

SYMPOSIUM ES10

Frontiers in Oxide Interface Spintronics—Magnetoelectrics,
Multiferroics and Spin-Orbit Effects
April 18 - April 21, 2017

Symposium Organizers

John Heron, University of Michigan
Satoshi Okamoto, Oak Ridge National Laboratory
Morgan Trassin, ETH Zürich
Pu Yu, Tsinghua University

Symposium Support

CrysTec GmbH
Lake Shore Cryotronics Inc
NT-MDT America Inc.
Radiant Technologies, Inc

Proceedings Statement

All authors are invited to submit articles based on their 2017 MRS Spring Meeting presentations to the journals in the MRS portfolio (www.mrs.org/publications-news). Papers submitted and accepted for publication in MRS Advances (www.mrs.org/mrs-advances) will be available as symposium collections. Visit the MRS/Cambridge University Press Publications Booth #100 in the Exhibit Hall to learn more, including MRS Advances print options available at special rates during the meeting week only.

* Invited Paper

SESSION ES10.1: Complex Oxides—Ferroelectric Domains
and Domain Walls

Session Chairs: Julia Mundy and Morgan Trassin
Tuesday Morning, April 18, 2017
PCC North, 200 Level, Room 222 A

10:30 AM ES10.1.01

Domain Wall Architecture in Tetragonal Ferroelectric Thin Films [Gabriele De Luca](#); ETH Zurich, Switzerland.

10:45 AM ES10.1.02

Emergent Chirality in Electrically Polar Vortex Superlattices [Padraic Shafer](#); Lawrence Berkeley National Laboratory, United States.

11:00 AM *ES10.1.03

Imaging Complex Oxides with Electrons and Photons on Nano- to Picometer Length Scales [Venkatraman Gopalan](#); Pennsylvania State University, United States.

11:30 AM ES10.1.04

Unravelling Elastic Anomalies during Morphotropic Phase Transitions [Pankaj K. Sharma](#); The University of New South Wales, Australia.

11:45 AM ES10.1.05

Structure of Ferroelectric Vortices in a Single Layer PbTiO₃ Thin Film [Shang-Lin Hsu](#); University of California, Berkeley, United States.

SESSION ES10.2: Multiferroics and Magnetoelectrics—Engineered
Materials and Interfaces

Session Chairs: Venkatraman Gopalan and Pu Yu
Tuesday Afternoon, April 18, 2017
PCC North, 200 Level, Room 222 A

1:30 PM ES10.2.01

Recent Advances in Large Area Pulsed Laser Deposition—Epitaxial Growth of Complex Oxides on Silicon [Rik Groenen](#); University of Twente, Netherlands.

1:45 PM *ES10.2.02

Phase Competition by Design in R_{0.5}Ba_{0.5}MnO₃ [Craig J. Fennie](#); Cornell University, United States.

2:15 PM ES10.2.03

Ferromagnetic and Ferroelectric BiFeO₃ Interlayers in Ferrite-Manganite Superlattices [Michael R. Fitzsimmons](#)^{1,2}; ¹Oak Ridge National Laboratory, United States; ²University of Tennessee, United States.

2:30 PM *ES10.2.04

Atomically Engineered Ferroic Layers Yield a Room-Temperature Magnetoelectric Multiferroic [Julia Mundy](#); University of California, Berkeley, United States.

3:00 PM BREAK

SESSION ES10.3: Correlated Oxides—Interfaces and Magnetism I

Session Chairs: John Heron and Satoshi Okamoto
Tuesday Afternoon, April 18, 2017
PCC North, 200 Level, Room 222 A

3:30 PM ES10.3.01

Electrostatic vs Electrochemical Doping and Control of Ferromagnetism in Ion-Gel-Gated Ultrathin La_{0.5}Sr_{0.5}CoO_{3-δ} [Jeffery Walter](#); University of Minnesota, United States.

