

Basic Science of Dielectrics

- I.1 Improved Mixing Rule on Permittivity; Kikuo Wakino; *Murata Manufacturing Company Ltd., Japan.*
- I.2 Atomic Level Control of Perovskite Lattice Instabilities by Cation Substitution; David J. Singh^{*}, M. Ghita[†], M. Fornari[†], and S.V. Halilov[#]; ^{*}*Oak Ridge National Laboratory*, [†]*Central Michigan University*, and [#]*R.J. Mears LLC, USA.*
- I.3 Effect of Cation Ratio on Defect Structure and Related Properties of Lithium Niobate – Lithium Ion Diffusion in LN – ; Hajime Haneda, Isao Sakaguchi, Shunji Takekawa, Masaru Nakamura, and Kenji Kitamura; *National Institute for Materials Science, Advance Materials Laboratory, Japan.*
- I.4 Influence of Vacancies on the Dielectric Properties of HfO₂; Eric Cockayne; *National Institute of Standards and Technology, USA.*
- I.5 Dielectric Relaxation of BaTiO₃-based Ceramics; Takaaki Tsurumi, J. Li, H. Kakemoto, S. Wada and H. Kawaji; *Tokyo Institute of Technology, Japan.*
- I.6 First-Principles Based Simulations of the Relaxor Ferroelectrics PSN and PMN; Benjamin Burton^{*}, Eric Cockayne^{*}, S. Tinte^{*}, and U.V. Waghmare[†]; ^{*}*National Institute of Standards and Technology, USA*, [†]*J. Nehru Center for Advanced Scientific Research, India.*
- I.8 Apparent Colossal Dielectric Relaxation by Electrical Heterogeneous Structure; Mamoru Fukunaga; *Waseda University, Japan.*
- I.9 Polarization Rotation in Relaxor Ferroelectrics: Advances in First-principles Studies of Transducer Materials; Ronald E. Cohen^{*}, Z. Wu^{*}, N. Choudhury^{*†}, and A. Asthagiri^{*#}; ^{*}*Carnegie Institute of Washington, USA*, [#]*University of Florida, USA*, and [†]*Bhabha Atomic Research Centre, India.*
- I.10 Ferroelectric Systems with Ultra-Low Domain Wall Energy: PMN-PT and PZN-PT Near the Morphotropic Boundary; A.G. Khachatryan^{*} and [†]D. Viehland; ^{*}*Rutgers University*, [†]*Virginia Polytechnic Institute, USA.*
- I.11 Electric-field-induced transformation of incommensurate modulations in antiferroelectric Pb_{0.99}Nb_{0.02}[(Zr_{0.58}Sn_{0.42})_{0.955}Ti_{0.045}]_{0.98}O₃; Xiaoli Tan^{*} Hui He^{*}, and David P. Cann[†]; *Iowa State University*^{*}, *Oregon State University*[†] *USA.*
- I.12 Relaxor Ferroelectric Polymers; Shihai Zhang^{*}, Cheng Huang^{*}, Z.-Y. Cheng[^], F. Xia^{*}, R. Klein^{*}, Q. M. Zhang^{*}, V. Bobnar[†], A. Levstik[†], and Francois Bauer[#]; ^{*}*The Pennsylvania State University, USA*, [^]*Auburn University, USA*, [†]*Josef Stefan Institute, Slovenia*, [#]*Institut Franco-Allemand de Recherches de Saint-Louis, (ISL), France.*
- I.13 Phase Transformation of Fine Powder of Barium Titanate Confirmed by Raman Spectroscopy and Powder X-Ray Diffraction; Tooru Nakai, Hiroyuki Ikawa, Seiichi Higuchi, and Minoru Takemoto; *Kanagawa Institute of Technology, Japan.*
- I.14 Nanograin Barium Titanates Ceramics, Processing and Properties; L-Wei Chen; *University of Pennsylvania, USA.*

- I.15 Size and Temperature Dependence of Crystal Structures on Barium Titanate Nanoparticles; Takuya Hoshina, Hirofumi Kakemoto, Takaaki Tsurumi, and Satoshi Wada; Tokyo Institute of Technology, Japan.
- I.16 Effect of Oxygen Partial Pressure on Sintering Undoped Nanocrystalline Barium Titanate Powder; Anton Polotai*, Kristen Breece*, Elizabeth Dickey*, Vadim Bulanov†, Andrey Ragulya†, and Clive Randall*; *The Pennsylvania State University, †NAS of Ukraine, USA.
- I.17 Multi-polarization-mechanism in polar dielectrics and dielectric behavior under dc bias; Ang Chen and Zhi Yu; The University of Akron, USA.
- I.18 Dielectric relaxor behavior in doped quantum paraelectrics and related dielectrics; Zhi Yu and Ang Chen; The University of Akron, USA.
- I.19 Electrospinning of Complex Oxide Ceramic Nanofibers; Juan C. Nino, Junhan Yuh, and Wolfgang M. Sigmund; University of Florida, USA.
- I.20 Flexoelectricity Beyond the Transverse Effect; Wenyi Zhu, Nan Li, and L. Eric Cross; The Pennsylvania State University, USA.
- I.21 The polar cluster like behavior in Ti⁴⁺ doped Ba(ZrTi)O₃ ceramics; Tanmoy Maiti*, E. Alberta†, R. Guo*, and Amar Bhalla*; The Pennsylvania State University, †TRS Ceramics, USA.

