

Oral session

Monday, August 29th, 2022

9:00 1-1 **Opening**
at Hotel Danrokan 2F -Crystal-

A. Domain and domain wall dynamics

Chairperson: Zuo-Guang Ye

- 9:30 1-2 **Antiferroelectric phase boundaries in lead zirconate**
Invited Ying Liu,¹ Gustau Catalan^{1,2}
¹ ICN2-Institut Català de Nanociència i Nanotecnologia
² ICREA-Institució Catalana de Recerca i Estudis Avançats
- 10:00 1-3 **Magnetization reversal by electric field in Co-substituted BiFeO₃ under a control of domains by trailing fields-**
Kei Shigematsu,^{1,2} Takuma Itoh,¹ Marin Katsumata¹ and Masaki Azuma^{1,2}
¹ Laboratory for Materials and Structures, Tokyo Institute of Technology
² Kanagawa Institute of Industrial Science and Technology

10:20 *Coffee Break (30 min)*

Chairperson: Gustau Catalan

- 10:50 1-4 **Separation of ferroelectric and non-ferroelectric features in piezoresponse force microscopy**
Invited G. Kevin Ligonde,¹ Kerisha Williams,² and Nazanin Bassiri-Gharb^{1,2}
¹ G.W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology
² School of Materials Science and Engineering, Georgia Institute of Technology
- 11:20 1-5 **Characterization of Dielectric and Ferroelectric Materials Using Scanning Nonlinear Dielectric Microscopy**
Invited Yoshiomi Hiranaga
Tohoku University

11:50 *Lunch (90 min)*

Chairperson: Nazanin Bassiri-Gharb

- 13:20 1-6 **Unconventional Properties of Nominally Charged Domain Walls in Uniaxial Ferroelectric Lead Germanate**
Invited A. Gruverman,¹ O. Bak,¹ T. S. Holstad,² Y. Tan,³ H. Lu,¹ D. M. Evans,² K. A. Hunnestad,² B. Wang,³ J. P. V. McConville,⁴ P. Becker,⁵ L. Bohatý,⁵ I. Lukyanchuk,⁶ V. M. Vinokur,⁷ A. T. J. van Helvoort,⁸ J. M. Gregg,⁴ L.-Q. Chen,³ and D. Meier²
¹ Department of Physics and Astronomy, University of Nebraska
² Department of Materials Science and Engineering, Norwegian University of Science and Technology
³ Department of Materials Science and Engineering, Pennsylvania State University
⁴ School of Mathematics and Physics, Queen's University
⁵ Institute of Geology and Mineralogy, University of Cologne
⁶ Laboratory of Condensed Matter Physics, University of Picardie
⁷ Materials Science Division, Argonne National Laboratory
⁸ Department of Physics, Norwegian University of Science and Technology

- 13:50 1-7 **Domain Wall Contributions to Properties in PZT Ceramics and Films**
 Invited Lyndsey M. Denis-Rotella,¹ Giovanni Esteves,² Julian Walker,¹ Hanhan Zhou,²
 Jacob L. Jones,² and Susan Trolier-McKinstry¹
¹ Materials Science and Engineering Department and Materials Research Institute,
 Penn State
² Materials Science and Engineering Department, North Carolina State University
- 14:20 1-8 **Ferroelectricity at the nanoscale: complex polarisation textures and emergent functionalities**
 Kumara Cordero-Edwards,¹ Philippe Tückmantel,¹ Christian Weymann,¹
 Céline Lichtensteiger,¹ Salia Cherifi-Hertel,² Aaron Naden,³ Iaroslav Gaponenko,¹ and
Patrycja Paruch¹
¹ DQMP, University of Geneva
² Université de Strasbourg, CNRS, Institut de Physique et Chimie des Matériaux de
 Strasbourg
³ School of Chemistry, University of St Andrews

B. Domain walls

- 14:40 1-9 **Quantifying, Tuning, and Reconfiguring 2D Electron Gases in Ferroic Domain Walls**
 Invited Lukas M. Eng^{1,2}, Elke Beyreuther¹, Manuel Zahn¹, Henrik Beccard¹, Ekta Singh¹,
 Thomas Kämpfe¹, Benjamin Kirbus¹, Zeeshan Amber¹, Peter Hegarty¹, Michael Rüsing¹,
 Petr Bednyakov³, Jiří Hlinka³, Clifford Hicks⁴, and Simone Sanna⁵
¹ Institute of Applied Physics, TU Dresden
² ct.qmat: Würzburg-Dresden Cluster of Excellence, EXC 2147, TU Dresden
³ Institute of Physics of the Czech Academy of Sciences
⁴ Univ. Birmingham, School of Physics and Astronomy
⁵ Justus-Liebig-Univ. Giessen, Institut für Theoretische Physik

