**RMW18**

**The 18th Workshop on Reactive Metal Processing**

**March 28 (Fri.) – 29 (Sat.), 2025 @ Boston/Cambridge**

(After TMS 2025, March 23 (Sun.) – 27 (Thu.), 2025 @ Las Vegas, Nevada)

**Organizers:**

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

**Toru H. Okabe** *Institute of Industrial Science (IIS),*

*The University of Tokyo*

**Antoine Allanore** *Massachusetts Institute of Technology*

**Shunsuke Yagi** *IIS, The University of Tokyo*

**Program Coordinators:**

**Takanari Ouchi** *IIS*, *The University of Tokyo*

**Gen Kamimura** *Massachusetts Institute of Technology*

**Isaac Oda-Bayliss** *IIS*, *The University of Tokyo*

**Gavin Winter** *Massachusetts Institute of Technology*

**Kai Shimada** *IIS*, *The University of Tokyo*

Sponsors

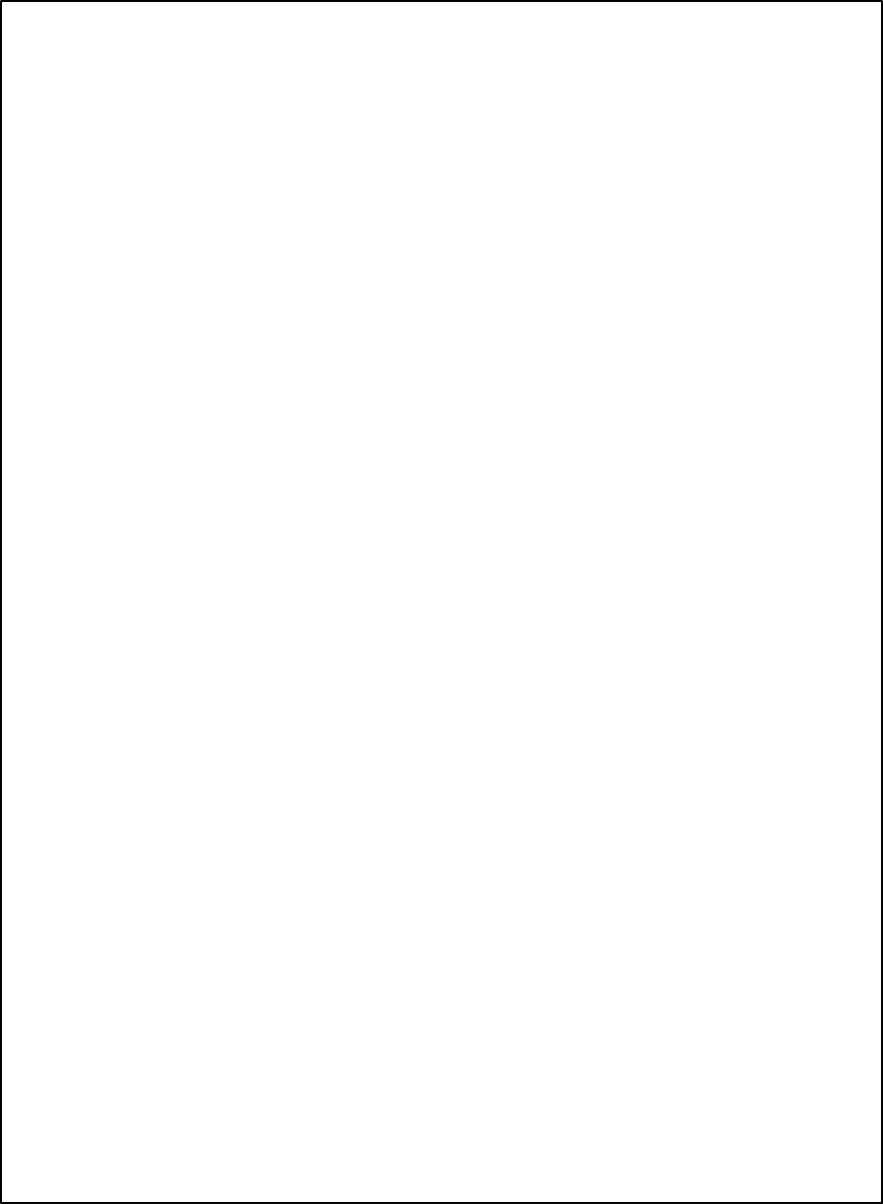
* The Rare Metal Research Workshop, one of the Special Research Groups organized by the Foundation for the Promotion of Industrial Science (FPIS)
* (RC-40: directed by Prof. T. H. Okabe, RC-104: directed by Prof. S. Yagi)
* Research Center for Sustainable Material Energy Integration (SUSMAT)
* Institute of Industrial Science, The University of Tokyo (IIS UTokyo SYMPOSIUM No.123)