3:45 PM *ES10.3.02

Spin Orbit Torques and Proximity-Induced Magnetism in Thulium Iron Garnet Heterostructures [C. A. Ross](#); Massachusetts Institute of Technology, United States.

4:15 PM ES10.3.03

Magneto-Optical Isolator Designs Inspired by Seedlayer-Free Terbium Iron Garnets with Opposite Chiralities [Prabesh Dulal](#); University of Minnesota, United States.

4:30 PM *ES10.3.04

Controllable In-Plane Uniaxial Magnetic Anisotropy in Ni/NiO(110) Heterostructures [Ce-Wen Nan](#); Tsinghua University, China.

SESSION ES10.4: Poster Session I

Session Chairs: John Heron and Pu Yu
Tuesday Afternoon, April 18, 2017
8:00 PM - 10:00 PM

Sheraton, Third Level, Phoenix Ballroom

ES10.4.01

Room Temperature Magnetocapacitance Effects in Multiferroic M-type Hexaferrites—Bulk and Thin Film [Ruijun Tang](#); Soochow University, China.

ES10.4.02

Oxygen Transport-Driven Suppression of Phase Separation in the Double Perovskite Oxide La₂MnNiO₆ [Steven R. Spurgeon](#); Pacific Northwest National Laboratory, United States.

ES10.4.03

Controlled Deposition and Multiferroic Behavior of Ba_{0.70}Sr_{0.30}TiO₃-CoFe₂O₄ and PbZr_{0.52}Ti_{0.48}O₃-CoFe₂O₄ Vertical Aligned Nanostructures [Sergey Basov](#)^{1,2}; ¹Université catholique de Louvain, Belgium; ²Université de Bordeaux, France.

ES10.4.04

Orbital Preferential Occupation Induced Controllable Uniaxial Magnetic Anisotropy Observed in Ni/NiO(110) Heterostructures [Yu-Jun Zhang](#); Tsinghua University, China.

ES10.4.05

Magnetic Anisotropy of CoFe₂O₄ Nanotubes Synthesized by Radical-Enhanced ALD [Pui Lam Cheung](#); University of California, Los Angeles, United States.

ES10.4.06

High-Performance CuFe₂O₄ Epitaxial Thin Films with Enhanced Ferromagnetic Resonance Properties Hong Wang; Xi'an Jiaotong University, China.

ES10.4.07

Impact of Internal Electric Field on the Strain Memory Effect of Poled BiScO₃-PbTiO₃ Ceramics Jianguo Chen; Shanghai University, China.

ES10.4.08

Investigation of Ferroelectric and Ferromagnetic MPBs of Modified BiFeO₃-PbTiO₃ Solid Solutions J.R. Cheng; Shanghai University, China.

ES10.4.09

Improvement of Dielectric Tunability for Ba_{0.6}Sr_{0.4}TiO₃ Thin Films with Ba_xSr_{1-x}TiO₃ Buffer Layer on Stainless Steel Substrates Jinrong Cheng; Shanghai University, China.

SESSION ES10.5: Frontiers in Spintronics I
Session Chairs: Pietro Gambardella and Fengyuan Yang
Wednesday Morning, April 19, 2017
PCC North, 200 Level, Room 222 A

8:30 AM *ES10.5.01

Antiferromagnetic Spintronics Tomas Jungwirth^{1,2}; ¹Institute of Physics, Czech Academy of Sciences, Czech Republic; ²University of Nottingham, United Kingdom.

9:00 AM ES10.5.02

Correlation of the Conductivity/Magnetic Properties and the Electronic, Crystalline and Compositional Structure of Strongly Correlated Complex-Oxide Thin Films for Spintronic Applications German R. Castro^{1,2}; ¹SpLine CRG BM25 at the ESRF The European Synchrotron, France; ²Consejo Superior de Investigaciones Científicas CSIC, Spain.

9:15 AM *ES10.5.03

Spin Dynamics in Antiferromagnets Di Xiao; Carnegie Mellon University, United States.