15:10

Coffee Break (30 min)

Chairperson: Alexei Gruverman

- 15:40 1-10 **Corbino Cones and Memory Devices involving LiNbO₃ Ferroelectric Domain Walls**
 Invited Conor J. McCluskey¹, Ahmet Suna¹, Matthew G. Colbear¹, James P. V. McConville¹,
 Shane J. McCartan¹, Jesi R. Maguire¹, Michele Conroy², Kalani Moore², Alan Harvey²,
 Felix Trier^{3,4}, Ursel Bangert², Alexei Gruverman⁵, Manuel Bibes³, Amit Kumar¹,
 Raymond G. P. McQuaid¹ and J. Marty Gregg¹
¹ School of Mathematics and Physics, Queen's University Belfast
² Department of Physics & Bernal Institute, University of Limerick
³ Unité Mixte de Physique, CNRS, Thales, Université Paris-Saclay
⁴ Department of Energy Conversion and Storage, Technical University of Denmark
⁵ Department of Physics and Astronomy, University of Nebraska
- 16:10 1-11 **Correlative imaging of ferroelectric domain walls**
Iaroslav Gaponenko^{1,2}, Salia Cherifi-Hertel,³ Ulises Acevedo-Salas,³
 Nazanin Bassiri-Gharb,^{2,4} and Patrycja Paruch¹
¹ Department of Quantum Matter Physics, University of Geneva
² G.W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology
³ CNRS, Institut de Physique et Chimie des Matériaux de Strasbourg
⁴ School of Materials Science and Engineering, Georgia Institute of Technology

C. Materials and properties

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| 16:30 | 1-12 | Structural Study on Emergent Ferroelectricity in Perovskite-type Oxides by Synchrotron Radiation X-ray Diffraction |
| | Invited | <u>Yoshihiro Kuroiwa</u>
Graduate School of Advanced Science and Engineering, Hiroshima University |
| 17:00 | 1-13 | Ferroelasticity vs. Ferroelectricity in Organic-Inorganic Halide Perovskites |
| | Invited | <u>Zuo-Guang Ye</u> , ¹ Maryam Bari, ¹ and Alexei A. Bokov ¹
¹ Department of Chemistry and 4D LABS, Simon Fraser University |

Chairperson: Susan Trolier-McKinstry

- 9:00 2-1 **Energy storage ceramic capacitors utilizing ferrorestorable polarization**
Invited Yuji Noguchi¹ and Hiroki Matsuo²
¹ Division of Information and Energy, Faculty of Advanced Science and Technology, Kumamoto University
² International Research Organization for Advanced Science & Technology (IROAST), Kumamoto University
- 9:30 2-2 **Contribution of A-site cation off-centering on the piezoelectricity and domain structure in Bi-based lead-free piezoceramics**
Invited Sangwook Kim
Graduate School of Advanced Science and Engineering, Hiroshima University
- 10:00 2-3 **Antiferroelectric-like behavior and unconventional domain response in titanite-type CaTi(Si_{1-x}Ge_x)O₅**
Hiroki Taniguchi, Takumi Watanabe, Akitoshi Nakano, and Kazuhiko Deguchi
Department of Physics, Nagoya University
- 10:20 *Coffee Break (30 min)*

D. Domain structure and properties

Chairperson: Yuji Noguchi

- 10:50 2-4 **Revealing Competing Domain Styles in Relaxor Ferroelectrics**
Invited Hiroyuki Takenaka,¹ Robert B. Wexler,^{1,2} and Andrew M. Rappe¹
¹ Department of Chemistry, University of Pennsylvania
² Department of Chemistry, Washington University
- 11:20 2-5 **Physics and application of ferroelectric domains. Centenary of ferroelectricity**
Invited Vladimir Shur
Institute of Physics and Applied Mathematics, Ural Federal University
- 11:50 *Lunch (90 min)*