http://www.okabe.iis.u-tokyo.ac.jp/core-to-core/rmw

**The 18th Workshop on Reactive Metal Processing**

**(IIS UTokyo SYMPOSIUM No.123)**

March 28 (Fri.) – March 29 (Sat.), 2025, MIT, Cambridge, MA



Time:

* 1st day: on March 28 (10:00 – 17:00 and Banquet at 18:30)
* 2nd day: on March 29 (10:00 – 14:00)  
  Refreshments will be served around 9:00 AM on both days.

Venue:

* **Haus Allen Room (MIT)**
* **Le Méridien Cambridge**

Registration Fee:

$300 / person

Organizers:

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

**Prof. Toru H. Okabe** *IIS, The University of Tokyo*

**Prof. Antoine Allanore** *Massachusetts Institute of Technology*

**Prof. Shunsuke Yagi** *IIS, The University of Tokyo*

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Contact:

Kai Shimada, *IIS, The University of Tokyo*

E-mail: shimada-kai079@g.ecc.u-tokyo.ac.jp

**Workshop Program**

**Day 1**

Morning, March 28 (Friday), 2025 @ Haus Allen Room (MIT)

19:00 – 10:00 **Coffee & Breakfast Service**

10:00 – 10:10 **Opening Remarks**

*Prof. Antoine Allanore*

*Massachusetts Institute of Technology*

Session Chair: *Prof. Antoine Allanore*

10:10 – 10:40 **Brine to Battery™: Electrolytic Production of Li-metal Electrodes: Introducing the lithium - vanadium oxide cell**

*Donald R. Sadoway*

*Massachusetts Institute of Technology*

10:40 – 11:00 **Break**

Session Chair: *Prof. Adam C. Powell, IV*

11:00 – 11:30 **Metal Nanoparticle Synthesis - Liquid Phase Process Design Using Potential-pH Diagram -**

*Shunsuke Yagi*

*IIS, The University of Tokyo*

11:30 – 12:00 **Sulfidation to Enhance the Physico-chemical Separation of Ternary Oxides, a Thermodynamic Study**

*Charles Boury*

*Massachusetts Institute of Technology*

12:00 – 13:00 **Lunch**

Session Chair: *Dr. Takanari Ouchi*

13:00 – 13:30 **Direct Carbon Fuel Cell for High-Efficiency Bioenergy with Carbon Capture**

*Adam C. Powell, IV*

*Worcester Polytechnic Institute*

13:30 – 14:00 **TBD**

*Raluca O. Scarlat*

*University of California, Berkeley*

14:00 – 14:20 **Photo & Break**

Session Chair: *Dr. Gen Kamimura*

14:20 – 15:20 **3-min Short Presentation by Poster Presenters**

15:20 – 16:20 **Poster Session at the Haus Room and Allen Room at Building 36**

18:00 – **Reception** @ Le Méridien Cambridge

18:30 – **Banquet** @ Le Méridien Cambridge

**Day 2**

Morning, March 29 (Saturday), 2025 @ Haus Allen Room (MIT)

9:00 – 10:00 **Coffee & Breakfast Service**

10:00 – 10:10 **Opening Remarks**

*Prof. Shunsuke Yagi*

*IIS, The University of Tokyo*

Session Chair: *Prof. Shunsuke Yagi*

10:10 – 10:40 **Building Electricity Infrastructure and Electrifying Metals Production**