9:45 AM ES10.5.04

An Insight of Magnetic Metal/Insulator Interfaces in Transition Metal Oxides Laura Steren; GlyA e Instituto de Nanociencia y Nanotecnología, Centro Atómico Constituyentes, CNEA, Argentina.

10:00 AM BREAK

SESSION ES10.6: Correlated Oxides—Interfaces and Magnetism II
Session Chairs: Ken-ichi Uchida and Di Xiao
Wednesday Morning, April 19, 2017
PCC North, 200 Level, Room 222 A

10:30 AM *ES10.6.01

FMR-Driven Pure Spin Transport from Y₃Fe₅O₁₂ Thin Films to Metals and Antiferromagnetic Insulators Fengyuan Yang; The Ohio State University, United States.

11:00 AM ES10.6.02

Anomalous Hall Effect by Charge Transfer at Non-Polar Interfaces in SrIrO₃/SrMnO₃ Superlattices Ho Nyung Lee; Oak Ridge National Laboratory, United States.

11:15 AM *ES10.6.03

Emergent Phenomena at the LaTiO₃/SrTiO₃ Interface—Evidence for Giant Rashba Spin Splitting Yuri Suzuki; Stanford University, United States.

11:45 AM ES10.6.04

Electronic Properties of Electron-Doped CaMnO₃ Thin Films Probed by Magnetotransport and Angle-Resolved Photoemission Spectroscopy Lorenzo Vistoli; Unité Mixte de Physique CNRS/Thales, Université Paris-Sud, Université Paris-Saclay, France.

SESSION ES10.7: Correlated Oxides—Interfaces and Magnetism III

Session Chairs: Ken-ichi Uchida and Di Xiao
Wednesday Afternoon, April 19, 2017
PCC North, 200 Level, Room 222 A

1:30 PM *ES10.7.01

Interlayer Coupling in Nickelate-Based Heterostructures Marta Gibert; University of Geneva, Switzerland.

2:00 PM *ES10.7.02

Potential of the LaAlO₃/SrTiO₃ Interface for Spintronics D. Vaz and Agnes Barthelemy; Unité Mixte de Physique CNRS-THALES, France.

2:30 PM BREAK

SESSION ES10.8: Frontiers in Spintronics II

Session Chairs: John Heron and Yuri Suzuki
Wednesday Afternoon, April 19, 2017
PCC North, 200 Level, Room 222 A

3:30 PM *ES10.8.01

Spin-Orbit Torques and Magnetoresistance in 5d and 4d Metal Systems Pietro Gambardella; ETH Zurich, Switzerland.

4:00 PM ES10.8.02

Heteroepitaxial Ferromagnetic Perovskite Hot-Electron Transistor Down to the Monolayer Limit Brian S. Kim; Stanford University, United States.

4:15 PM *ES10.8.03

Thermal Imaging of Spin Peltier Effects Ken-ichi Uchida^{1,2,3}; ¹National Institute for Materials Science, Japan; ²Tohoku University, Japan; ³Japan Science and Technology Agency, Japan.

4:45 PM ES10.8.04

Magnetic Backward Diode Exploiting Crossover Spin Valve Action in Manganese Substituted Magnetite/Semiconductor Heterojunctions Harinath Aireddy; IIT Kharagpur, India.

SESSION ES10.9: Poster Session II
Session Chairs: John Heron and Julia Mundy
Wednesday Afternoon, April 19, 2017
8:00 PM - 10:00 PM
Sheraton, Third Level, Phoenix Ballroom

ES10.9.01

Strain Mediated Large Electro-Mechanical Property of Thin Films Yanxi Li; Virginia Polytechnic Institute and State University, United States.

ES10.9.02

Expanding Ionic Electrolyte Gating on Oxide Heterostructures by Incorporating Poly-Ionic Liquids with Multifunctional Cation and Anion Groups Hua Zhou; Argonne National Laboratory, United States.

