Program on May 29

09:30 Opening & Keynote address

**Opening ceremony**

Kazumi Kato

**Keynote address**

Harry L. Tuller

**Plenary**

Session Chair: C. Elissalde and S. Guillemet-Fritsch

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<td>09:45</td>
<td>Plenary</td>
<td><strong>Modification, Control, and Exploitation of Ferroelectric Interfaces</strong></td>
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<td>10:45</td>
<td>Plenary</td>
<td><strong>Engineering Nanoscale Oxides: What the Future Holds</strong></td>
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**Session 01 Ferroelectric thin films**

Session Chair: P. Muralt

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<th>Time</th>
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<td>13:00</td>
<td>Invited</td>
<td><strong>Phase stability and Property design in HfO₂-based ferroelectric thin films</strong></td>
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HIROSHI FUNAKUBO¹,²,³, TAKAO SHIMIZU¹, KILIHA KATAYAMA², TAKANORI MIMURA², TAKANORI KIGUCHI⁴, TAKAHISA SHIRAISHI⁴, AKIHIRO AKAMA⁴, TOYOHIKO J. KONNO⁴, and OSAMI SAKATA¹,²,³,⁵
13:30 - 13:45  Oral

Flexible domain switch in ferroelectric film on tensile substrate
Xiaoyan Lu1,2, Zuhuang Chen2,3, Ruijuan Xu2, and Lane W. Martin2,3
1School of Civil Engineering, Harbin Institute of Technology, Harbin, 150001, China, 2Department of Materials Science & Engineering, University of California, Berkeley, CA 94720, USA, 3Materials Science Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA

Session 02  Piezoelectric thin films and their applications
Session Chair: P. Muralt & I. Kanno

Session Chair: P. Muralt
14:00 - 14:30  Invited

Evaluation of piezoelectric characteristics of thin films for MEMS applications
Isaku Kanno
Dept. Mechanical Eng., Kobe University, Kobe 657-8501, Japan

14:30 - 14:45  Oral

Electromechanical Behavior of Piezoelectric Semiconductor Nanofibers under an Axial Force
Y.X. Luo1, X.Y. Wang1, C.L. Zhang1,2,3, W.Q. Chen1,2,3 and J.S. Yang1,4
1Department of Engineering Mechanics, Zhejiang University, Hangzhou 310027, P.R. China, 2Key Laboratory of Soft Machines and Smart Devices of Zhejiang Province, Hangzhou 310027, P.R. China, 3Soft Matter Research Center (SMRC), Zhejiang University, Hangzhou 310027, P.R. China,
4Department of Mechanical and Materials Engineering, University of Nebraska-Lincoln, Lincoln, NE 68588-0526, U.S.A.

Session Chair: I. Kanno
15:00 - 15:30  29-1-08in Invited
Declamping in Lead Magnesium Niobate – Lead Titanate Films
R. Keech,1 L. Ye,2 J.L. Bosse,2 G. Esteves,3 J, Guerrier,3 J. L. Jones,3 M. A. Kuroda,4 B.D. Huey,2 and S. Trolier-McKinstry1
1Dept. Materials Sci. & Eng., and Materials Res. Inst., University Park, PA, USA, 2Dept. Materials Sci. & Eng., University of Connecticut, Storrs, CT, USA, 3Dept. Materials Sci. & Eng., North Carolina State University, Raleigh, NC, USA, 4 Dept. Physics, Auburn University, Auburn, AL, USA

15:30 - 15:45  29-1-10or Oral
Stress Engineering of Piezoelectric Thin Films for Actuator Applications
Mani Sivaramakrishnan1, Peter Mardilovich1 and Susan Trolier-McKinstry2
1Xaar plc, 316 Science Park, Cambridge CB4 0XR, U.K., 2Department of Materials Science and Engineering and Materials Research Institute, Penn State University, University Park, PA, USA

15:45 - 16:00  29-1-11or Oral
Large Piezoelectricity and Ferroelectricity in (Bi$_{0.5}$Na$_{0.5}$)TiO$_3$–BaTiO$_3$ based lead-free thin films
Qianru Lin, Rui Ding and Danyang Wang*
School of Materials Science and Engineering, The University of New South Wales, Sydney, NSW 2052, Australia

16:00 - 16:30  29-1-12in Invited
Pushing the Performance of Electro-Mechanical Thin Films
Paul Muralt
Electroceramic Thin Films Group, Ecole Polytechnique Fédérale de Lausanne, EPFL, Lausanne, 1015 Switzerland; IEEE-UFFC Distinguished Lecturer
Session 03  Thin film growth of functional oxides

Session Chair: I. Kanno

16:30 – 16:45  29-1-14 or Oral
Growth of a-axis oriented sputtered AlN thin films and its physical properties
R. Ramaseshan¹, Padmalochan Panda¹, S. Tripura Sundari¹, H. Suematsu² and S. Dash¹
¹Materials Science Group, Indira Gandhi Centre for Atomic Research, HBNI, Kalpakkam-603102, India, ²Energy Density Research Institute, Nagaoka University of Technology, Nagaoka, Japan

16:45 – 17:00  29-1-15 or Oral
Low-Temperature Preparation of Rutile-Type TiO₂ Thin Film for Dielectric Mirror
Akihiro Ishii¹, Itaru Oikawa¹, Masaaki Imura², Toshimasa Kanai² and Hitoshi Takamura¹
¹Department of Materials Science, Graduate School of Engineering, Tohoku University, Sendai 980-8579, Japan, ²Thin Films Division, Nippon Electric Glass Co., Ltd., Nagahama 529-0292, Japan
Program on May 29  Room 2

