation and Growth in Ni Electrodeposition: Polycrystalline Thin Films and Multilayers”(tentative)  
Walther Schwarzacher(Bristol)
- 15:00-15:20 “Numerical Modeling of a Pressurized Solid Oxide Fuel Cell for Electrified Aircraft Propulsion”  
Hironori Nakajima(Kyushu Univ.), Keiichi Okai (JAXA), and Takayuki Kojima(JAXA)
- 15:20-15:40 “High Speed AFM Measurements on Nanobubbles during Water Electrolysis(tentative)”  
Hisayoshi Matsushima, Ryuto Ohashi, Ibuki Sato, Mikito Ueda(Hokkaido)
- 15:40-16:10 Coffee Break
- <NGRC Session 1>
- 16:10-16:30 “Hydrogen-mediated Deposition of Pt and Pd Films”  
Natasa Vasiljevic, Nikolay Dimitrov, Ben Rawlings(Bristol)
- 16:30-16:50 “Electrodeposition of Reactive Metals in Ionic Liquid(tentative)”  
Andreas Bund(TU Ilmenau)
- 16:50-17:20 “Cobalt Oxide State during OER(tentative)”  
Philippe Allongue(Ecole Polytechnique, Paris)
- 17:20-17:40 “Electrowinning of Aluminum and Carbon Footprint”  
Geir-Martin Haaberg(NTNU)
- 17:40-18:00 “Materials Recovery from Spent LiFePO<sub>4</sub> Batteries through Molten Salt Processing”  
Yang Xiao(China)
- 18:00-18:20 “Electrochemical Performance of Cu-alloy Cathodes in Thin-Film-All-Solid-State Fluoride Batteries”  
Munekazu Motoyama, Takashi Nakagawa, Zempachi Ogumi and

Takeshi Abe(Kyushu Univ. & Kyoto Univ.)

18:20-20:00 Supper

20:00-21:00 Short Presentation (2min)

21:00-23:00 Poster Session (Student Poster will be evaluated.)

11/10(Fri.) 8:30-12:30

<Thin Film and Nano-, Microelectronics-1>

9:00-9:30 “An *in situ* Look at Interfacial Controls on Nucleation”

James J. De Yoreo(PNNL)

9:30-10:00 “Superation Generation and Deposition of Alkalilike Ta@Si16 and  
Halogen-like Al13 via Atomic Aggregation(tentative)”

A. Nakajima(Keio)

10:00-10:30 “Crystal Growth Physics and Innovation in SiC Power Devices(tentative)”

Tsunenobu Kimoto(Kyoto)

10:30-11:00 Coffee Break

<Computational Chemistry>

11:00-11:20 “Accelerating the Discovery of Materials for Separation and Catalysis  
towards Low Carbon Technologies”

Caetano R. Miranda(USP, Brazil)

11:20-11:50 “Electrochemical-Mechanical Coupling in Battery and  
Fuel Cell Materials(tentative)”

Yue Qi(Brown)

11:50-12:20 “Multi-scale Models of Nucleation and Growth in Ferroelectric and  
Electrochemical Processes”

Andrew M. Rappe(Pennsylvania)

12:20-13:30 Lunch

13:30-15:30 “Tea Ceremony” mainly for Foreign Participants

<NGRC-2>

15:30-16:00 “Electroless Monolayer Deposition---Advancing the Opportunities for Catalyst Monolayer Synthesis via Surface Limited Redox Replacement Reaction”

S. Dalgamouni and S. R. Brankovic(Houston)

16:00-16:20 “Electrochemical Nucleation of Co, Fe and Co-Fe Alloys in Aqueous Electrolytes”

Adriana Ispas and Andreas Bund(TU Ilmenau)

16:20-16:40 “Dendritic Growth of Li Metal Anode(tentative)”

Adam Maraschky, Ruwani Wasalathanthri, Rohan Akolkar(CWRU)

16:40-17:00 “Surfactant Mediated Electrodeposition: New Phenomena, Insights and Opportunities” and

Tom Moffat(NIST)

<Thin Film and Nano-, Microelectronics-2>

17:00-17:30 “Crystal Growth Technology of GeSn-related Group-IV Heteroepitaxial Layers”

Osamu Nakatsuka, Shigehisa Shibayama, Masashi Kurosawa, and Mitsuo Sakashita(Nagoya)

17:30-18:00 “Inversion Symmetry Broken Bulk SnS Formed by Step-edge-induced Spiral Growth for Energy Harvesting”

Kosuke Nagashio(Tokyo)

18:30-22:00 Banquet

11/11(Sat.) 8:30 Checking-Out at Kansai Seminar House

8:45 MK Jumbo-Taxi(9person x 6cars) (No. 23-38478 Ms. Ito(MK))

<"NOH" Session in "Kongo NOH Theatre">

9:45-11:45 "Lecture and NOH Performance"

11:45-12:00 Poster Award+Concluding Remarks by NGRC Office

12:15- Departure for Subway "Imadegawa" Station

It takes about 10 min from Imadegawa to JR Kyoto Station

JR Shinkansen "NOZOMI"(140min Ride) or "HIKARI"(160min Ride) is operated every 10min to Tokyo. The passengers with JR Pass can't use "NOZOMI", but "HIKARI".