ES10.9.03

Ferroelectric Domain Structure and Photovoltaic Effect in Flexible BiFeO₃ Films Radhe Agarwal; University of Puerto Rico, Rio Piedras, United States.

ES10.9.04

Improved Dielectric Properties of (Ba,Sr)TiO₃-Ba₄Ti₁₃O₃₀ Composite Ceramics for Tunable Microwave Devices Dengren Jin; Shanghai University, China.

ES10.9.05

Fabrication and Characterization of La, Ga Co-Modified BiFeO₃-PbTiO₃ Multiferroic Ceramics with High Magnetic Field Assisted Sintering Jinrong Cheng; Shanghai University, China.

ES10.9.06

Probing the Tip Induced Polarization Switching and Magnetoelectric Coupling in PFN/NZFO/PFN Heterostructure at Room Temperature Dhiren K. Pradhan; University of Puerto Rico, United States.

ES10.9.07

Hydrothermal Synthesis of Ferroelectric Oxide Heterostructures with Sharp Interfaces Ming Li; Zhejiang University, China.

ES10.9.08

Resonant and Non-Resonant Raman Spectroscopy of Nickel Oxide Crystals and Thin Films Ece Aytan; University of California Riverside, United States.

ES10.9.09

Reversible Control of the Magnetization in Iron Based Magnetic Oxides via Lithium Ions Yanxue Chen; Shandong University, China.

SESSION ES10.10: Composite Multiferroics—Electric Field Control of Magnetism and Magnetoelectric Interfaces I

Session Chairs: John Heron and Sebastiaan van Dijken

Thursday Morning, April 20, 2017

PCC North, 200 Level, Room 222 A

8:00 AM *ES10.10.01

Device Applications of Acoustically Drive Ferromagnetic Resonance in Synthetic Multiferroic Heterostructures Sayceef Salahuddin; University of California, Berkeley, United States.

8:30 AM ES10.10.02

On the Speed of Piezostain-Mediated Voltage-Driven Perpendicular Magnetization Reversal—A Computational Perspective Renci Peng^{1,2}; ¹Tsinghua University, China; ²Pennsylvania State University, United States.

8:45 AM *ES10.10.03

Magnetism and Spin Transport in Ferroelectric/Ferromagnetic Heterostructure Jingsheng Chen; National University of Singapore, Singapore.

9:15 AM ES10.10.04

Electric Field Control of Magnetic Skyrmions in Magnetoelectric Nanostructures Jiamian Hu^{1,2}; ¹Pennsylvania State University, United States; ²University of Wisconsin-Madison, United States.

9:30 AM ES10.10.05

Deterministic Control of Cationic Substitution by Strain in Bi₄Ti₃O₁₂-BiFeO₃ Epitaxial Thin Films Changhee Sohn; Oak Ridge National Laboratory, United States.

9:45 AM ES10.10.06

Probing the Depth Dependent Magnetization of FeGa/NiFe Multilayers Using Polarized Neutron Reflectometry Colin R. Rementer; University of California Los Angeles, United States.

10:00 AM BREAK

SESSION ES10.11: Multiferroics and Magnetoelectrics—Properties of Thin-Films

Session Chairs: Jingsheng Chen and Sayceef Salahuddin

Thursday Morning, April 20, 2017

PCC North, 200 Level, Room 222 A

10:30 AM ES10.11.01

Magnetic and Dielectric Properties in Room-Temperature Multiferroic GaxFe_{2-x}O₃ Epitaxial Thin Films Tsukasa Katayama; Tokyo Institute of Technology, Japan.

10:45 AM *ES10.11.02

Non-Collinear Spin Order in BiFeO₃—Tuning, Control and Imaging Manuel Bibes; CNRS-Thales, France.