Session 04  High permittivity dielectric ceramics
Session Chair: T. Tsurumi and C. Elissalde

Session Chair: T. Tsurumi
13:00 - 13:30  29-2-01  Invited
Dielectric inclusions as oxygen solid state buffers in BaSrTiO$_3$ ceramics
C. Elissalde, U-C. Chung, M. Albino, J. Lesseur, R. Epherre, G. Chevallier, D. Bernard, F. Mauvy, C. Estournès and M. Maglione
$^1$CNRS, Univ. Bordeaux, ICMCB, UPR 9048, F-33600 Pessac, France,
$^2$Université de Toulouse, CIRIMAT, CNRS INPT UPS, Université Paul-Sabatier, F-31062 Toulouse, France

13:30 – 13:45  29-2-03  Oral
Thermal Ammonolysis of Barium Titanate: the Effect of Nitrogen Incorporation on the Electrical Characteristics
Yusuke Otsuka$^1$, Christian Pithan$^2$, Jürgen Dornseiffer$^3$ and Rainer Waser$^2$
$^1$Murata Manufacturing Co., Ltd., Kyoto 617-8555, Japan, $^2$Peter Grünberg Institute, Forschungszentrum Jülich GmbH, 52428 Jülich, Germany,
$^3$Institute of Energy and Climate Research, Forschungszentrum Jülich GmbH, 52428 Jülich, Germany

13:45 – 14:00  29-2-04  Oral
Effects of CuO addition on sintering and electrical properties of lead-free BaTiO$_3$ based ceramics
Yingchun Liu$^1$, Yunfei Chang$^1$, Chunying Wang$^1$, Yuan Sun$^1$, Jie Wu$^1$, Wenwu Cao$^{1,2}$
$^1$Condensed Matter Science and Technology Institute, Harbin Institute of Technology, Harbin 150080, China, $^2$Department of Mathematics, The Pennsylvania State University, University Park, PA16802, USA

14:00 – 14:30  29-2-05  Invited
Colossal permittivity materials: an overview
Sophie Guillemet-Fritsch$^1$, Hyuksu Han$^{1,2}$, Pascal Dufour$^1$, Christophe Tenailleau$^1$
Characterization of Localized Electronic Structures Enabling Colossal Permittivity Ceramic Capacitors
Kosuke Tsuji¹, Wei-Ting Chen¹, Hanzheng Guo¹, HyukSu Han²,³, Sophie Guillemet-Fritsch², Clive A. Randall¹
¹Center for Dielectrics and Piezoelectrics, Department of Material Science and Engineering, The Pennsylvania State University, University Park, Pennsylvania 16802, U.S.A., ²CIRIMAT, Université de Toulouse, CNRS, UPS, INP, 118 route de Narbonne, 31062, Toulouse Cedex 9, France, ³Korea Institute of Industrial Technology, Gwahakdanji-ro 137-41, Gangwon-do, 25440 Republic of Korea

Session Chair: C. Elissalde
15:00 – 15:30   29-2-08 in Invited

A New Trend in the Study and Applications of Ceramic Capacitors
Takaaki Tsurumi, Kazuki Tomie, Masaya Karube, Takuya Hoshina and Hiroaki Takeda
School of Materials and Chemical Technology, Tokyo Institute of Technology, Ookayama, Meguro, Tokyo 152-8552, Japan

Session 05 Piezoelectric ceramics
Session Chair: C. Elissalde
15:30 – 15:45   29-2-10 or Oral

High-Power Impedance Spectroscopy for Fatigued Alkali Niobate Piezoceramics
Hiroshi Nishiyama¹, Ken-ichi Kakimoto¹,², Keiichi Hatano³, Yukihiro Konishi³
¹Department of Life Science and Applied Chemistry, Nagoya Institute of Technology, Nagoya 466-8555, Japan, ²Fronteir Research Institute for Materials Science, Nagoya Institute of Technology, Nagoya 466-8555, Japan, ³TAIYO YUDEN Co., LTD., Gunma 370-3347, Japan
15:45 – 16:00  29-2-11or  Oral
Enhanced Piezoelectricity with Improved Thermal Stability Achieved in BaZrO₃ and (Bi,Na)HfO₃ Modified KNN-based Lead-free Piezoceramics
Qing Liu¹, Lei Zhao¹, Wei Sun¹, Ke Wang¹, Long-Tu Li¹, and Jing-Feng Li¹*
School of Materials Science and Engineering, Tsinghua University, Beijing, China

16:00 – 16:30  29-2-12in  Invited
Piezoelectric Properties and Microstructure of (K,Na)NbO₃–Based Composite Lead-Free Piezoelectric Ceramic
Kazushige Ohbayashi, Takayuki Matsuoka, Kazuaki Kitamura, Hideto Yamada, Tomoko Hishida, and Masato Yamazaki
NGK SPARK PLUG Co., Ltd., 2808 Iwasaki, Komaki, Aichi 485-8510, Japan

16:30 – 16:45  29-2-14or  Oral
Novel morphotropic NaNbO₃–BaTiO₃–ABO₃ lead-free piezoceramics
Jian Fu¹, He Qi¹, Ruzhong Zuo¹*
Institute of Electro Ceramics & Devices, School of Materials Science and Engineering, Hefei University of Technology, Hefei, 230009, P.R. China

16:45 – 17:00  29-2-15or  Oral
Diffuse Phase Transitions and Giant Electrostrictive Coefficients in Lead-Free Fe³⁺-doped 0.5Ba(Zr₀.₂Tio.₈)O₃–0.5(Ba₀.₇Ca₀.₃)TiO₃ Ferroelectric Ceramics
Li Jin, Renjie Huo, Jihui Gong, Song Xia, Yujun Feng, and Xiaoyong Wei
Electronic Materials Research Laboratory, Key Laboratory of the Ministry of Education & International Center for Dielectric Research, Xi’an Jiaotong University, Xi’an 710049, China
**Session 20  Low-dim oxides**