Chairperson: Andrew Rappe

- 13:20 2-6 **Ultrahigh Strain and Piezoelectric Behavior in Gen III PMN-PZT Single Crystals ($d_{33} > 4,000$ pC/N) Developed by SSCG Technique**
Invited Dong-Ho KIM,¹ Hyun-Taek OH,¹ and Ho-Yong LEE^{1,2}
¹ R&D Division, Ceracomp Co., Ltd.
² Department of Materials Science and Engineering, Sun Moon University
- 13:50 2-7 **Domain structures and properties of AC poled PMN-PT single crystals**
Invited Xiaoning Jiang,¹ Hwang-Pill Kim,¹ and Yohachi (John) Yamashita^{1,2}
¹ Department of Mechanical and Aerospace Engineering, North Carolina State University
² Faculty of Engineering, Toyama Prefectural University

14:20	2-8	Domain Structure of Perovskite Single Crystals and Ceramics <u>Yohachi (John) Yamashita</u> , ^{1,2} Yuri Yago ¹ , Yiqin Sun, ¹ Zhuangkai Wang ¹ , and Tomoaki Karaki ¹ ¹ Department of Engineering, Toyama Prefectural Univ. ² Aerospace and Mechanical Engineering Dep., NC State Univ.
14:40	2-9 Invited	Domain structure change by applying an electric field in dominantly in-plane-polarized (100)/(001)-oriented tetragonal Pb(Zr, Ti)O₃ films <u>Hiroshi Funakubo</u> ¹ , Daichi Ichinose ¹ , Yoshitaka Ehara ^{1,2} , Takao Shimizu ^{1,3} , Osami Sakata ⁴ , and Tomoaki Yamada ⁵ ¹ Department of Materials Science and Engineering, Tokyo Institute of Technology ² Department of Communications Engineering, National Defense Academy ³ Research Center for Functional Materials, National Institute for Materials Science ⁴ Japan Synchrotron Radiation Research Institute (JASRI)/SPRING-8 ⁵ Department of Energy Engineering, Nagoya University
15:10		Coffee Break (30 min)
Chairperson: Hiroshi Funakubo		
15:40		2 min poster presentation
16:10		Poster session (80 min) at Hotel Danrokan 1F -Amber-
18:00		<u>Banquet “TAIYO YUDEN Party”</u> at Hotel Danrokan 2F -Crystal-

Chairperson: Tomoaki Yamada

- 9:00 3-1 **Bulk nano-domains in KTP: stability, dynamics and applications**
Invited Carlota Canalias,¹ Andrius Zukauskas,¹ Patrick Mutter,¹ and Cherrie Lee¹
¹ Department of Applied Physics, KTH-Royal Institute of Technology
- 9:30 3-2 **Realization of Both Electron and Hole Layers Proving Intrinsic Ferroelectric Origin not due to Defects**
Invited Y. Watanabe,^{1,2} D. Matsumoto,² Y. Urakami,² S. Miyauchi,² S. Kaku,² T. Yamada,¹ S. Cheong,³ and A. Masuda²
¹ Kyushu University
² University of Hyogo
³ Rutgers University
- 10:00 3-3 **Enhanced photovoltaic effects in ferroelectric thin films with nanodomains**
Hiroki Matsuo,¹ and Yuji Noguchi²
¹ International Research Organization for Advanced Science & Technology (IROAST), Kumamoto University
² Division of Information and Energy, Faculty of Advanced Science and Technology, Kumamoto University

10:20

Coffee Break (30 min)

Chairperson: Yukio Watanabe

- 10:50 3-4 **Engineering novel functionalities in ferroelectric superlattices**
Invited Pavlo Zubko^{1,2}
¹ Department of Physics and Astronomy, University College London
² London Centre for Nanotechnology

E. Domains

- 11:20 3-5 **Nanoscale Structure Analysis of Ferroelectric Materials**
Invited Yasuhiro Yoneda,¹ Hyunwook Nam,² Shintaro Ueno,² Ichiro Fujii,² Sangwook Kim,³ and Satoshi Wada²
¹ Materials Sciences Research Center, Japan Atomic Energy Agency
² Interdisciplinary Graduate School of Medical and Engineering, University of Yamanashi
³ School of Advanced Science and Engineering, Hiroshima University

11:50

Lunch (90 min)