11:15 AM ES10.11.03

Controlling the Electrical and Magnetoelectric Properties of Epitaxially Strained Sr_{1-x}Ba_xMnO₃ Thin Films Eric Langenberg^{1,2}; ¹Instituto de Ciencia de Materiales de Aragón (ICMA), Universidad de Zaragoza-CSIC, Spain; ²Universidad de Zaragoza, Spain.

11:30 AM ES10.11.04

Oxygen-Vacancy Engineering in Strained Multiferroic SrMnO₃ Thin Films Laura Maurel^{1,2,3}; ¹Paul Scherrer Institut, Switzerland; ²Universidad de Zaragoza, Spain; ³Universidad de Zaragoza, Spain.

11:45 AM ES10.11.05

Magnetoelectricity at the Antiperovskite/Perovskite Interface Ding-Fu Shao; University of Nebraska-Lincoln, United States.

SESSION ES10.12: Complex Oxides—MITs

Session Chairs: Manuel Bibes and Pu Yu

Thursday Afternoon, April 20, 2017

PCC North, 200 Level, Room 222 A

1:30 PM ES10.12.01

Nanoscale Resistive Domains Imaging across a Metal-to-Insulator Transition in NdNiO₃ Daniele Preziosi; UMR137-CNRS/Thales, France.

1:45 PM *ES10.12.02

Understanding Nanoscale Heterogeneity and Phase Coexistence in Quantum Materials Elke Arenholz; Lawrence Berkeley National Lab, United States.

2:15 PM ES10.12.03

Engineering One-Dimensional Quantum Stripes from Layered Complex Oxides Ambrose Seo; University of Kentucky, United States.

2:30 PM *ES10.12.04

Metal-Insulator Transitions in All-In/All-Out Ordered 5d Pyrochlore Oxides Tae Won Noh^{1,2}; ¹Seoul National University, Korea (the Republic of); ²Seoul National University, Korea (the Republic of).

3:00 PM BREAK

SESSION ES10.13: Correlated Oxides—Interfaces and Magnetism IV

Session Chairs: Elke Arenholz and Tae Won Noh

Thursday Afternoon, April 20, 2017

PCC North, 200 Level, Room 222 A

3:30 PM ES10.13.01

Heteroepitaxy of Fe₃O₄/Muscovite—A New Perspective for Flexible Spintronics Ping-Chun Wu; National Chiao Tung University, Taiwan.

3:45 PM *ES10.13.02

Ultrastrong Magnetic Coupling at the La_{0.7}Sr_{0.3}MnO₃-SrRuO₃ Interface Kathrin Dorr; MLU Halle-Wittenberg, Germany.

4:15 PM ES10.13.03

Double Perovskite Sr₂FeMoO₆—A Potential Candidate for Room Temperature Magnetoresistive Device Applications Nitu Kumar; University of Puerto Rico, United States.

4:30 PM *ES10.13.04

Controlled Lateral Anisotropy in Correlated Manganite Heterostructures by Interface-Engineered Oxygen Octahedral Coupling Mark Huijben; University of Twente, Netherlands.

SESSION ES10.14: Poster Session III
Session Chairs: Satoshi Okamoto and Morgan Trassin
Thursday Afternoon, April 20, 2017
8:00 PM - 10:00 PM
Sheraton, Third Level, Phoenix Ballroom

ES10.14.01

Angle-Resolved Photoemission Spectroscopy on Strained NdNiO₃ Thin Films Daniele Preziosi; UMR137-CNRS/Thales, France.

ES10.14.02

Size Driven Polarization Rotation as well as Magnetic Order Tuning in a Magnetoelectric Multiferroic Narayan Bastola; Indian Institute of Science, India.

ES10.14.03

Manipulation of Magnetic Properties of LaMnO₃ through Interface Engineering Liang Wu; Tsinghua University, China.

ES10.14.04

Multifunctional Properties of Highly c-Axis Oriented NZFO Thin Films Dhiren K. Pradhan; University of Puerto Rico, United States.