**Session Chair: A. Yasumori**

13:00 - 13:30  29-3-01in  Invited

*Fabrication and Multifunctional Properties of Low-dimensional Titania Nanotube-based Nanocomposites*

Sunghun Eom¹, Yuto Yamasaki², Hisataka Nishida¹, Sung Hun Cho¹, Tomoyo Goto¹, and Tohru Sekino¹*

¹The Institute of Scientific and Industrial Research (ISIR), Osaka University, Ibaraki, Osaka 567-0047, Japan

13:30 – 13:45  29-3-03or  Oral

*Phase Structure and Fractal Growth of Pulsed Laser Deposited WO₃*

J. Puustinen, J. Huotari and J. Lappalainen

Faculty of Information Technology and Electrical Engineering ITEE, University of Oulu, Oulu FIN-90570, Finland

13:45 – 14:00  29-3-04or  Oral

*Advanced V₂O₅ nanostructured sensors for control of Selective Catalytic Reduction*

Joni Huotari, Jarkko Puustinen and Jyrki Lappalainen

Faculty of Information Technology and Electrical Engineering, University of Oulu, Oulu, FIN-90570, Finland

14:00 – 14:30  29-3-05in  Invited

*Metal Oxide Nanosurfaces and Hetero-interfaces for Solar Harvesting Applications*

Sanjay Mathur¹, Yakup Gönüllü¹ and Thomas Fischer¹

¹Chair, Inorganic and Materials Chemistry, Department of Chemistry, University of Cologne, Greinstr. 6, Cologne D 50859, Germany
14:30 – 14:45  29-3-07   Oral

Recent Developments of Pulsed Laser Deposition of Complex Fractal Metal Oxide Structures for Chemical Sensors

Jyrki Lappalainen, Joni Huotari, Jarkko Puustinen and Tilman Sauerwald

1Faculty of Information Technology and Electrical Engineering, University of Oulu, P.O. Box 4500, FIN-90014, Oulu, Finland, 2Laboratory for Measurement Technology, Department of Mechatronics, Saarland University, 66123 Saarbrücken, Germany

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Session 21  Sensors and devices

Session Chair: T. Sekino

15:00 – 15:30  29-3-08   Invited

Silicate Glasses and Glass-Ceramics Thermal Barrier Coating for Mg2Si Thermoelectric Elements

Atsuo Yasumori, An Ozeki, Sumire Kondo, Kenichiro Iwasaki and Tsutomu Iida

1Dept. Materials Sci. Tech., Tokyo University of Science, Tokyo 125-8585, Japan, 2Div. Thermoelectrics for Waste Heat Recovery, RIST, Tokyo University of Science, Tokyo 125-8585, Japan

15:30 – 15:45  29-3-10   Oral

Defects governing the electrical and optical properties of transparent conducting BaSnO3

Michael J. Campion and Harry L. Tuller

Department of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

15:45 – 16:00  29-3-11   Oral

Elaborate Manipulation for Sub-10 nm Hollow Catalyst Sensitized Heterogeneous Oxide Nanofiber for Room Temperature Chemical Sensors

Ji-Soo Jang, Seon-Jin Choi, Won-Tae Koo, Sang-Joon Kim and Il-Doo Kim

*
Thermoelectric Array Sensors with catalyst combustors for breath analysis
WooSuck Shin\textsuperscript{1}, Tomoyo Goto\textsuperscript{2}, Daisuke Nagai\textsuperscript{1}, Toshio Itoh\textsuperscript{1}, Takafumi Akamatsu\textsuperscript{1} and Kazuo Sato\textsuperscript{3}

Electroceramics Group, Inorganic Functional Materials Research Institute, National Institute of Advanced Industrial Science and Technology, Nagoya 463-8560, Japan\textsuperscript{1}, The Institute of Scientific and Industrial Research (ISIR), Osaka University, Ibaraki 567-0047, Japan\textsuperscript{2}, Aichi Institute of Technology, Toyota 470-0392, Japan\textsuperscript{3}

RuCo nanoparticles loaded WO\textsubscript{3} nanofibers as breath gas sensing layers for diagnosis of diseases
Nam-Hoon Kim\textsuperscript{1}, and Il-Doo Kim\textsuperscript{1,*}

Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Republic of Korea

Multi-shelled WO\textsubscript{3} yolk-shell spheres for highly sensitive and selective detection of NO\textsubscript{2}
Jun-Sik Kim, Ji-Wook Yoon, Yun Chan Kang, and Jong-Heun Lee*  
Department of Materials Science and Engineering, Korea University, Seoul 02841, Republic of Korea
Program on May 29

Session 33 SOFC materials 1
Session Chair: T. Yamaguchi

13:00 - 13:30 29-4-01
Invited
Anionic, Cationic & Electronic Defects in Transition-Metal Perovskite Oxides & Their Connections to Oxygen Exchange Reactions
William C. Chueh
Department of Materials Science & Engineering, Stanford University, Stanford, CA 94305, USA

13:30 – 13:45 29-4-03
Oral
Understanding the Role of Microstructure on Oxygen Surface Exchange Kinetics via In Situ Optical Absorption Relaxation: Sr(Ti,Fe)O₃ case study
Ting Chen¹², George F. Harrington¹³⁴, Kazunari SASAKI¹²³, and Nicola H. Perry¹⁴*
¹International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, Nishi-ku Fukuoka 819-0395, Japan, ²Department of Hydrogen Energy Systems, Faculty of Engineering, Kyushu University, Nishi-ku Fukuoka, 819-0395, Japan, ³Next-Generation Fuel Cell Research Center (NEXT-FC), Kyushu University, 744 Motoooka Nishi-ku Fukuoka 819-0325, Japan, ⁴Department of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, U.S.A.