*Katrin E. Daehn*

*Massachusetts Institute of Technology*

10:40 – 11:00 **Break**

Session Chair: *Chair TBD*

11:00 – 11:30 **Electrochemical Extraction of Minor Elements from Metals**

*Takanari Ouchi*

*IIS, The University of Tokyo*

11:30 – 12:00 **Containerless Methods for High-throughput Property Measurement of Alloy Melts**

*Ethan Benderly-Kremen*

*Massachusetts Institute of Technology*

12:00 – 12:10 **Information for the Next RMW**

*Prof. Toru H. Okabe*

*IIS, The University of Tokyo*

12:10 – 12:20 **Closing Remarks**

*Prof. Donald R. Sadoway*

*Massachusetts Institute of Technology*

12:20 – 13:30 **Lunch**

13:30 – **Laboratory Tour**

**List of Poster Presenters**

1. **The Catalytic Activity of Transition Metal Doped α-MnO2 for Oxygen Evolution Reaction**  
   *Kai Shimada*1,2,  
   1Department of Materials Engineering, Graduate School of Engineering, The University of Tokyo  
   2Institute of Industrial Science, The University of Tokyo
2. **Solvoacidity in Molten Fluoride Salts**  
   *Haley Williams*,  
   1University of California, Berkeley
3. **Understanding Fundamental Mechanisms for Electrochemical Reduction of Iron Oxide in Aqueous Alkaline Media**  
   *Gavin Winter*1,  
   1Massachusetts Institute of Technology
4. **The Effect of Temperature for Hematite Sulfidation with Elemental Sulfur**   
   *Matthew Mickalek*1,  
   1Massachusetts Institute of Technology
5. **Electrochemical Measurement of Dissolved Non-Metallic Contamination in Molten Salts**  
   *Nathan Bradshaw*1,  
   1Massachusetts Institute of Technology
6. **Behavior of Phosphate in Sulfur-rich Systems**  
   *Ava Waitz*1,  
   1Massachusetts Institute of Technology
7. **Recent Progress of Displacement Datteries**  
   *Kashif Mushtaq*1,  
   1Iberian Center for Research in Energy Storage CIIAE
8. **Study on Reduction of MnO by Bio-carbon for Carbon-neutral Ferromanganese Production**  
   *Shingo Katayama*1,  
   1Nippon Denko Co. Ltd

**List of Poster Presenters**

1. **Effect of Cell Structure on the Distribution of Surface Current Density in Rechargeable Mg Batteries Through Simulation**  
   *Tamura Atsushi*1,  
   1Institute of Industrial Science, The University of Tokyo
2. **Conductivity of BaS-La2S3 Electrolyte for Electrolysis of FeS**  
   *Natalie Chapman*1,  
   1Massachusetts Institute of Technology
3. **A process for carbon-free deoxidation of CO2 to produce CO based on the coupling of gas-liquid reaction and steel–slag electrolysis**  
   *Wenhe Wu*1,  
   1School of Materials Science and Engineering, Shanghai University
4. **Carbo-sulfidation of BaSO4 in the Presence of FeS**  
   *Gen Kamimura*1,  
   1Massachusetts Institute of Technology
5. **Flow Electrolysis for Iron Production**  
   *Omid Mahdavi*1,  
   1Worcester Polytechnic Institute
6. **Preliminary exploration of electrochemical anodic deposition process for recycling of PGMs**  
   *Momoka* *Imoto*1,2,  
   1Department of Materials Engineering, Graduate School of Engineering, The University of Tokyo  
   2Institute of Industrial Science, The University of Tokyo
7. **TBD**  
   *Isaac Oda-Bayliss*1,  
   1Institute of Industrial Science, The University of Tokyo
8. **Mapping the Pseudo-ternary FeS-BaS-La2S3 Composition Space to Inform Molten Sulfide Electrolysis**  
   *Eve Meltzer*1,  
   1Massachusetts Institute of Technology
9. **Methane Decomposition Enabled by Molten Alkali Halide Electrolysis**  
   *Xiaofei Guan*1,  
   1ShanghaiTech University

