



**The AIMR International Symposium 2017  
(AMIS2017)  
Program & Abstracts**

**“The 10<sup>th</sup> Anniversary of AIMR congratulating Mathematics-Materials  
Science Collaboration”**

**February 12 (Sunday) Hotel Metropolitan Sendai**

<b>Registration</b>	<b>16:00 -</b>
<b>Welcome Reception</b>	<b>17:00 - 19:00</b>

**February 13 (Monday) Sendai International Center**

<b>Registration</b>	<b>08:30 -</b>
<b>Opening Remarks</b>	<b>09:00 - 09:20</b> at HAGI (2nd floor) <b>Susumu Satomi</b> , President of Tohoku University <b>Toshio Kuroki</b> , WPI Program Director <b>Motoko Kotani</b> , Director of AIMR
<b>Opening Addresses</b>	<b>09:20 - 09:40</b> at HAGI (2nd floor) <b>Kazuo Kyuma</b> , Executive Member of Council for Science, Technology and Innovation <b>Yasunao Seki</b> , Director-General, Research Promotion Bureau, MEXT

<b>Opening Session 9:40 – 12:00</b> at HAGI (2nd floor)		
<b>Chair: Motoko Kotani</b>		
Mon. - 1	<b>9:40 – 10:20</b>	<b>Albert Fert</b> (Université Paris-Sud) “Topological Materials for Spintronics (From Topological Insulators to Magnetic Skyrmions)”
<b>Coffee Break 10:20 – 10:40</b>		
Mon. - 2	<b>10:40 – 11:20</b>	<b>Hideo Hosono</b> (Tokyo Institute of Technology ) “Electron and Hydrogen as Anions in Oxides: utilization for emergence of functionality”
Mon. - 3	<b>11:20 - 12:00</b>	<b>John Ball</b> (University of Oxford) “Complex interfaces in materials undergoing solid phase transformations”

**Lunch/ Free Discussion 12:00 – 13:30**

**\*The posters are displayed until 14:00 on February 15 at SAKURA 1 (2nd floor).**

<b>Session 1 13:30 - 15:00 at HAGI (2nd floor)</b>		
<b>-Non-equilibrium materials and bulk metallic glasses-</b>		
<b>Chair: Mingwei Chen</b>		
Mon. - 4	<b>13:30 – 14:00</b>	<b>Lindsay Greer</b> (AIMR / The University of Cambridge) “Extending the Range of the Glassy State in Metallic Alloys”
Mon. - 5	<b>14:00 – 14:30</b>	<b>Takeshi Egami</b> (University of Tennessee) “Atomic and Molecular Dynamics of Liquids and Colloids”
Mon. - 6	<b>14:30 – 15:00</b>	<b>Dmitri V. Louzguine</b> (AIMR) “Surface Structure and Properties of Metallic Glasses”

**Coffee Break 15:00 – 15:20**

<b>Session 2 15:20 – 16:50 at HAGI (2nd floor)</b>		
<b>-Energy materials and creation of new devices and systems-</b>		
<b>Chair: Seiji Samukawa</b>		
Mon. - 7	<b>15:20 – 15:50</b>	<b>Shin-ichi Orimo</b> (AIMR) “Complex Hydrides for Advanced Battery Devices”
Mon. - 8	<b>15:50 – 16:20</b>	<b>Tsunehiro Tanaka</b> (Kyoto University) “Outcome from ESICB”
Mon. - 9	<b>16:20 – 16:50</b>	<b>Atsushi Yamamoto</b> (National Institute of Advanced Industrial Science and Technology) “Thermoelectric Materials and Devices R&D in AIST toward high-efficient energy harvester”

## February 14 (Tuesday) Sendai International Center

<b>Session 3      09:00 – 10:30      at HAGI (2nd floor)</b>		
<b>-Spintronics-</b>		
<b>Chair: Shigemi Mizukami</b>		
Tue. - 1	<b>09:00 – 09:30</b>	<b>Masashi Kawasaki</b> (The University of Tokyo) “Spin Physics in Heterostructures of Novel Quantum Materials”
Tue. - 2	<b>09:30 – 10:00</b>	<b>Eiji Saitoh</b> (AIMR) “Spinons and Phonons in Spintronics”
Tue. - 3	<b>10:00 – 10:30</b>	<b>Katsumi Tanigaki</b> (AIMR) “Order and Disorder in Topological Materials”

**Coffee Break              10:30 – 10:50**

<b>Session 4      10:50 – 12:20      at HAGI (2nd floor)</b>		
<b>-Porous topological materials-</b>		
<b>Chair: Katsumi Tanigaki</b>		
Tue. - 4	<b>10:50 – 11:20</b>	<b>Yoshinori Yamamoto</b> (AIMR) “Nanoporous Metal Skeleton Catalysts for Molecular Transformations”
Tue. - 5	<b>11:20 – 11:50</b>	<b>Jonah Daedalus Erlebacher</b> (Johns Hopkins University) “Scale and Phase Evolution in Dealloyed Nanoporous Materials”
Tue. - 6	<b>11:50 – 12:20</b>	<b>Yoshikazu Ito</b> (AIMR) “3D graphene expands graphene applications”

