**RMW6**

The 6th Workshop on Reactive Metal Processing

March 4 - March 5, 2011 @ Caltech

Pasadena, California

Organizers

**Donald R. Sadoway**, *Massachusetts Institute of Technology*

**Toru H. Okabe**, *IIS, the University of Tokyo*

**Sossina M. Haile**, *California Institute of Technology*

**Tetsuya Uda**, *Kyoto University*

The 6th Workshop on Reactive Metal Processing

March 4 (Friday) - March 5 (Saturday), 2011, Caltech, Pasadena, CA

Time:

* 1st day: on Mar 4 (9:00 - 18:00 and 18:30 - Banquet)
* 2nd day: on Mar 5 (9:00 - 14:00)

Venue:

* **Beckman Institute at Caltech (for workshop)**

Building No.74 on Campus Directory Map

1200 East California Boulevard, Pasadena, CA 91125

* **The Athenaeum at Caltech (for banquet)**

http://athenaeum.caltech.edu/

Organizers:

**Prof. Donald R. Sadoway**,

*Massachusetts Institute of Technology*,

**Prof. Toru H. Okabe**,

*Institute of Industrial Science, the University of Tokyo*,

**Prof. Sossina M. Haile**,

*California Institute of Technology*,

**Prof. Tetsuya Uda**,

*Kyoto University*

Sponsor:

A part of the workshop is financially supported by the Rare Metal Research Workshop (RC-40: directed by Prof. Okabe), one of the Special Research Group organized by the Foundation for the Promotion of Industrial Science (FPIS).

Registration Fee:

$200 / person (including banquet)

RMW6 Coordinator:

Katsuhiro Nose, *Institute of Industrial Science, the University of Tokyo*

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Workshop Program

**Day 1** Morning, March 4 (Friday), 2011 @ Beckman Institute

9:00 **Opening Remarks**

*Prof. Donald R. Sadoway*, Massachusetts Institute of Technology

Session Chair: *Prof. Toru H. Okabe*

9:10 – 9:55 **“Ceria as a reactive oxide for thermochemical dissociation of H2O and CO2”**

William C. Chueh, Aldo Steinfeld and *Sossina M. Haile*,

California Institute of Technology

9:55 – 10:25 **“Electrocatalysis in solid acid fuel cells: Hydrogen permeation through thin film platinum anodes”**

*Mary Louie* and Sossina M. Haile,

California Institute of Technology

10:25 – 10:40 Break

Session Chair: *Prof. Georges J. Kipouros*

10:40 – 11:10 **“Cathode wear in Al electrolysis cells”**

*Egil Skybackmoen*, SINTEF

11:10 – 11:40 **“HF measurements inside an aluminium electrolysis cell”**,

*Karen Sende Osen*, Thor Anders Aarhaug, Asbjøren Solheim, Egil Skybakmoen and Camilla Sommerseth\*

SINTEF Materials and Chemistry, Norwegian University of Technology NTNU\*

11:40 – 12:45 Lunch Break

Afternoon, March 4 (Friday), 2011 @ Beckman Institute

Session Chair: *Prof. Kazuki Morita*

12:45 – 13:30 **“Current efficiency for aluminium deposition from molten cryolite-alumina electrolytes in a laboratory cell”**

*Geir M. Haarberg*, Joseph P. Armoo, Henrik Gudbrandsen, Egil

Skybakmoen, Asbjørn Solheim, Trond Eirik Jentoftsen,

Norwegian University of Science and Technology

13:30 – 14:15 **“Modification of steelmaking slags by minerals and recycled materials”**

*Georges J. Kipouros*,

Dalhousie University

14:15 – 14:30 Break

Session Chair: *Prof. Tetsuya Uda*

14:30 – 15:00 **“Rate of boron removal from molten silicon by slag and Cl2 gas treatments”**

*Hiroshi Nishimoto*, Kazuki Morita,

Institute of Industrial Science, the University of Tokyo

15:00 – 15:45 **3-min Short Presentation by Poster Presenters**

16:00 – 18:00 **Poster Session**@ the fountain square “gene pool”

18:30 – **Banquet**@ the Athenaeum

**Day 2**

Morning, March 5 (Saturday), 2011 @ Beckman Institute

9:00 **Opening Remarks**

*Prof. Sossina M. Haile*, California Institute of Technology

Session Chair: *Prof. Marcelle Gaune-Escard*

9:05 – 9:50 **“Electrometallurgical approaches to scalable stationary energy storage”**

*Donald R. Sadoway*,

Massachusetts Institute of Technology

9:50 – 10:20 **“Non-contact measurement of thermophysical properties”**

*Robert W. Hyers*,

University of Massachusetts

10:20 – 10:35 Break

Session Chair: *Prof. Geir M. Haarberg*

10:35 – 11:05 **“Iridium stability in molten oxides - a chemical and electrochemical perspective”**

H. Kim, J.C. Chen, D.R. Sadoway & *Antoine Allanore*,

Massachusetts Institute of Technology

11:05 – 11:35 **“Revaluation of equilibrium quotient between titanium ions and metallic titanium in NaCl-KCl equimolar molten salt”**

*Hidehiro Sekimoto*, Yoshitaro Nose, Akihiro Uehara, Tetsuya Uda, Hajimu Yamana, Hiroyuki Sugimura

Kyoto University

11:35 – 13:00 Lunch Break

Afternoon, March 5 (Saturday), 2011 @ Beckman Institute

Session Chair: *Dr. Luis Ortiz*

13:00 – 13:30 **“Investigations on the mechanism of acid leaching of alkali-activated ilmenite concentrate and titanium-rich slag”**