13:45 – 14:00 29-4-04
Oral
Orientation Effect on Tuning the Ionic Conductivity of Thin Film Electrolyte for Intermediate Temperature Solid Oxide Fuel Cell
P. Arunkumar¹, R. Ramaseshan² and K. Suresh Babu¹
¹Centre for Nanoscience and Technology, Pondicherry University, Puducherry – 605014, India, ²Thin Film and Coating Section, Surface & Nanoscience Division, Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam – 603 102, India
14:00 – 14:15  29-4-05or   Oral  
**Understanding, Controlling, and Applying Optical Absorption of Sr(Ti,Fe)O_{3-x}: Relationship to Defect Chemistry and Kinetics**
Nicola H. Perry\(^1,2\), Nam-Hoon Kim\(^3\), Elif Ertekin\(^3\), and Harry L. Tuller\(^1,2\)
\(^1\)International Institute for Carbon-Neutral Energy Research (wpi-I2CNER), Kyushu University, Fukuoka 819-0395, Japan, \(^2\)Department of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, U.S.A., \(^3\)Mechanical Engineering Department, University of Illinois at Urbana-Champaign, Urbana, IL 61801, U.S.A.

14:15 – 14:30  29-4-06or   Oral  
**N-type mixed conduction in donor-doped Ba-In-based oxides**
Yukio Cho, Itaru Oikawa and Hitoshi Takamura
Department of Materials Science, Graduate School of Engineering, Tohoku University, Sendai 980-8579, Japan

14:30 – 14:45  29-4-07or   Oral  
**Defect and Transport Models of Perovskite-structured Mixed Ionic-electronic Conducting SrSn\(_{1-x}\)Fe\(_x\)O\(_{3-x/2+\delta}\)**
Chang Sub Kim\(^1,2\), Sean R. Bishop\(^1,2\), Nicola H. Perry\(^1,3\), Harry L. Tuller\(^1,2\)
\(^1\)Department of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, USA, \(^2\)Materials Processing Center, Massachusetts Institute of Technology, Cambridge, MA 02139, USA, \(^3\)International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, Nishi-ku Fukuoka 819-0395, Japan

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**Session 34  SOFC materials 2**
Session Chair: W. C. Chueh

15:00 – 15:30  29-4-08in   Invited  
**Hydride Ion Conduction in Oxyhydrides**
Genki Kobayashi
Research Center of Integrative Molecular Systems, Institute for Molecular Science, Myodaiji, Okazaki, Aichi 444-8585, Japan
15:30 – 15:45
29-4-10 or Oral
**Development of Proton Conductive Electrochemical Cell for Intermediate Temperature Operation**
Toshiaki Yamaguchi, Hiroyuki Shimada, Katsuhiro Nomura, Koichi Hamamoto, Hirofumi Sumi and Yuki Yamaguchi
Functional Integration Technology Group, Inorganic Functional Materials Research Institute, Department of Materials and Chemistry, National Institute of Advanced Industrial Science and Technology, Nagoya 463-8560, Japan

15:45 – 16:00
29-4-11 or Oral
**Oxygen permeation and electrical properties of Ca doped SmFeO₃**
Isao Kagomiya¹, Yuki Hirota¹, Kyosuke Tsunekawa¹ and Ken-ichi Kakimoto¹
Nagoya Institute of Technology, Nagoya 466-8555, Japan

16:00 – 16:15
29-4-12 or Oral
**Oxygen Nonstoichiometry and Electric Transport Properties of Pr₆₋ₓCaₓMnO₃₋ₓ/d**
Yuichi Iida¹, Christian Pithan² and Rainer Waser²
¹New Technology Center, Murata Manufacturing Co., Ltd., Kyoto 617-8555, Japan, ²Peter Grünberg Institute, Forschungszentrum Jülich GmbH, 52428 Jülich, Germany

16:15 – 16:30
29-4-13 or Oral
**Microstructure-Performance Relationships in Composite Electrolytes**
S. Patrício¹, A. Jamale¹, J. Grilo¹, N. Martins¹, R. Nascimento², F. Marques¹
¹Dept. of Materials and Ceramic Eng. /CICECO, University of Aveiro, 3810-193 Aveiro, Portugal, ²Materials Science and Eng. Postgraduate Program, UFRN, 59078-970, Natal, Brazil

16:30 – 16:45
29-4-14 or Oral
**Lattice strain vs. defect association: Rare earth doped-CeO₂ films**
George F. Harrington¹,²,³,⁴, Nicola Perry²,³, Kazunari Sasaki¹, Bilge Yildiz³,¹, and Harry Tuller²,¹,⁴
¹Next-Generation Fuel Cell Research Centre, Kyushu University, Fukuoka 819-0395, Japan, ²Department of Materials Science and Engineering,
Investigation of B-Site Substitution by Y, Ti, or Nb on the Performance of BSCF as Oxygen Separation Membrane

L.-S. Unger\textsuperscript{1}, S. Baumann\textsuperscript{2}, C. Niedrig\textsuperscript{1}, W. Menesklou\textsuperscript{1}, S. F. Wagner\textsuperscript{1}, E. Ivers-Tiffée\textsuperscript{1}