**Lunch/ Free Discussion    12:20 - 14:00**

**\*The posters are displayed until 14:00 on February 15 at SAKURA 1 (2nd floor).**

<b>Session 5</b> <b>14:00 – 15:30</b> at HAGI (2nd floor)		
<b>-Surfaces, interfaces and hierarchical structures-</b>		
<b>Chair: Yuichi Ikuhara</b>		
Tue. - 7	<b>14:00 – 14:30</b>	<b>Alexander Shluger</b> (AIMR / University College London) “Role of carrier injection in degradation of amorphous oxide films”
Tue. - 8	<b>14:30 – 15:00</b>	<b>Stephen John Pennycook</b> (National University of Singapore) “Uncovering the Functionality of Surfaces and Interfaces by Aberration-Corrected STEM”
Tue. - 9	<b>15:00 – 15:30</b>	<b>Taro Hitosugi</b> (AIMR / Tokyo Institute of Technology) “Solid-State Lithium Batteries Rechargeable in “One” Second”

**Coffee Break**    **15:30 - 15:50**

<b>Session 6</b> <b>15:50 – 17:20</b> at HAGI (2nd floor)		
<b>-Synthesis of hierarchical materials-</b>		
<b>Chair: Tadafumi Adschiri</b>		
Tue. - 10	<b>15:50 – 16:20</b>	<b>Hiroshi Yabu</b> (AIMR) “Hierarchic Self-Assembly of Diblock Copolymers in 3D Confined Spaces”
Tue.- 11	<b>16:20 – 16:50</b>	<b>Thomas Paul Russell</b> (AIMR / The University of Massachusetts Amherst) “Structuring Liquids”
Tue.- 12	<b>16:50 – 17:20</b>	<b>Hiroyuki Isobe</b> (AIMR / The University of Tokyo) “Structural Chemistry of Hydrogen and Carbon toward Materials”

## February 15 (Wednesday) Sendai International Center

<b>Session 7      09:00 – 10:00    at HAGI (2nd floor)</b>		
<b>-Mathematics-materials science collaboration and future prospects-</b>		
<b>Chair: Kazuto Akagi</b>		
Wed. - 1	<b>09:00 – 09:30</b>	<b>Yasumasa Nishiura (AIMR)</b> “Mathematics and Materials Science Collaboration -A Topical Review- ”
Wed. - 2	<b>09:30 – 10:00</b>	<b>Yasuaki Hiraoka (AIMR)</b> “Topological Data Analysis on Materials Science”

**Coffee Break    10:00 - 10:20**

<b>Session 8      10:20 - 12:00    at HAGI (2nd floor)</b>		
<b>-Mathematics-materials science collaboration and future prospects (Panel)-</b>		
<b>Moderator: Yasumasa Nishiura</b>		
Wed. - 3	<b>10:20 - 11:00</b>	Short presentation by young researchers <b>Daniel Packwood</b> (Institute for Integrated Cell-Material Sciences, Kyoto University) <b>Natsuhiko Yoshinaga (AIMR)</b> <b>Ippei Obayashi (AIMR)</b>
Wed. - 4	<b>11:00 - 12:00</b>	Discussion <b>John Ball (University of Oxford)</b> <b>Kiyoyuki Terakura</b> (National Institute for Materials Science) <b>Tadafumi Adschiri (AIMR)</b> <b>Yasuaki Hiraoka (AIMR)</b> <b>Daniel Packwood</b> (Institute for Integrated Cell-Material Sciences, Kyoto University)

**Lunch/ Poster Session/ Free Discussion    12:00 – 14:00**

## February 16 (Thursday) Hotel Metropolitan Sendai

<b>Joint Workshop 1 9:00 - 9:20</b> at SENDAI (4th floor)		
<b>Introduction</b>		
<b>Chair: Masaru Tsukada</b>		
Thu. - 1	<b>9:00 - 9:10</b>	<b>Motoko Kotani</b> (AIMR)
Thu. - 2	<b>9:10 - 9:20</b>	<b>Lindsay Greer</b> (AIMR / The University of Cambridge)

<b>Joint Workshop 2 9:20 - 10:50</b> at SENDAI (4th floor)		
<b>-Spin-centered science-</b>		
<b>Chair: Tomasz Dietl</b>		
Thu. - 3	<b>9:20 - 9:50</b>	<b>David D. Awschalom</b> (The University of Chicago) “Creating Quantum Technologies with Spins in Semiconductors”
Thu. - 4	<b>9:50 - 10:20</b>	<b>Xiaozhong Zhang</b> (Tsinghua University) “Semiconductor Nonlinear Effect Assisted Magnetoresistance and Magnetic Logic”
Thu. - 5	<b>10:20 - 10:50</b>	<b>Hideo Ohno</b> (AIMR) “Spin-orbit Torque Nanodevices”