12:00 – 1:00 p.m. Lunch (Patio)

SESSION II. Piezoelectric Materials, Phenomena, and Applications

Session Chairs: Takaaki Tsurumi, Tokyo Institute of Technology (Japan)
Ahmad Safari, Rutgers University (USA)

1:00–2:30 p.m. Plenary Lectures — Piezoelectric Materials, Phenomena, and Applications

- P11.1 1:00 – 1:30 p.m. Recent developments in Electromechanical Probing on the Nanoscale: Vector and Spectroscopic Imaging, Resolution, and Molecular Orientation Mapping; Sergei V. Kalinin*, S. Jesse*, A.Y. Borisevich*, H.N. Lee*, B.J. Rodriguez*, J. Hanson†, A. Gruverman†, E. Karapetian#, and M. Kachanov**; *Oak Ridge National Laboratory, †North Carolina State University, #Suffolk University, and **Tufts University, USA.
- P11.2 1:30 – 2:00 p.m. Nb-Perovskite Structured Piezoelectric Ceramics for Sensor and Actuator; Yasuyoshi Saito and Hisaaki Takao; Toyota Central R&D Labs, Japan.
- P11.3 2:00 – 2:30 p.m. Piezoelectric Multi-Layer Ceramic Components: Current Status and Future Trends; Heinz Florian; EPCOS OHG, Austria (Europe).
- 2:30 – 2:45 p.m. Break/Group Photo (Patio) (in case of rain, Group Photo will be taken at 5:30 PM in the Chesapeake Ballroom)
- 2:45 – 5:30 p.m. Poster Summaries and Poster Viewing

Piezoelectric Materials, Phenomena, and Applications

- II.1 Enhanced Tetragonality in $\text{PbTiO}_3\text{-Bi(B'B'')O}_3$ Solid Solutions; *Matthew R. Suchomel and Peter K. Davies; University of Pennsylvania, PA, USA.*
- II.2 Application of BSPT high temperature ceramics for acceleration sensors; *Sorah Rhee**, *J. Suzuki**, *S.J. Zhang†*, and *T.R. Shrout†*; **MEGGITT Endevco Inc., and †Penn State University, USA.*
- II.3 Piezoelectric Properties of Textured Ceramics in Bismuth Layer-structured Ferroelectrics; *Masahiko Kimura, Hirozumi Ogawa, Takuya Sawada, Kosuke Shiratsuyu, Nobuyuki Wada, and Akira Ando, Murata Manufacturing Co., Ltd.*
- II.4 Crystal-oriented $\text{Sr}_2\text{NaNb}_5\text{O}_{15}$ Ceramics Fabricated by High-Magnetic-Field Method; *Yutaka Doshida**, *Hiroshi Kishi†*, *Yusuke Hattori†*, *Atsushi Makiya†*, *Satoshi Tanaka†*, *Keizo Uematsu†*, *Tsunehisa Kimura#*; **Taiyo Yuden Co., Ltd., †Nagaoka University of Technology, #Tokyo Metropolitan University, Japan.*
- II.5 Longitudinal Elastic Properties of Morphotropic PMN-PT Single Crystal; *Lynn Ewart, Elizabeth McLaughlin, Hal Robinson, and Ahmed Amin; NAVSEA Undersea Warfare Center Division Newport, USA.*
- II.7 Mechanisms of “Solid State” Single Crystal Conversion; *Shen Dillon**, *Edward P. Gorzkowski†*, *Helen M. Chan**, *Martin P. Harmer**; **Lehigh University, †Naval Research Laboratory, USA.*
- II.8 Spark-Plasma Sintering of PMN-PT Ceramics for Solid State Single Crystal Growth; *Hisao Yamada; Cerone, Inc., USA.*
- II.9 Preparation and Piezoelectric Properties of 2 Inch Size Relaxor Single Crystals; *Noboru Ichinose and Kentaro Hirayama; Waseda University, Japan.*
- II.10 Relationship between Crystal Plane and Poling Direction to Realize Giant Electromechanical Coupling Factor of k_{31} Mode in Relaxor Single Crystals; *Toshio Ogawa; Shizuoka Institute of Science and Technology, Japan.*
- II.11 Dielectric, Elastic, Piezoelectric Constants and Surface Acoustic Wave Properties of Rare-Earth Calcium Oxoborates, $\text{RCa}_4\text{O(BO}_3)_3$ ($R = \text{La, Gd, Y}$), Single Crystals; *Hiroyuki Shimizu**, *Ayako Kondo**, *Masahiro Nishida†*, *Hiroaki Takeda**, *Takashi Nishida**, and *Tadashi Shiosaki**; **Nara Institute of Science and Technology (NAIST), †Sakai Chemical Industry Co., Ltd.† Japan.*
- II.12 High Density Deformable Mirror Technology; *Shoko Yoshikawa, Thomas Price, Jeffery Cavaco, and Mark Ealey; Xinetics, Inc., USA.*
- II.13 Ferroelectric and Piezoelectric Properties of $(\text{Bi}_{1/2}\text{K}_{1/2})\text{TiO}_3$ Ceramics; *Yuji Hiruma, Rintaro Aoyagi, Hajime Nagata and Tadashi Takenaka; Tokyo University of Science, Japan.*
- II.14 High Dielectric Constant and Large Electromechanical Coupling Factor Relaxor-Based Piezoelectric Ceramics; *Yohachi (John) Yamashita & Yasuharu Hosono; Toshiba Corporation, Japan.*
- II.16 Opportunities in Crystal Growth and Applications of PMN-PT Piezo Crystal; *Pengdi Han; H.C. Materials Corporation, USA.*