\textsuperscript{1}Institute for Applied Materials (IAM-WET), Karlsruhe Institute of Technology (KIT), 76131 Karlsruhe/Germany, \textsuperscript{2}Institute of Energy and Climate Research IEK-1 Materials Synthesis and Processing, Forschungszentrum Jülich GmbH, 52425 Jülich/Germany
29-W-01po

**Phase transitions and dielectric dispersion in (0.4-\(y\)Na\(_{0.5}\)Bi\(_{0.5}\)TiO\(_3\)-0.6SrTiO\(_3\)-\(y\)PbTiO\(_3\) solid solutions**

Šarūnas Svirskas\(^1\), Marija Dunce\(^2\), Eriks Birks\(^2\), Andris Sternberg\(^2\), Stanislav Kamba\(^3\), Jūras Banys\(^4\)

\(^1\)Faculty of Physics, Vilnius University, Sauletekio av. 9/3b., Vilnius, Lithuania, \(^2\)Institute of Solid State Physics, University of Latvia, Kengaraga 8, Riga, Latvia, \(^3\)Institute of Physics, Czech Academy of Sciences, Na Slovance 2, 182 21 Prague 8, Czech Republic

29-W-02po

**Piezoelectric Properties of PMN-PNN-PZT Ceramics for Ultrasonic Generator**

Juhyun Yoo\(^1,2,a\), Ta-Hee Kim\(^1\), Dong-Hi Seo\(^2\), Eun-Sup Lee\(^2\), Nak-Gu Choi\(^3\), Hoy-Seung Jeong\(^4\)

\(^1\)Department of Electrical Engineering, Semyung University, Jecheon, 390-711, Korea, \(^2\)Ulsso Hitech, Chongwon -gun 363-794, Korea, \(^3\)Hitomoroo, Wonju-si, Gangwon-do, Korea, \(^4\)Chungbuk Health&Science University, Chongwon -gun 363-794, Korea

29-W-03po

**Transient Vibration Control Method for Impact Noise Cancellation of Traveling Wave Type Ultrasonic Motor**

Jinheon Oh\(^1\), Junghoon Kwon\(^2\), Keejoe Lim\(^2\)

\(^1\)Camera R&D Group, Samsung Electronics, Suwon 16677, South Korea, \(^2\)Electric & Computer Engineering, Chungbuk National University, Cheongju 28644, South Korea
29-W-04po

**Na**\textsubscript{2}**NbO**\textsubscript{3} based lead-free relaxor ferroelectric ceramics with giant electrostrictive strain

Ruzhong Zuo\textsuperscript{1*}, He Qi\textsuperscript{1}, Jian Fu\textsuperscript{1}

\textsuperscript{1}Institute of Electro Ceramics & Devices, School of Materials Science and Engineering, Hefei University of Technology, Hefei, 230009, P.R. China

29-W-05po

**Dielectric and Piezoelectric Properties of Modified**

**\(\text{Na,K}\)**\textsubscript{2}**NbO**\textsubscript{3}-**(\text{Sr,Ca})TiO**\textsubscript{3} Ceramics with the variation of sintering time

Seung-Won Kim\textsuperscript{1}, Sung-Jin Cho\textsuperscript{1}, Ju-Hyun Yoo\textsuperscript{1,}\textsuperscript{a}, Jie-Young Lee\textsuperscript{2}

\textsuperscript{1}Department of Electrical Engineering, Semyung University, Jecheon, 390-711, Korea, \textsuperscript{2}Department of Computer Science, Semyung University, Jecheon 390-711, Republic of Korea

29-W-06po

**The quenching effects for depolarization temperature of Li-substituted**

**\(\text{Bi}_0.5\text{Na}_0.5\)**\textsubscript{2}**TiO**\textsubscript{3} lead-free ferroelectric ceramics

Tatsuki Miura, Hajime Nagata and Tadashi Takenaka

Faculty of Science and Technology, Tokyo University of Science, Yamazaki2641, Noda, Chiba, 278-8510, Japan

29-W-07po

**Photovoltaic and structural properties of Nd and Mn co-doped BiFeO**\textsubscript{3}

polycrystalline ceramics

Y. S. Huang\textsuperscript{1} and Chi-Shun Tu\textsuperscript{2}

\textsuperscript{1}Department of Physics, Fu Jen Catholic University, New Taipei City 24205, Taiwan, \textsuperscript{2}Graduate Institute of Applied Science and Engineering, Fu Jen Catholic University, New Taipei City 24205, Taiwan

29-W-08po

**Synthesis and characterization of praseodymium-doped BiFeO**\textsubscript{3}

multiferroic ceramics

Yi-Lin Hsieh\textsuperscript{1}, and Chi-shun Tu\textsuperscript{1}

\textsuperscript{1}Department of Physics, Fu Jen Catholic University, New Taipei City 24205, Taiwan
29-W-09po

**Domain structure and phase transition in samarium doped BiFeO$_3$ near morphotropic phase boundary**

Chang-Wei Yu$^1$, Chi-Shun Tu$^1$

$^1$Department of Physics, Fu Jen Catholic University, New Taipei City 24205, Taiwan

29-W-10po

**Phonon Anomalies and Magnetization in A-Site Doping (Bi$_{1-x}$A$_x$)FeO$_3$ Multiferroic Ceramics**

Wen-Hao Wu$^1$ and Chi-Shun Tu$^1$

$^1$Department of Physics, Fu Jen Catholic University, New Taipei City 24205, Taiwan

29-W-11po

**Photovoltaic effects in atmosphere controlling neodymium doped BiFeO$_3$ multiferroic ceramics**

Chun-Yen Lin$^1$ and Chi-Shun Tu$^1$

$^1$Department of Physics, Fu Jen Catholic University, New Taipei City 24205, Taiwan