**Coffee Break 10:50 - 11:10**

<b>Joint Workshop 3 11:10 - 12:40</b> at SENDAI (4th floor)		
<b>-Catalysts-</b>		
<b>Chair: Alan Lindsay Greer</b>		
Thu. - 6	<b>11:10 - 11:40</b>	<b>Katherine L. Orchard</b> (AIMR / The University of Cambridge) “Nanostructured Photoelectrodes for Solar Energy Conversion”
Thu. - 7	<b>11:40 - 12:10</b>	<b>Tadafumi Adschiri</b> (AIMR) “Supercritical Route for Nano Catalyst”
Thu. - 8	<b>12:10 - 12:40</b>	<b>Takeshi Fujita</b> (AIMR) “Dealloyed nanoporous metals for green catalyst”

**Lunch/ Free Discussion 12:40 - 14:00 at SENDAI (4th floor)**

<b>Joint Workshop 4 14:00 – 15:30</b> at SENDAI (4th floor)		
<b>-Observation and control of surfaces and interfaces-</b>		
<b>Chair: Tomokazu Matsue</b>		
Thu. - 9	<b>14:00 - 14:30</b>	<b>Li-Jun Wan</b> (AIMR / University of Science and Technology of China) “Li-S Batteries: Electrode Materials and in-situ AFM of Interfacial Structure”
Thu. - 10	<b>14:30 - 15:00</b>	<b>Yuichi Ikuhara</b> (AIMR / The University of Tokyo) “Atomic Resolution STEM Characterization of Lithium Ion Battery Materials”
Thu. - 11	<b>15:00 - 15:30</b>	<b>Patrick Han</b> (AIMR) “Toward Graphene Integration from the Bottom-Up”

**Coffee Break 15:30 - 15:50**

<b>Joint Workshop 5 15:50 – 17:20</b> at SENDAI (4th floor)		
<b>-Soft and Bio materials-</b>		
<b>Chair: Kazue Kurihara</b>		
Thu. - 12	<b>15:50 - 16:20</b>	<b>Paul Franklin Nealey</b> (The University of Chicago) “Directed Self-Assembly of Liquid Crystal Material Systems”
Thu. - 13	<b>16:20 - 16:50</b>	<b>Ayumi Hirano-Iwata</b> (AIMR) “Reconstitution of Ion Channel Functions in Artificially Formed Cell Membranes in Microfabricated Silicon Chips”
Thu. - 14	<b>16:50 - 17:20</b>	<b>Winfried Teizer</b> (AIMR / Texas A&M University) “Molecular Motors – A Different Kind of Transport”

**Banquet at SENDAI (千代) 18:30-20:00**

## February 17 (Friday) Hotel Metropolitan Sendai

<b>Joint Workshop 6 9:00 - 10:30</b> at SENDAI (4th floor)		
<b>-First-principles calculations-</b>		
<b>Chair: Masaru Tsukada</b>		
Fri. - 1	<b>9:00 - 9:30</b>	<b>Giulia Galli</b> (The University of Chicago) “First principles simulations of defect spin cubit in semiconductors”
Fri. - 2	<b>9:30 - 10:00</b>	<b>Chris James Pickard</b> (AIMR / The University of Cambridge) “Structure prediction and computational materials discovery”
Fri. - 3	<b>10:00 - 10:30</b>	<b>Kazuto Akagi</b> (AIMR) “First-Principles Calculations and Topological Data Analysis”

**Coffee Break 10:30 - 10:50**

<b>Joint Workshop 7 10:50 - 12:20</b> at SENDAI (4th floor)		
<b>-Informatics and Neuromorphic computing-</b>		
<b>Chair: Motoko Kotani</b>		
Fri. - 4	<b>10:50 - 11:20</b>	<b>Carola-Bibiane Schönlieb</b> (The University of Cambridge) “Mathematical challenges in electron tomography”
Fri. - 5	<b>11:20 - 11:50</b>	<b>Supratik Guha</b> (The University of Chicago) “Nano-materials for practical applications: opportunities in computing and cyberphysical sensing networks”
Fri. - 6	<b>11:50 - 12:20</b>	<b>Yoshihiko Horio</b> (RIEC, Tohoku University) “Towards a Brainmorphic Hardware System”

<b>Poster Award Ceremony</b>	<b>12:20- 12:30</b>
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<b>Closing Remarks</b>	<b>12:30- 12:40</b> <b>Masaru Tsukada</b> , Administrative Director of AIMR
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