ES10.14.05

Magnetic and Magnetoresistive Behavior of MnFe₂O₄ Nanofibers Obtained by Electrospinning Lizeth Vazquez Zubiarte; Universidad Autonoma de Ciudad Juarez, Mexico.

ES10.14.06

Synthesis and Characterization of Novel Inverted NiO@Ni_xMn_{1-x}O Core-Shell Nanoparticles Samiul Hasan; Missouri State University, United States.

ES10.14.07

Enhanced Dielectric and Ferroelectric Properties of 0.7BF-0.3PT Thin Films Derived by an Ethylene Glycol Modified Sol-Gel Method Jinrong Cheng; Shanghai University, China.

ES10.14.08

Enhanced Dielectric and Piezoelectric Properties of the BiFeO₃-PbTiO₃-BaZrO₃ Ternary High Curie Temperature Ceramics J.R. Cheng; Shanghai University, China.

SESSION ES10.15: Composite Multiferroics—Electric Field Control of Magnetism and Magnetoelectric Interfaces II
Session Chairs: John Heron and Jiamian Hu
Friday Morning, April 21, 2017
PCC North, 200 Level, Room 222 A

8:00 AM *ES10.15.01

Electric-Field Control of Magnetism in Strain-Coupled Multiferric Heterostructures Sebastiaan van Dijken; Aalto University, Finland.

8:30 AM ES10.15.02

Strain Effects on the Anisotropy and Domain Structure of FePt/BaTiO₃ Structures Laura Steren^{1,2,3}; ¹Centro Atomico Constituyentes, Argentina; ²Instituto de Nanociencia y Nanotecnología, Centro Atomico Constituyentes, Argentina; ³Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina.

8:45 AM *ES10.15.03

Real Space Studies of the Electronic and Magnetic Properties of Oxide Multiferroic Interfaces by Aberration Corrected STEM-EELS Maria Varela^{1,4}; ¹Universidad Complutense, Spain; ⁴Instituto de Magnetismo Aplicado UCM-ADIF-CSIC, Spain.

9:15 AM ES10.15.04

Abnormal Negative Electroresistance and Giant Resistance Modulation in Self-Strained Manganite/Piezoelectric Heterostructures Zhenping Wu^{1,2}; ¹Beijing University of Posts and Telecommunications, China; ²University of Geneva, Switzerland.

9:30 AM BREAK

SESSION ES10.16: Complex Oxides—Interfaces and Magnetism
Session Chairs: Satoshi Okamoto and Pu Yu
Friday Morning, April 21, 2017
PCC North, 200 Level, Room 222 A

10:00 AM ES10.16.01

Spin Reconstruction as a Function of Thickness at the (111)-Oriented La_{0.7}Sr_{0.3}MnO₃/LaFeO₃ Interface Ingrid G. Hallsteinsen^{1,2}; ¹Norwegian University of Science and Technology (NTNU), Norway; ²Lawrence Berkeley National Laboratory, United States.

10:15 AM *ES10.16.02

Novel Properties of 5d Transition Metal Compounds Xiangang Wan; Nanjing University, China.

10:45 AM *ES10.16.03

Interface Driven Emergent Phases in Iridates Masashi Kawasaki^{1,2}; ¹The University of Tokyo, Japan; ²RIKEN CEMS, Japan.

SESSION ES10.17: Complex Oxides—Structure and Phase Properties
Session Chairs: Satoshi Okamoto and Morgan Trassin
Friday Morning, April 21, 2017
PCC North, 200 Level, Room 222 A

11:15 AM ES10.17.01

Pressure-Induced Changes of Chemical Composition and Electronic Properties of Ultra-Thin Manganites Rama K. Vasudevan; Oak Ridge National Laboratory, United States.

11:30 AM ES10.17.02

Structural and Electronic Properties of SrTiO₃/GaAs Hetero-Interfaces Liang Hong; University of Illinois at Chicago, United States.