29-W-12po

**Thermal and Electrical Properties of β-LiAlSi$_2$O$_6$ and β-Al$_2$O$_3$ Composites for LTCC Applications**

Guanyu Chen$^{1,2}$, Zhifu Liu$^1$,*, Mingsheng Ma$^1$, Yongxiang Li$^{1,2,3,*}$

$^1$CAS Key Lab of Inorganic Functional Materials and Devices, Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 200050, China, $^2$School of Physical Science and Technology, ShanghaiTech University, Shanghai 201210, China, $^3$School of Engineering, RMIT University, Melbourne, VIC. 3000, Australia

29-W-13po

**Low-temperature Sintering of Cu$_{x/3}$Nb$_{2x/3}$Ti$_{1-x}$O$_2$ Microwave Dielectric Ceramics with CuO-B$_2$O$_3$ additions**

Hui Shao$^{1,2}$, Zhifu Liu$^1$ and Yongxiang Li$^{1,3}$

$^1$Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai
200050, China, ²School of Materials Science and Engineering, Jiangsu University of Science and Technology, Zhenjiang 212003, China, ³School of Engineering, RMIT University, Melbourne, VIC. 3000, Australia

29-W-14po
Low temperature co-fired behavior with Ag electrode in a CaO-Al₂O₃-SrO-B₂O₃-SiO₂ glass with Al₂O₃ addition
Po-Hsien Wu, Kuei-Chih Feng, Pin-Yi Chen, Chi-Shun Tu, Ying-Hsin Chen, Cheng-Sao Chen, Pei-Ying Wong
²Department of Mechanical Engineering, Ming Chi University of Technology, New Taipei City 24301, Taiwan, ³Department of Mechanical Engineering, Hwa Hsia University of Technology, New Taipei City 23567, Taiwan, ³Department of Physics, Fu Jen Catholic University, New Taipei City 24205, Taiwan

29-W-15po
Dielectric Properties of Nonstoichiometric (Ba,Sr)TiO₃ ceramics for Microwave Tunable Applications
Zhe Song, Kun Huang, Shiwo Ta, and Zhenxiao Fu
¹Fenghua Research Institute (Guangzhou) Co., Ltd., Guangzhou 510663, Guangdong, PR China, ²State Key Laboratory of Advanced Materials and Electronic Components, Fenghua Advanced Technology Co., Ltd, Zhaoqing 526020, Guangdong, PR China

29-W-16po
Preparation of MnO₂-nanosheet / Boron doped diamond (BDD) electrochemical capacitor
Akira Ueda, Akihisa Aimi, Chiaki Terashima, Tatsuo Aikawa, Takeshi Kondo, Makoto Yuasa, and Kenjiro Fujimoto
¹Faculty of Science and Technology, Tokyo University of Science, Noda 278-8510, Japan, ²Japan Science and Technology Agency (ACT-C), Chiyoda 102-0076, Japan

29-W-17po
Influence of Yb₂O₃ and Lu₂O₃ doping on microstructural and electrical characteristics of ZnO-Bi₂O₃ based varistor films
Taiyun Chen¹, Sujuan Zhong², Jia Ma², Qingke Zhang², Li Bao², Dong Xu¹,²
¹School of Material Science and Engineering, Jiangsu University, Zhenjiang
212013, P. R. China, ²Zhengzhou Research Institute of Mechanical
Engineering, Zhengzhou 450001, P. R. China

29-W-18po
Theoretical investigation of influence of strain on electro-optic effect
in ferroelectric thin films
Shinya Kondo¹, Tomoaki Yamada¹, Alexander K. Tagantsev², Nava Setter²,
Masahito Yoshino¹, and Takanori Nagasaki¹
¹Department of Materials, Physics and Energy Engineering, Nagoya
University, Nagoya 464-8603, Japan, ²Ceramics Laboratory, EPFL-Swiss
Federal Institute of Technology, Lausanne CH-1015, Switzerland

29-W-19po
Dielectric and Piezoelectric Properties of NKN-System ceramics for
Piezoelectric Energy Harvesting Device
Jong-Dae Han¹, Juhyun Yoo¹*, Lark-Hoon Hwang², Dong-In Kwon²,
Yong-Woo Lee³
¹Department of Electrical Engineering, Semyung University, Jecheon
390-711, Republic of Korea, ²Department of Electrical Engineering, Semyung
University, Jecheon 390-711, Republic of Korea, ³Central R&D Center,
WOOJIN Industrial Systems, Goesan 367-782, Republic of Korea

29-W-20po
Indirect measurements of electrocaloric effect in (001) (Ba, Sr)TiO₃
thin films by positive-up-negative-down method
Shogo Matsuo¹, Tomoaki Yamada¹, Takafumi Kamo², Hiroshi Funakubo²,
Masahito Yoshino¹, and Takanori Nagasaki¹
¹Department of Materials, Physics and Energy Engineering, Nagoya
University, Nagoya 464-8603, Japan, ²School of Materials and Chemical
Technology, Tokyo Institute of Technology, Yokohama 226-8502, Japan

29-W-21po
Ceramic Composite Films formed by Aerosol Co-Deposition – Overview
and Potential Applications
J. Exner¹, M. Schubert¹, D. Hanft¹, M. Bruckner¹, P. Fuierer² and R. Moos³
¹Department of Functional Materials, University of Bayreuth, Universitätsstraße 30, 95440 Bayreuth, Germany, ²Materials and Metallurgical Engineering Department, New Mexico Institute of Mining and Technology, Socorro, NM, USA