- II.17 Temperature dependence of electrical and electromechanical properties of Ba(Zr_{0.2}Ti_{0.8})O₃ thin films by chemical solution deposition; *Takashi Hayashi, Kohei Ohashi, and Hiroshi Maiwa; Shonan Institute of Technology, Japan.*
- II.18 Characterization and process control of Ag interdiffusion into multilayer PZT actuators; *Niall Donnelly, Thomas R. Shrout, and Clive A. Randall; The Pennsylvania State University, USA.*
- II.19 High strain response in donor doped BaTiO₃ with gradient structures; *Relva Buchanan, C.Y. Yau, Euisuk Park, and Rajesh Surana, University of Cincinnati, USA.*
- II.20 Domain Wall Engineering for Lead-free Piezoelectric Crystals; *Satoshi Wada, Koichi Yako, Keiichi Yokoo, Hirofumi Kakemoto, and Takaaki Tsurumi; Tokyo Institute of Technology, Japan.*
- II.21 Theoretical analysis on domain size dependence of piezoelectric properties in domain engineered ferroelectric crystals; *Wenwu Cao* and Rajeev Ahluwalia†; *The Pennsylvania State University, †Los Alamos National Laboratory, USA.*

7:00–9:00 p.m. Dinner (Chesapeake Ballroom) – “Electroceramic Bridge Building Awards Banquet”
2005 Awardees: Noboru Ichinose and Kikuo Wakino (Japan);
L. Eric Cross and Robert Pohanka (U.S.)

Tuesday, November 8

7:30 a.m. Continental Breakfast (Patio)

SESSION III. Multifunctional Materials, Microwave, and Optical Materials

Session Chairs: Takashi Yamamoto, *National Defense Academy (Japan)*
Susan Trolier-McKinstry, *The Pennsylvania State University (USA)*

8:30–9:30 a.m. Plenary Lectures – *Multifunctional Materials, Microwave, and Optical Materials*

PIII.1 8:30 – 9:00 a.m. Multiferroic Materials with Polarization; *Shuxiang Dong, Junyi Zhai, Zhengping Xing, Jie-Fang Li, and D. Viehland; Virginia Polytechnic Institute, USA.*

PIII.2 9:00 – 9:30 a.m. Embedded Ceramic Passive on Printed Wiring Board Using Aerosol Deposition; *Yoshihiko Imanaka* and Jun Akedo†; *Fujitsu Limited, †National Institute of Advanced Industrial Science and Technology, Japan.*

9:30 – 9:45 a.m. Break (Patio)