Haruka Express to KIX airport(75min Ride) is operated every 30min.

Otherwise, Free-Tour in Downtown Kyoto

Several participants stay another night in Kansai-Seminar House or Other Hotel in Downtown.

11/12(Sun.) 10:00 Checking-Out at Kansai-Seminar House

## Poster presentation list

- P1. Deuterium enrichment using PEM water electrolysis by changing water stoichiometry  
Ibuki Sato, Hisayoshi Matsushima, Mikito Ueda (Hokkaido University)
- P2. Electrocatalytic Carbon Dioxide Reduction Microdevice  
Lei Zheng-Yan, Shigeki Kawamura, Nguyen Van Toan, Masaya Toda, Takahito Ono (Tohoku University)
- P3. Water electrolysis using water-based magnetic fluid with different polarities  
Arisa Kanehara, Yuhiro Iwamoto, Yasushi Ido, Yosuke Ishii, Balachandran Jeyadevan (Nagoya Institute of Technology)
- P4. Novel Highly Efficient Water Electrolysis Using NaOH-KOH Hydrate Melt  
Keita Goto, Kenji Kawaguchi, Toshiyuki Nohira (Kyoto University)
- P5. Two-dimensional phase-field simulations of electrodeposited dendrites  
Shoma Sato, Shinji Sakane, and Tomohiro Takaki (Kyoto Institute of Technology)
- P6. Effect of  $O^{2-}$  Ion Concentration on the Crystalline Structure of Electrodeposited W Films in Molten CsF–CsCl  
Haochen Wang, Yutaro Norikawa, Toshiyuki Nohira (Kyoto University)
- P7. Preparation of p-n Junction Si Films by Si Electrodeposition in KF-KCl Molten Salt  
Hou Zhengyang, Wataru Moteki, Yutaro Norikawa, Toshiyuki Nohira (Kyoto University)
- P8. Electrodeposition of Crystalline Si Film Using Thin Liquid Zn in Molten KF-KCl- $K_2SiF_6$   
Wataru Moteki, Yutaro Norikawa, Toshiyuki Nohira (Kyoto University)
- P9. In-situ high-speed AFM observation of electrolytic nanobubbles  
Ryuto Ohashi, Hisayoshi Matsushima, Mikito Ueda (Hokkaido University)

- P10. Copper pulse plating in a microfluidic channel  
Naoya Miyashita, Satoshi Doi, Masanori Hayase (Tokyo University of Science)
- P11. Miniature fuel cell with monolithically fabricated Si electrodes  
Jo Kato, Shimpei Ida, Mizuki Takagishi, Masanori Hayase  
(Tokyo University of Science)
- P12. Investigation of Sodium-ion Transfer Reaction between Non-graphitizable Carbon and Various Electrolytes  
Shota Tsujimoto, Changhee Lee, Yuto Miyahara, Kohei Miyazaki, Takeshi Abe  
(Kyoto University)
- P13. Tracking Perovskite Oxide/Electrolyte Interface during Oxygen Evolution Reaction via 3D Electrochemical Impedance Spectroscopy Yuta Inoue, Yuto Miyahara, Kohei Miyazaki, Changhee Lee, Ryo Sakamoto, Takeshi Abe (Kyoto University)
- P14. Unusual polarization conversion phenomenon caused by alignment control of dipole moments in uniaxially-stretched photoluminescent film  
Kaito Nakamura<sup>1</sup>, Yutaka Okazaki<sup>1</sup>, Guillaume Raffy<sup>2</sup>, Andre Del Guerzo<sup>2</sup>, Kan Hachiya<sup>1</sup>, and Takashi Sagawa<sup>1</sup>  
(1. Graduate School of Energy Science, Kyoto University, Jaapan, 2. University of Bordeaux, France,)
- P15. Formation of composite nanoparticles via rapid co-condensation during plasma spray and its feasibility for all-solid-state battery anodes  
H. Nakashima<sup>1</sup>, R. Ohta<sup>1</sup>, T. Tohara<sup>2</sup>, K. Murata<sup>2</sup>, M. Kambara<sup>1,2</sup>  
(1. Dept. Mater. Manufact. Sci., Osaka Univ., 2. Dept. Mater. Eng., Univ. Tokyo)
- P16. Crystallographic features of microstructures in titanium foils manufactured with direct electro-deposition in molten salt electrolysis  
Takumi Kaneko, Yuta Nakajo, Daisuke Suzuki, Matsuhide Horikawa, Hideki Fujii  
(Toho Titanium Co., Ltd.)