29-W-22po
Local crystal structure and physical properties of sputtered Cr-doped AlN thin films
Padmalochan Panda¹, Madhusmita Sahoo¹, R. Ramaseshan¹, S. Tripura Sundari¹, H. Suematsu² and S. Dash¹
¹Materials Science Group, Indira Gandhi Centre for Atomic Research, Kalpakkam-603102, India, ²Energy Density Research Institute, Nagaoka University of Technology, Nagaoka, Japan

29-W-23po
Microstructural and Electrical Properties of (Y, Sr)CoO₃₋δ Thin Films Tuned by the Film-Growth Temperature
Hongmei Jing¹, Shao-Bo Mi²*, Guangliang Hu¹, Lu Lu¹, Ming Liu¹, Shaodong Cheng¹, Sheng Cheng¹, Chun-Lin Jia¹,²,³
¹The School of Electronic and Information Engineering, Xi'an Jiaotong University, Xi'an 710049, PR China, ²State Key Laboratory for Mechanical Behavior of Materials, Xi'an Jiaotong University, Xi'an 710049, PR China, ³Peter Grünberg Institute and Ernst Ruska Center for Microscopy and Spectroscopy with Electrons, Forschungszentrum Jülich, D-52425 Jülich, Germany

29-W-24po
Grain Growth Enhancement and Electrical Properties of Li₆B₄O₉-Added (K,Na)NbO₃ Thin Films
Mitsunori Iwata¹, Koichiro Hayashi¹, Wataru Sakamoto¹, Takashi Iijima², Isamu Yuito³, Teruaki Takeuchi¹, Toshinobu Yogo¹
¹Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya 464-8603, Japan, ²National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba 305-8569, Japan, ³Research Organization for Nano and Life Innovation, Waseda University, Tokyo 162-0041, Japan
29-W-25po

**Ferroelectric property of one-axis-oriented lead zirconate titanate films under different in-plane stress conditions**

Hiroshi Uchida¹, Daichi Ichinose², Hiromi Shima³, Takahisa Shiraiishi⁴, Takanori Kiguchi⁵, Akihiro Akama⁶, Ken Nishida³, Toyohiko J. Konno⁴ and Hiroshi Funakubo²

¹Department of Materials and Life Sciences, Sophia University, Tokyo 102-8554, Japan, ²School of Materials and Chemical Technology, Tokyo Institute of Technology, Yokohama 224-8502, Japan, ³Department of Communications Engineering National Defense Academy, Yokosuka 239-8686, Japan, ⁴Institute for Materials Research, Tohoku University, Sendai 980-8577, Japan

29-W-26po

**Effect of Elastic Field on Crystal Structure in Compositionally Modulated PMN-PT Superlattices**

Cangyu Fan¹, Takanori Kiguchi², Takahisa Shiraiishi², Akihiro Akama², and Toyohiko J. Konno²

¹Department of Materials Science, Tohoku University, Sendai 980-8579, Japan, ²Institute for Materials Research, Tohoku University, Sendai 980-8577, Japan

29-W-27po

**Shear-driven novel ferroelectric materials: k-Al₂O₃ type structure**

Shintaro Yasui¹, Yosuke Hamasaki¹, Tsukasa Katayama¹, Takuya Osakabe¹, Ayako Konishi², Hiroki Moriwake², and Mitsuru Itoh¹

¹Laboratory for Materials and Structures, Tokyo Institute of Technology, Yokohama 226-8502, Japan, ²Nanostructures Research Laboratory, Japan Fine Ceramics Center(JFCC), Nagoya 456-8587, Japan

29-W-28po

**Synthesis of high-dispersion BaTiO₃-PVP nanoparticles by hydrothermal method**

Jinhui Li¹,², Woosuck Shin¹,² *, Akihiro Tsuruta², Koji Inukai³, Yosuke Takahashi³

¹Department of Frontier Materials, Nagoya Institute of Technology, Nagoya
Highly Catalytic Activity for 1,4-Dioxane Oxidation in Liquid-phase by Using Pt/CeO₂-ZrO₂-SnO₂/SBA-16

Kenji Matsuo, Pil Gyu Choi, Naoyoshi Nunotani, and Nobuhito Imanaka
Department of Applied Chemistry, Faculty of Engineering, Osaka University, 2-1 Yamadaoka, Suita, Osaka 565-0871, Japan
Program on May 30

**Plenary**
Session Chair: M. Awano

09:00 - 09:45 30-0-03pl  Plenary

**Mixed Ionic Electronic Conductors for High Temperature Electrochemical Devices**
John Kilner\(^1,2\), John Druce\(^1\) and Helena Tellez\(^1\)
\(^1\)International Institute for Carbon Neutral Energy Research (I2CNER) 744 Moto-oka, Nishi-ku, Fukuoka, 819-0395 JAPAN, \(^2\)Dept. of Materials, Faculty of Engineering, Imperial College, London, UK

**Session 06** Tunable ferroelectric and dielectric thin films
Session Chair: H. Funakubo

10:00 – 10:30 30-1-16in  Invited

**Tunable Ferroelectric (Ba,Sr)TiO\(_3\) Thin Films: Design of Microstructure and Dielectric Properties via Solution-Based Processing**
Barbara Malič and Tanja Pečnik
Electronic Ceramics Department, Jožef Stefan Institute, Jamova cesta 39, 1000 Ljubljana, Slovenia

10:30 – 10:45 30-1-18or  Oral

**Role of stoichiometry and interface quality in the performance of (Ba,Sr)TiO\(_3\) tunable capacitors with high figures of merit**
Christopher R. Freeze and Susanne Stemmer
Materials Department, University of California, Santa Barbara, California 93106-5050, USA