9:45 a.m. – 12:30 p.m. Poster Summaries and Poster Viewing

Multifunctional Materials, Microwave, and Optical Materials

- III.1 High Speed Optical Micro-Scanner Fabricated by Aerosol Deposition; J. Akedo, M. Lebedev, and J. Park; *National Institute of Advanced Science and Technology, Japan.*
- III.2 New ferromagnetic ferroelectric $\text{Bi}_2\text{NiMnO}_6$ compound with double-perovskite structure; Yuichi Shimakawa, Masaki Azuma, Kazuhide Takata, Masayuki Hashisaka, Daisuke Kan, Atsunobu Masuno, Maiko Sakai, Takahito Terashima, Ko Mibu, and Mikio Takano; *Kyoto University, Japan.*
- III.3 Multiferroic Self-Assembled Nanostructures in Epitaxial Films; Igor Levin^{*}, J. Slutsker^{*}, J. Li^{*†}, and A. Roytburd[†]; ^{*}*National Institute of Standards and Technology* and [†]*University of Maryland, USA.*
- III.4 Enhancement of Insulating and Ferroelectric Properties of Bismuth Ferrite Thin Films by Ion-substitution; Hiroshi Uchida^{*}, Shintaro Yasui^{*}, Risako Ueno[†], Hiroshi Funakubo[†], and Seiichiro Koda^{*}; ^{*}*Sophia University*, [†]*Tokyo Institute of Technology, Japan.*
- III.5 Magnetically tunable dielectric materials; Gavin Lawes^{*}, T. Kimura^{**}, C.M. Varma^{***}, M.A. Subramanian[†], R.J. Cava[#], and A.P. Ramirez^{##}; ^{*}*Wayne State University*, ^{**}*Los Alamos National Laboratory*, ^{***}*University of California Riverside*, [†]*Dupont Central Research and Development*, [#]*Princeton University*, ^{##}*Bell Laboratories, Lucent Technologies, USA.*
- III.6 Dielectric permittivity mapping with non-contact microwave probe for dielectric materials; Hirofumi Kakemoto, Takakiyo Harigai, Song-Min Nam, Satoshi Wada and Takaaki Tsurumi; *Tokyo Institute of Technology, Japan.*
- III.7 Microwave Propagation Through the Dielectric Resonator Arrays; Masato Iwasaki^{*†}, Steve Perini^{*}, Elena Semouchkina^{*}, George Semouchkin^{*}, Khalid Rajab^{*}, Eugene Furman^{*}, Masahiko Okuyama[†], Clive Randall^{*}, and Michael Lanagan^{*}; ^{*}*The Pennsylvania State University, USA*, [†]*NGK Spark Plug Co. Ltd., Japan.*
- III.8 Silicates with Low Permittivity for Millimeterwave Dielectrics; Hitoshi Ohsato^{*}, Tsutomu Tsunooka^{*}, Tomonori Sugiyama^{*}, Mio Terada^{*}, Yi-Ping Guo^{*}, Keizou Kawamura[†] and Ken-ichi Kakimoto^{*}; ^{*}*Nagoya Institute of Technology* and [†]*Taiyo Yuden Co., Ltd., Japan.*
- III.9 New Developments in Ceramic Metamaterials; Khalid Z. Rajab, Elena Semouchkina, George Semouchkin, Clive Randall, Amanda Baker, Masato Iwasaki, Raj Mittra, and Michael T. Lanagan; *The Pennsylvania State University, USA.*
- III.10 Optical Properties of Transparent Ceramics, Nobuhiko Tanaka, Yuji Kintaka, Satoshi Kuretake, Akira Ando, and Yukio Sakabe; *Murata Manufacturing Co., Ltd., Japan.*
- III.11 Measurement of complex permittivity in dielectric materials using a free space method; Youngjoon An^{*}, Takashi Yamamoto^{*}, Hirotake Okino^{*}, Takeshi Deguchi[†], and Shunkichi Ueda[†]; ^{*}*National Defense Academy*, [†]*Osaka Laboratory/Tayca Co., Japan.*

- III.12 Optical Probes of Strained Ferroelectric Thin Films; Hongzhou Ma^{*}, P. Irvin^{*}, J.H. Haeni^{**}, W. Chang[†], R. Uecker^{††}, P. Reiche^{††}, Y. Li^{**}, S. Choudhury^{**}, W. Tian[#], M.E. Hawley^{##}, B. Craig[^], A.K. Tagantsev^{^^}, X.Q. Pan[#], S.K. Streiffer^{^^}, L.Q. Chen^{**}, S.W. Kirchoefer[†], D.G. Schlom^{**}, and Jeremy Levy^{*}; ^{*}University of Pittsburgh, USA, ^{**}Penn State University, USA, [†]Naval Research Laboratory, USA, ^{††}Institute for Crystal Growth, Berlin, Germany, [#]University of Michigan, ^{##}Los Alamos National Laboratory, [^]Motorola Labs, ^{^^}Ecole Polytechnique de Fédérale de Lausanne, Switzerland, and ^{^^^}Argonne National Laboratory.
- III.15 Paraelectric Thin Films with Engineered Misfit Strain and Anisotropic Epitaxy; W. K. Simon^{*}, E.K. Akdogan^{*}, Ahmad Safari^{*}, and J. A. Bellotti[†]; Rutgers University, [†]Naval Research Laboratories, USA.
- III.16 Interrelation between Dielectric Property and Elastic Property of Ceramics of Nominal Composition $(\text{Ba}_{1-x}\text{Ca}_x)(\text{Mg}_{1/3}\text{Ta}_{2/3})\text{O}_3$; Hiroyuki Ikawa^{*}, Michio Yamashiro^{*}, Mikio Fukuhara[†], and Minoru Takemoto^{*}; ^{*}Kanagawa Institute of Technology, [†]Tohoku University, Japan.
- III.17 $\text{Bi}_{1.5}\text{Zn}_{1.0}\text{Nb}_{1.5}\text{O}_7$ Thin Films for Tunable Microwave Applications; Susanne Stemmer^{*}, Jiwei Lu^{*}, Jaehoon Park^{*}, Robert A. York^{*}, and Alexander K. Tagantsev[†]; ^{*}University of California-Santa Barbara, USA, [†]Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland.
- III.18 Comparative Phase Equilibria in the $\text{Bi}_2\text{O}_3\text{-MO}_x\text{-Nb}_2\text{O}_5$ Systems ($\text{MO}_x = \text{Mn}_2\text{O}_3, \text{Fe}_2\text{O}_3, \text{Co}_3\text{O}_4, \text{ZnO}$); Terrell Vanderah^{*}, M.W. Lufaso^{*}, A.U. Adler^{*}, I.M. Pazos^{*}, and S.M. Bell[†]; ^{*}National Institute of Standards and Technology (NIST), [†]TCI Ceramics, Inc. USA.
- III.19 Synthesis and Structural Characterization of $\text{Bi}(\text{Fe}_x\text{Al}_{1-x})\text{O}_3$ Thin Films; Takeshi Yoshimura, Morihiro Okada, Norifumi Fujimura; Osaka Prefectural University, Japan.
- III.20 Products and Microwave Dielectric Properties and Abnormally Wide Solid Solution Range of the $(\text{Ba}_{1-x}\text{Ca}_x)(\text{Sc}_{1/2}\text{Nb}_{1/2})\text{O}_3$ System; Yuya Fujii, Minoru Takemoto, Michinori Takayama, Jun Katagiri, Daisuke Satoh, Ryo Hirukawa, and Hiroyuki Ikawa; Kanagawa Institute of Technology, Japan.
- III.21 Microwave Electrooptic Coefficient and Modulation Applications Using Ferroelectric Single Crystal Fibers; Chuanyong Huang, Jonathan Taylor, Amar Bhalla, and Ruyan Guo; The Pennsylvania State University, USA.