*Xu Qian*, Fu Yajun, Sun Lin, Jin Jianfeng,

Northeastern University

13:30 – 14:00 **“Electrochemical formation of RE-Ni (RE=Nd and Dy) alloys in molten salts and its application for selective separation of Nd and Dy”**

*Toshiyuki Nohira*, Seitaro Kobayashi, Katsutoshi Kobayashi, Rika Hagiwara, Tetsuo Oishi and Hirokazu Konishi,

Kyoto University

14:00 – **Closing Remarks**

*Prof. Toru H. Okabe*, Institute of Industrial Science, the University of Tokyo

**Photo Session**

14:30 – **Laboratory tour**

*Evan C. Brown*, California Institute of Technology

List of Poster Presentations

1. **“Electronic behavior of Ba0.5Sr0.5Co0.8Fe0.2O3-d and SrCo0.9Nb0.1O3-d”**,

*Robert E. Usiskin*, Richard Y. Wang, Sossina M. Haile,

California Institute of Technology

1. **“Dissolution behavior of rhodium into molten silicate slag”**,

*Chompunoot Wiraseranee*, Toru H. Okabe, Kazuki Morita,

Institute of Industrial Science, the University of Tokyo

1. **“Particulate emissions from electrolysis cells”**,

*Heiko Gaether* 1), Arne Petter Ratvik 1), Thor Anders Aarhaug 2),

1)NTNU, Department of Materials Science and Engineering, 2) SINTEF Materials and Chemistry

1. **“Thermodynamic properties of liquid Ca-Sb alloys”**,

*Sophie Poizeau*, Hojong Kim, Donald R. Sadoway,

Massachusetts Institute of Technology

1. **“Synthesis of Sr-doped LaP3O9 single crystals in phosphoric acid solutions and their proton conduction properties”**,

*Takayuki Onishi,* Naoyuki Hatada, Kazuaki Toyoura,Yoshitaro Nose, and Tetsuya Uda,

Kyoto University

1. **“CsH2PO4 nanoparticles via electrospray deposition”**,

*Áron Varga*, Andrew J. Downard, Hyung Wan Do, Richard C. Flagan, Sossina M. Haile,

California Institute of Technology

1. **“Thermodynamic measurement by double Knudsen mass spectrometry”**,

*Takashi Nagai*, Masafumi Maeda,

Institute of Industrial Science, the University of Tokyo

1. **“Phase behavior in selected solid acid system”**,

*Ayako Ikeda*, Chatr Panithipongwut, Mary Louie, Daniil Kitchaev, Sossina M. Haile,

California Institute of Technology

1. **“Purification of silicon by electron beam melting technique”**,

*Tomoki Kageyama*, Takashi Nagai, Masafumi Maeda,

Institute of Industrial Science, the University of Tokyo

1. **“Cation nonstoichiometry in yttrium-doped barium zirconate”**,

*Yoshihiro Yamazaki*, Chih-kai Yang, Sossina M. Haile,

California Institute of Technology

1. **“Development of the new recycling process of platinum group metals”**,

*Katsuhiro Nose*, A. Semih Sunkar, Kazuki Morita, Toru H. Okabe,

Institute of Industrial Science, the University of Tokyo

1. **“Strain accommodation and transformation disconnections at a rock-salt/tetradymite interface: PbTe/Sb2Te3”**,

*Nicholas A. Heinz*, Teruyuki Ikeda, G.Jeffrey Snyder, Douglas L.,

California Institute of Technology

1. **“Nanostructure formation in bulk thermoelectric materials”**,

*Teruyuki Ikeda*, G. Jeffrey Snyder,

California Institute of Technology

1. **“Crystal growth of ZnSnP2 based on phase diagram – toward　photovoltaics using chalcopyrite phosphide”**,

*Yoshitaro Nose*, Tetsuya Uda,

Kyoto University

1. **“Hierarchical ceria electrode structures for solid oxide fuel cells via cathodic electrochemical deposition”**,

*Evan C. Brown*, Sossina M. Haile,

California Institute of Technology

List of Participants

**Allanore, Antoine,** Postdoctoral Associate, MIT

**Boysen, Dane,** Postdoctoral Associate, MIT

**Brown, Evan C.,** PhD candidate, Caltech

**Chueh, William C.,** Postdoctoral Associate, Sandia National Lab.

**Gaertner, Heiko,** PhD candidate, NTNU

**Gaune-Escard, Marcelle,** Professor, Ecole Polytechnique, CNRS UMR 6595

**Haarberg, Geir M.,** Professor, NTNU

**Haile, Sossina M.,** Professor, Caltech

**Heinz, Nicholas A.,** PhD candidate, Caltech

**Hyers, Robert W.,** Associate Professor , University of Massachusetts

**Ikeda, Ayako,** PhD candidate, Caltech

**Ikeda, Teruyuki,** Vsiting Associate, Caltech

**Kageyama, Tomoki,** Graduate student, IIS, the University of Tokyo

**Kim, Hojong,** Postdoctoral Associate, MIT

**Kipouros, Georges J.,** Professor, Dalhousie University

**Louie, Mary,** PhD candidate, Caltech

**Morita, Kazuki,** Professor, IIS, the University of Tokyo

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**Osen, Karen Sende,** Research Scientist, SINTEF

**Poizeau, Sophie,** Graduate student, MIT

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**Yan, Chih-kai,** PhD candidate, Caltech

**Yurko, Jim,** Research Affiliate, Elkem