**History of RMW**

2006 **The 1st Workshop on Reactive Metal Processing (RMW1)**

March 17 (Fri.) - March 19 (Sat.), Cambridge, MIT

2006 **The 2nd Workshop on Reactive Metal Processing (RMW2)**

November 16 (Thurs.) - November 17 (Fri.), Tokyo, The University of Tokyo

2007 **The 3rd Workshop on Reactive Metal Processing (RMW3)**

March 2 (Fri.) - March 3 (Sat.), Cambridge, MIT

2008 **The 4th Workshop on Reactive Metal Processing (RMW4)**

March 14 (Fri.) - March 15 (Sat.), Cambridge, MIT

2010 **The 5th Workshop on Reactive Metal Processing (RMW5)**

February 18 (Thurs.) - February 19 (Fri.), Seattle, Red Lion Hotel on 5th Avenue

2011 **The 6th Workshop on Reactive Metal Processing (RMW6)**

March 4 (Fri.) - March 5 (Sat.), Pasadena, Caltech

2012 **The 7th Workshop on Reactive Metal Processing (RMW7)**

March 16 (Fri.) - March 17 (Sat.), Cambridge, MIT

2013 **The 8th Workshop on Reactive Metal Processing (RMW8)**

March 8 (Fri.) - March 9 (Sat.), Cambridge, MIT

2014 **The 9th Workshop on Reactive Metal Processing (RMW9)**

February 21 (Fri.) - February 22 (Sat.), Pasadena, Caltech

2015 **The 10th Workshop on Reactive Metal Processing (RMW10)**

March 20 (Fri.) - March 21 (Sat.), Cambridge, MIT

2016 **The 11th Workshop on Reactive Metal Processing (RMW11)** February 19 (Fri.) - February 20 (Sat.), Cambridge, MIT

2017 **The 12th Workshop on Reactive Metal Processing (RMW12)**

March 3 (Fri.) - March 4 (Sat.), Cambridge, MIT

2018 **The 13th Workshop on Reactive Metal Processing (RMW13)**

March 16 (Fri.) - March 17 (Sat.), Cambridge, MIT

2019 **The 14th Workshop on Reactive Metal Processing (RMW14)**

March 15 (Fri.) - March 16 (Sat.), Cambridge, MIT

2020 **The 15th Workshop on Reactive Metal Processing (RMW15)**

February 28 (Fri.) - February 29 (Sat.), San Diego, UC San Diego

2023 **The 16th Workshop on Reactive Metal Processing (RMW16)**

March 24 (Fri.) - March 25 (Sat.), Cambridge, MIT

2024 **The 17th Workshop on Reactive Metal Processing (RMW17)**

March 24 (Fri.) - March 25 (Sat.), Cambridge, MIT

**RMW1 in 2006 at MIT RMW2 in 2006 at IIS**

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**RMW5 in 2010 at Seattle RMW17 in 2024 at MIT**

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**List of Participants**

| Adam Powell | Associate Professor | WPI |
| --- | --- | --- |
| Aindrea Campbell | Materials Engineer | Apple Inc. |
| Antoine Allanore | Professor | MIT |
| Artem Iurkovskyi | Undergraduate Student | WPI |
| Atsushi Tamura | Project Assistant Professor | IIS, The University of Tokyo |
| Ava Waitz | Graduate Research Assistant | MIT |
| Ayato Katayama | Researcher | Nippon Denko Co., Ltd. |
| Bohdana Naidych | Postdoctoral Researcher | Sadoway Labs Foundation |
| Caspar Stinn | Principal Scientist | Outokumpu |
| Charles Boury | Ph.D. MBA student | MIT |
| Daniel Mc Arthur Sehar | Postdoctoral researcher | WPI |
| Donald R. Sadoway | Professor Emeritus | MIT, Sadoway Labs |
| Eli Brosh | Researcher | Nuclear Research Center Negev |
| Erez Boukobza | Researcher | Nuclear Research Center Negev, Tel Aviv University |
| Ethan Benderly-Kremen | Graduate student | MIT |
| Eve Meltzer | PhD Candidate | MIT |
| Gavin Winter | PhD student | MIT |
| Gen Kamimura | Postdoctoral Fellow | MIT |
| Guillaume Lambotte | Chief Scientist | Boston Metal |
| Haley Williams | PhD Student | University of California, Berkeley |
| Henry Hutcheson | Scientist | Outokumpu Stainless |
| Hiroyuki Iwasaki | SSHE Advisor | ExxonMobil Japan Products Technology Center |
| Hrishikesh Nirgude | Research Assistant | WPI |
| Isaac Oda-Bayliss | Research Associate | IIS, The University of Tokyo |
| Joe Lessard | Materials Engineer | Apple Inc. |
| Jonathan Lamboley | Senior Expert in pyrometallurgy | Eramet |
| Jonathan Paras | Harry S. Truman Fellow | Sandia National Laboratories |
| Kai Shimada | Graduate student | IIS, The University of Tokyo |
| Kali Simonds | Staff Engineer | Sadoway Labs Foundation |
| Karthik Vinayagam | Student | WPI |
| Kashif Mushtaq | Senior Researcher | Iberian Center for Research in Energy Storage CIIAE |
| Katrin Daehn | Research scientist | MIT |