12:30–1:30 p.m. Lunch (Patio)

SESSION IV. Dielectric Capacitor Materials

Session Chairs: Masatoshi Adachi, Toyama Prefectural University (Japan)
I. Wei Chen, University of Pennsylvania (USA)

1:30–2:30 p.m. Plenary Lectures — Dielectric Capacitor Materials

- PIV.1 1:30 – 2:00 p.m. Interfacial Defect Chemistry in Electroceramics: Complementary Analytical Transmission Electron Microscopy and Impedance Spectroscopy Studies; Elizabeth C. Dickey, Clive A. Randall, Gai-Ying Yang, and Oomman Varghese; The Pennsylvania State University, USA.

PIV.2 2:00 – 2:30 p.m. Residual Stress and Electrical Performance of Multilayer Ceramic Capacitors; Yukie Nakano, Takeshi Nomura, and Atsushi Hitomi; TDK Corporation, Japan.

2:30 – 2:45 p.m. Break (Patio)

2:45 – 6:15 p.m. Poster Summaries and Poster Viewing

Dielectric Capacitor Materials

- IV.1 The Synthesis and Property of CaZrO₃ by Using Ultra Fine and Highly Dispersed CaCO₃; Jin Amagai^{*}, Yuzo Kato^{*}, Akira Ueki^{*}, Noriko Saito[†], Naoki Ohashi[†], Hajime Haneda[†]; ^{*}Ube Material Industries, Ltd., [†]NIMS, Japan.
- IV.2 Effect of Manganese Distribution on Properties of CaZrO₃-Based Ceramics, Pascal Pinceloup, A. Gurav, and M. Randall; KEMET Electronics Corporation, USA.
- IV.3 Microcontact Printed Thin Film Capacitors; H. Nagata^{*}, S.W. Ko^{*}, Susan Trolier-McKinstry^{*}, C.A. Randall^{*}, P. Pinceloup[†], J. Beeson[†], D. Skamser[†], M. Randall[†], and A. Tajuddin[†]; ^{*}The Pennsylvania State University, [†]Kemet Electronics Corp., USA.
- IV.4 Effects of the Printed Wiring Board Process on Ceramic Thin-Film Capacitors Integrated into Printed Wiring Boards; William Borland^{*}, J.J. Barnes^{*}, S.H. Zhang^{*}, J.P. Maria[†], B. Laughlin[†], and J.F. Ihlefeld[†]; ^{*}Dupont Electronic Technologies and [†]North Carolina State University, USA.
- IV.5 PLZT Film-on-Foil Capacitors for Embedded Passives; David Kaufman, S. Saha, and K. Uprety; Argonne National Laboratory, USA.
- IV.6 High-K CuCu₃Ti₄O₁₂ Dielectrics; David Cann^{*}, Eric Patterson[†], Seunghwa Kwon^{*}, Chien-Chih Huang^{*}, and Steve W. Martin[†]; ^{*}Oregon State University, [†]Iowa State University, USA.
- IV.7 The Effect of Sintering Conditions and Starting Powders on the Giant Dielectric Properties of CaCu₃Ti₄O₁₂; Barry Bender and Ming-Jen Pan; U.S. Naval Research Laboratory, USA.
- IV.8 Effects of Interlayer Diffusion on the Dielectric Properties of Multilayer Structures; Ming-Jen Pan, Barry A. Bender, and Edward Gorzkowski; U.S. Naval Research Laboratory, USA.
- IV.9 Complex Permittivity Model of Barrier Layer Capacitor with Bimodal Grain Size Distribution; Ming-Jen Pan, Barry A. Bender, and Edward Gorzkowski; U.S. Naval Research Laboratory, USA.
- IV.10 Mechanism of Capacitance Aging Under DC-field in X7R-MLCCs; Takaaki Tsurumi, M. Shono, H. Kakemoto and S. Wada; Tokyo Institute of Technology, Japan.
- IV.11 Interfacial Reactions in Ni-BaTiO₃ Base Metal Electrode Multilayer Ceramic Capacitors (BME-MLCCs); Gaiying Yang, S.I. Lee, Z. K. Liu, C. Anthony, E. C. Dickey, and C. A. Randall; The Pennsylvania State University, USA.