Chairperson: Pavlo Zubko

- 13:20 3-6 **Nonlinear optical microscopy from bulk to thin film ferroelectric –What happens under optical confinement?**
Invited Michael Rüsing,¹ Zeeshan H. Amber,¹ and Lukas M. Eng^{1,2}
¹ Technical University of Dresden, Institute of Applied Physics
² ct.qmat: Dresden-Würzburg Cluster of Excellence—EXC 2147, TU Dresden

- 13:50 3-7 **3D Imaging of Nanocrystals by Coherent X-ray Diffraction**
Invited Kenji Ohwada,¹ Norihiro Oshime,¹ Kento Sugawara,¹ Ayumu Shimada,¹ Nagise Fukushima,² Tetsuro Ueno,¹ Akihiko Machida,¹ Tetsu Watanuki,¹ Shintaro Ueno,³ Ichiro Fujii,³ Satoshi Wada,³ Koichi Momma,⁴ Kenji Ishii,¹ Hidenori Toyokawa,^{1,5} Shinya Tsukada,⁶ and Yoshihiro Kuroiwa²
¹ SRRC, National Institutes for Quantum Science and Technology (QST)
² Graduate School of Advanced Science and Engineering, Hiroshima University
³ Graduate Faculty of Interdisciplinary Research, University of Yamanashi
⁴ National Museum of Nature and Science
⁵ Japan Synchrotron Radiation Research Institute (JASRI), SPring-8
⁶ Faculty of Education, Shimane University
- 14:20 3-8 **Domain Structure Observation and Design of Phase Transition-type Negative Thermal Expansion Materials**
Takumi Nishikubo^{1,2}, Takashi Imai,² Yuki Sakai,^{1,2} Masaichiro Mizumaki,³ Shogo Kawaguchi,³ Norihiro Oshime,⁴ Ayumu Shimada,⁴ Kento Sugawara,⁴ Kenji Ohwada,⁴ Akihiko Machida,⁴ Tetsu Watanuki,⁴ Kosuke Kurushima,⁵ Shigeo Mori,⁶ Takashi Mizokawa⁷ and Masaki Azuma^{2,1}
¹ Kanagawa Institute of Industrial Science and Technology
² Laboratory for Materials and Structures, Tokyo Institute of Technology
³ Japan Synchrotron Radiation Research Institute, SPring-8
⁴ National Institutes for Quantum Science and Technology (QST), SPring-8
⁵ Toray Research Center
⁶ Department of Materials Science, Osaka Prefecture University
⁷ Department of Applied Physics, Waseda University
- 14:40 3-9 **The Multiwells: Switching Portraits of the Thiophosphate Family**
Invited Petro Maksymovych
Center for Nanophase Materials Sciences, Oak Ridge National Laboratory
- 15:10 *Coffee Break (30 min)*
- Chairperson: Petro Maksymovych**
- 15:40 3-10 **Domain Structure Evolution in Tensile-strained (Pb_xSr_{1-x})TiO₃ Thin Films below 50 nm Thickness**
Invited Tomoaki Yamada¹, Yuto Ota¹, Xueyou Yuan¹, Daisuke Ichinose², Yoshitaka Ehara³, Takao Shimizu^{2,4}, Masahito Yoshino¹, Hiroshi Funakubo², and Takanori Nagasaki¹
¹ Department of Energy Engineering, Nagoya University
² School Materials and Chemical Technology, Tokyo Institute of Technology
³ Department of Communications Engineering, National Defense Academy
⁴ Research Center for Functional Materials, National Institute for Materials Science
- 16:10 3-11 **Atomic-scale analysis of composition modulated Pb(Zr_xTi_{1-x})O₃ superlattice**
Yukio Sato,¹ Goki Kimura,² Sang Hyo Kweon,² Goon Tan,³ and Isaku Kanno²
¹ Department of Materials Science and Engineering, Kyushu University
² Department of Mechanical Engineering, Kobe University
³ Faculty of Liberal Arts, Sciences and Global Education, Osaka Metropolitan University
- 16:30 3-12 **Visualization of the Atomic Displacements and Nano Domains of Dielectrics for a MLCC using the Atomic Resolution Scanning Transmission Electron Microscope**
Invited Minoru Ryu¹ and Yoshiki Iwazaki¹
¹ Research and Development Laboratory, TAIYO YUDEN CO., LTD.

17:00 3-13

Closing