**List of Participants**

| Kimaya Suryarao | Senior Scientist | Outokumpu |
| --- | --- | --- |
| Lucas Marden | Scientist | Outokumpu |
| M. Akbar Rhamdhani | Professor | Swinburne University of Technology |
| Maika Sakamoto | Administrative staff | IIS |
| Manisha Dahal | Analysis engineer | Sadoway labs foundation |
| Masatoshi Ueno | Managing Director | Komatsu |
| Matthew Michalek | Research Assistant | MIT |
| Matthew Humbert | Staff Scientist | Sadoway Labs Foundation |
| Michael Abere | Staff Scientist | Sandia National Labs |
| Mohammad Ibrahim | Postdoctoral researcher | NTNU, Trondheim |
| Momoka Imoto | Graduate Student | IIS, The University of Tokyo |
| Natalie Chapman | RA | MIT |
| Nathan Bradshaw | Graduate Student | MIT |
| Omid Mahdavi | PhD student | WPI |
| Peace Kim | Senior Research Scientist | Phoenix Tailings |
| Peter Poulos | Undergraduate BS candidate | WPI |
| Ragnhild Aune | Professor | NTNU |
| Raluca Scarlat | Associate Professor | UC Berkeley |
| Rich Bradshaw | COO | Sadoway Labs Foundation |
| Ryota Tezuka | Administrative staff | IIS |
| Sami Meddeb | Pyrometallurgical engineer | Eramet |
| Shingo Katayama | Executive Adviser of R&D | NIPPON DENKO Co. Ltd. |
| Shunsuke Yagi | Associate Professor | IIS |
| Tadeu Carneiro | CEO | Boston Metal |
| TAEHYUK LEE | Senior Researcher | KIGAM |
| Takanari Ouchi | Lecturer | IIS |
| Tomás Villalón Jr. | CTO | Phoenix Tailings |
| Toru H. Okabe | Professor | IIS |
| Wenhe Wu | Associate Professor | Shanghai University |
| Xiaofei Guan | Assistant Professor | ShanghaiTech University |
| Xueqi Pang | Postdoctoral Researcher | Sadoway Labs Foundation |

**List of Guest Participants**

| Jianlu Zheng | Postdoc Associate | MIT |
| --- | --- | --- |
| Kazumi Wada | Professor | The University of Tokyo, MIT |
| Ryosei Nakama | Undergraduate Student | The University of Tokyo |
| Tamaki Yamamoto | Undergraduate Student | The University of Tokyo |
| Toshiki Okayasu | Undergraduate Student | The University of Tokyo |
| Wataru Morioka | Undergraduate Student | The University of Tokyo |
| Yu Nishiuchi | Undergraduate Student | The University of Tokyo |

**Venue Details**

Workshop:

Haus Allen Room

Building 36, Room 462 (4th floor)

50 Vassar St, Cambridge, MA 02139

Interactive Campus Map available at: <http://whereis.mit.edu/>

Banquet:

Le Méridien Boston Cambridge

20 Sidney St, Cambridge, MA 02139