- IV.12 The {111} modulated domains in X7R formulated BaTiO₃ multilayer ceramic capacitors; *Yu-Chuan Wu*^{*}, *Daniel E. McCauley*[†], *Mike Chu*[†], and *Hong-Yang Lu*^{*†}; ^{*}National Sun-Yat Sen University (Taiwan) and [†]Ferro Corp., USA.
- IV.13 Effect of Re-oxidation on Dielectric Properties in Ni-MLCC; *Hiroshi Kishi*, *Youichi Mizuno*, *Tomoya Hagiwara* and *Hirokazu Orimo*; *Taiyo Yuden Co., Ltd., Japan.*
- IV.14 Effect of Dielectric Thickness on the dc and ac Dielectric Breakdown for Low Fired COG and X7R MLC Capacitors; *Galeb H. Maher*, *James M. Wilson* and *Samir G. Maher*; *MRA Laboratories, Inc., USA.*
- IV.15 Structural Analysis of Eu and Nd Substitution for BaTiO₃ Ceramics; *Takanori Ishikawa*^{*}, *Kenji Ohnuma*^{*}, *Ken-ichi Kakimoto*^{*}, *Hitoshi Ohsato*^{*}, and *Youichi Mizuno*[†]; ^{*}Nagoya Institute of Technology and [†]Taiyo Yuden Co., Ltd., Japan.
- IV.16 PO₂ Dependence of the Diffuse Phase Transition in Base Metal Capacitor Dielectrics; *Daniel E. McCauley*, *Mike S.H. Chu*, and *Mohammed H. Megherhi*; *Ferro Electronics Corporation, USA.*
- IV.17 Electric Conduction of Thin-layer Ni-MLCCs with Core-Shell Structure; *Koichiro Morita*^{*†}, *Youichi Mizuno*^{*}, *Hirokazu Chazono*^{*}, *Hiroshi Kishi*^{*}, *G. Y. Yang*[†], *E. Dickey*[†], *C. A. Randall*[†]; ^{*}Taiyo Yuden Co., Ltd. (Japan), [†]The Pennsylvania State University, USA.
- IV.18 Factors in Improved DC Bias Performance in X7R Capacitors; *Craig Nies* and *Marianne Berolini*; *AVX Corp., USA.*
- IV.19 New Development in Copper Compatible Base Metal Dielectric Formulations; *Mohammed H. Megherhi*, *Walt J. Symes*, *Mike S.H. Chu*, and *Daniel E. McCauley*; *Ferro Electronic Materials Systems, USA.*
- IV.20 Barium-titanate-based lead-free materials for capacitor and PTCR use far beyond 130°C; *Tadashi Shiosaki*, *Hiroaki Takeda*, *Ryuhei Goto*, and *Takashi Nishida*; *Nara Institute of Science & Technology (NAIST), Japan.*
- IV.21 The Role of Anion Impurities in Barium Titanate; *Ian Burn*; *IBC, Inc., USA.*
- IV.22 The Effect of Grain Size on the Thin Layer BME X7R Dielectrics; *Xilin Xu*^{*}, *P. Pinceloup*^{*}, *J. Beeson*^{*}, *A. Gurav*^{*}, and *G.Y. Yang*[†]; ^{*}KEMET Electronics Corp., [†]Penn State University, USA.
- IV.23 Modified Sodium Bismuth Titanate for High Temperature Capacitor Applications; *Conor Walsh*^{*}, *Gerald Wynick*^{*}, *Walter Schulze*^{*}, *Keith Bridger*[†], *Arthur Cooke*[†], and *James Weigner*[#]; ^{*}Alfred University, [†]Active Signal Technologies, and [#]Lockheed Martin Maritime Sensors and Systems, USA.
- IV.24 New Relaxor Dielectrics for High Temperature Capacitors; *Craig Stringer*^{*}, *S.J. Zhang*^{*}, *T.R. ShROUT*^{*}, *C.A. Randall*^{*}, *E. Alberta*[†], *W. Hackenberger*[†], and *G. Schwarze*[#]; ^{*}The Pennsylvania State University, [†]TRS Technologies, Inc., and [#]NASA-Glenn Research Center, USA.
- IV.25 Characterization of PLZT Based Materials For High Energy Density Applications; *Bruce Tuttle*, *David Williams*^{*}, *Jill Wheeler*^{*}, *Luke Brewer*^{*}, *Paul Clem*^{*}, *Mark Rodriguez*^{*}, and *Geoffrey Brennecke*[†]; ^{*}Sandia National Laboratories, [†]University of Illinois at Champaign, USA.

- IV.26 Dielectric Properties of Particles in Suspensions and Polymer Composites; *Abhishek Manohar, Fatih Dogan, Lynell Gilbert, and Thomas Schuman; University of Missouri-Rolla, USA.*
- IV.27 Optimization of Processing Parameters for Barium Strontium Titanate Glass Ceramics; *Edward P. Gorzkowski, M.-J. Pan, B. Bender, and C. C. M. Wu; Naval Research Laboratory, USA.*
- IV.28 Modeling of Field Distribution and Energy Storage in Diphasic Dielectrics; *Robert W. Schwartz and Sandeep Patil; University of Missouri-Rolla, USA.*
- IV.29 Glass Ceramic Dielectrics; *Michael Lanagan, Jun Du, Chiping Wang, Beth Jones, Bhadri Rangarajan, Tony Perrotta, and Tom ShROUT; The Pennsylvania State University, USA.*
- IV.30 Phase and Defect Equilibrium of BaTiO₃: Revisited; *Clive A. Randall, S. il Lee, and Zi.K. Liu; The Pennsylvania State University, USA.*
- IV.31 Development of Fine Grain and High Tetragonality Barium Titanate Synthesized by Modified Hydrothermal Process; *S. Ogama, T. Shikada, K. Hidaka, and T. Ito; Sakai Chemical Industry Co., Ltd., Japan.*

Wednesday, November 9

7:30 a.m. Continental Breakfast (Patio)

<p>SESSION V. Thin Films, Material Science, and Applications</p>

Session Chairs: Hajime Haneda, *National Institute for Research in Inorganic Materials (Japan)*
Jan Allen, *U.S. Army Research Laboratory (USA)*

8:30–9:30 a.m. Plenary Lectures — *Thin Films, Material Science, and Applications*

- PV.1 8:30– 9:00 a.m. Bit Distribution and Reliability of Production-Worthy 1.5V FRAM Embedded with 130nm, 5LM Copper CMOS Logic; *Scott Summerfelt**, *K.R. Udayakumar**, *K. Boku**, *K.A. Remack**, *J. Rodriguez**, *F.G. Celii**, *S. Aggarwal**, *G. Albrecht**, *Y. Obeng**, *J.S. Martin**, *L. Hall**, *L. Matz**, *B. Rathsack**, *H. McAdams**, *K.J. Taylor**, *R. Yonemoto**, *T.S. Moise**, *R. Bailey†*, *M. Depner†*, *G. Fox†*, and *J. Eliason†*; **Texas Instrument and †Ramtron International, USA.*
- PV.2 9:00– 9:30 a.m. Growth of Potassium Niobate (KNbO₃) Single Crystals for Piezoelectric Applications; *Masatoshi Adachi, Nao Fujita, Yoshiki Norimatsu, and Tomoaki Karaki; Toyama Prefectural University, Japan.*

9:30 – 9:45 a.m. Break (Patio)

9:45 a.m. – 12:00 p.m. Poster Summaries and Poster Viewing

Thin Films, Material Science, and Applications

- V.1 Dielectric and Optical Properties of Perovskite-type Artificial Superlattices; Takakiyo Harigai^{*}, Song-Ming Nam^{*}, Hirofumi Kakemoto^{*}, Satoshi Wada^{*}, Keisuke Saito[†], and Takaaki Tsurumi^{*}; ^{*}Tokyo Institute of Technology,, [†]BRUKER AXS K.K., Japan.
- V.2 Fabrications of Relaxor PSN/PT thin films by PLD method and their characterization; Shutaro Asanuma^{*}, Yoshiaki Uesu^{*}, Mamoru Fukunaga^{*}, Raphael Haumont[†], Brihim Dkhil[†], Charlotte Maliberi[†], and Jean Michel Kiat[†]; [†]École Centrale Paris (France), ^{*}Waseda University, Japan.
- V.3 Radioisotope Power Generator Using Thin Film Piezoelectric Cantilevers; Ronald G. Polcawich, R. Duggirala[†], E. Zakar^{*}, M. Dubey^{*}, and A. Lal[†]; ^{*}U.S. Army Research Laboratory, [†]Cornell University, USA.
- V.4 Emerging Piezoelectric PZT MEMS Devices, Madan Dubey, Ronald Polcawich, Eugene Zakar, Jeff Pulskamp, Luke Currano, Paul Amirtharaj, Richard Piekarz, John Conrad, and Derwin Washington, U.S. Army Research Laboratory, USA.
- V.5 Fabrication of Ferroelectric-gate Transistors using YMnO₃ thin films; Takeshi Yoshimura, K. Haratake, R. Arai, N. Shigemitsu, K. Masuko, M. Nishijima, N. Fujimura; Osaka Prefecture University, Japan.
- V.6 Synthesis and Properties of Intergrowth Bi₄Ti₃O₁₂-SrBi₄Ti₄O₁₅ Ferroelectric Thin Films by Chemical Solution Deposition; Wataru Sakamoto, Keiichi Imada, Tetsuo Shimura, and Toshinobu Yogo; Nagoya University, Japan.
- V.7 Thin Film Dielectrics for Embedded and Wireless Applications, Jon-Paul Maria^{*}, Jon F. Ihlefeld^{*}, Brian J. Laughlin^{*}, Mark D. Losego^{*}, and William J. Borland[†]; ^{*}North Carolina State University, [†]Dupont Electronic Technologies, USA.
- V.8 Preparation and Properties of Pb(Mg_{1/3}Nb_{2/3})O₃ (50%)-PbTiO₃ (50%) Thin Films by Chemical Solution Deposition, Hiroshi Maiwa^{*} and Noboru Ichinose[†]; ^{*}Shonan Institute of Technology, [†]Waseda University, Japan.
- V.9 Evaluation of polar *c*-domain volume in tetragonal PbZr_xTi_{1-x}O₃ thin films using polarized Raman spectroscopy, Ken Nishida^{*}, Minoru Osada[†], Syunshuke Wada^{*}, Shoji Okamoto[#], R. Ueno[#], H. Funakubo[#], and Takashi Katoda^{*}; ^{*}Kochi University of Technology, [†]National Institute for Materials Science, [#]Tokyo Institute of Technology, Japan.
- V10. Reversible Domain Wall Motion Contributions to Rayleigh Behavior in Ferroelectric Films; Susan Trolrier-McKinstry^{*}, Nazanin Bassiri Gharb^{*}, and Dragan Damjanovic; [†]Ceramic Laboratory Swiss Federal Institute of Technology, Lausanne (Switzerland), and ^{*}The Pennsylvania State University, USA.
- V11. Bottom-Up Fabrication of Pb-Free Ferro-/Piezoelectric Films Using Complex Alkoxides; Kazumi Kato^{*†}, Kazuyuki Suzuki^{*}, Yiping Guo^{*}, Tatsuo Kimura^{*}, Kaori Nishizawa^{*}, Takeshi Miki^{*}; ^{*}National Institute of Advanced Industrial Science & Technology, [†]Nagoya Institute of Technology, Japan.

- V12. Temperature dependency of *P-E* hysteresis loops for rhombohedral PZT films; Hiroshi Funakubo, Akihiro Sumi, Hitoshi Morioka, Shoji Okamoto, and Shintaro Yokoyama; Tokyo Institute of Technology, Japan.
- V13. In Situ X-ray Scattering Studies of Electroded Epitaxial PbTiO₃ Thin Films; Stephen K. Streiffer^{*}, G.B. Stephenson^{*}, D.D. Fong^{*}, P.H. Fuoss^{*}, J.A. Eastman^{*}, R.-V. Wang^{*}, F. Jiang^{*}, K. Latifi[†], and Carol Thompson[‡]; ^{*}Argonne National Laboratory, [†]Northern Illinois University, USA.
- V14. Polarization Reversal Property of Ferroelectric Thin Film for Ferroelectric Memories; Masahiro Echizen and Yoichiro Masuda; Hachinohe Institute of Technology, Japan.
- V15. Investigation into Electrical Conduction Mechanisms of Pb(Zr,Ti)O₃ Thin-Film Capacitors with Pt, IrO₂ and SrRuO₃ Top Electrodes; Yoichiro Masuda^{*} and Takashi Nozaka[†]; ^{*}Hachinohe Institute of Technology, [†]Yokohama Denshi Seiko Co., Ltd., Japan.
- V 16. Ferroelectric and Piezoelectric Properties of Lanthanoid-Substituted Bi₄Ti₃O₁₂ Thin Films Grown on (111)Pt and (100)IrO₂ Electrodes; Yutaka Adachi^{*}, Dong Su[†], Paul Murali[†], and Nava Setter[‡]; ^{*}National Institute for Materials Science, Japan, and [†]Swiss Federal Institute of Technology (EPFL).

12:00–12:30 p.m. *Break*

12:30-1:30 p.m. *Farewell Lunch (Patio)*