10:45 – 11:15 30-1-19in  Invited

**Crystallization controlled BaTiO\(_3\), SrTiO\(_3\) thin films by chemical solution deposition**
Tadasu Hosokura, Kosuke Shiratsuyu, Akira Ando, and Takehiro Konoike
Murata Manufacturing Co., Ltd., Nagaokakyo-shi 617-8555, Japan
11:15 – 11:30  30-1-21or  Oral
Fabrication and electrical properties for ferroelectric (Pb,La)(Zr,Ti)O₃ capacitors with Sn:In₂O₃ bottom and top electrodes
Yoko Takada¹, Rika Tamano¹, Naoki Okamoto¹, Takeyasu Saito¹, Takeshi Yoshimura², Norifumi Fujimura², Koji Higuchi³, and Akira Kitajima³
¹Dept. of Chemical Engineering, Osaka Prefecture University, Sakai 599-8531, Japan, ²Dept. of Physics and Electronics, Osaka Prefecture University, Sakai 599-8531, Japan, ³The Institute of Scientific and Industrial Research, Ibaraki 567-0047, Japan

11:30 – 11:45  30-1-22or  Oral
Epitaxial integration of functional oxides with silicon using pulsed-laser deposition
Matjaž Spreitzer¹, Daniel Diaz¹, Tjaša Parkelj¹, Urška Gabor¹, and Danilo Suvorov¹
¹Advanced Materials Department, Jožef Stefan Institute, Jamova 39, 1000 Ljubljana, Slovenia

Session 07  Nanostructured ferroelectrics and their domain structure
Session Chair: L. W. Martin and Y. Ivry

Session Chair: L. W. Martin
13:00 – 13:30  30-1-23in  Invited
Sol-gel-processed (K,Na)NbO₃ and BiFeO₃ based epitaxial thin films: temperature-dependent domain structure and piezoelectric response
Jing-Feng Li¹, Jin Luo1 and Wei Sun¹
¹School of Materials Science and Engineering, Tsinghua University, Beijing, China, 100084

13:30 – 13:45  30-1-25or  Oral
Aqueous Thin-Film Deposition of Lead-Free Bi₀.₅Na₀.₅TiO₃ Based Piezoelectric Compositions
Mads Christensen¹, Mari-Ann Einarsrud¹ and Tor Grande¹
¹Department of Materials Science and Engineering, NTNU, Trondheim NO-7491, Norway
13:45 – 14:00   30-1-26or Oral

**Domain formation in Pb(Zr,Ti)O₃ nanorods driven by depolarizing field**

Tomoaki Yamada¹,², Daisuke Ito¹, Tomas Sluka³, Nava Setter³, Osami Sakata⁴,⁵, Takahiro Namazu⁶, Hiroshi Funakubo⁵, Masahito Yoshino¹, and Takanori Nagasaki¹

¹Department of Materials, Physics and Energy Engineering, Nagoya University, Nagoya 464-8603, Japan, ²PRESTO, Japan Science and Technology Agency, Kawaguchi 332-0012, Japan, ³Swiss Federal Institute of Technology-EPFL, Lausanne CH-1015 Switzerland, ⁴Synchrotron X-ray Station at SPring-8 and Synchrotron X-ray Group, National Institute for Materials Science, Sayo 679-5148, Japan, ⁵School of Materials and Chemical Technology, Tokyo Institute of Technology, Yokohama 226-8503, Japan, ⁶Department of Mechanical Engineering, Aichi Institute of Technology, Toyota 470-0392, Japan

14:00 – 14:30   30-1-27in Invited

**Exciting nanodomains and atomic-scale dipoles**

Maya Barzilay¹,², Asaf Herhkovitz¹,², Itamar Holzman¹,², Cecile Saguy², and Yachin Ivry¹,²

¹Deptartment of Materials Science and Engineering, Technion – Israel Institute of Technology, Haifa 3200003, Israel, ²Solid State Institute, Technion – Israel Institute of Technology, Haifa 3200003, Israel

14:30 – 14:45   30-1-29or Oral

**Nanostructured Ferroelectrics for Local Geometric Strain Relief and Switching Control**

James Steffes¹, Zachary Thatcher¹, Ryan Cordier¹, Bryan D. Huey¹

¹University of Connecticut, Institute of Materials Science, Storrs, CT, 06269-3136 USA

Session Chair: Y. Ivry

15:00 – 15:30   30-1-30in Invited

**Negative-pressure induced enhancements in freestanding nanoferroelectrics**

Jin Wang¹, Ben Wylie-van Eerd², Tomas Sluka³, Cosmin Sandu³ and Brahim Dkhil⁴, Alexander Tagantsev¹, Joe Trodahl², and Nava Setter³
Session 08  Caloric effects for energy conversion
Session Chair: Y. Ivry

15:30 – 15:45  30-1-32 or Oral
Electrocaloric effects in multilayer capacitors based on ferroelectric oxides
Tomoyasu Usui¹, Sakyo Hirose¹, Bhaskaran Nair², Xavier Moya² and Neil D. Mathur²
¹Murata Manufacturing Co., Ltd., 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan, ²Department of Materials Science, University of Cambridge, Cambridge CB3 0FS, UK

15:45 – 16:00  30-1-33 or Oral
Electrocaloric Effects and Temperature Distribution Analysis of BaTiO₃-based Ceramics and Multi-layer Capacitor
Hiroshi Maiwa
Department of Materials and Human Environmental Sciences, Shonan Institute of Technology, Fujisawa 251-8511, Japan

16:00 – 16:30  30-1-34 Invited
Multicaloric electroceramics
P. Lloveras¹, E. Stern-Taulats², M. Barrio¹, J.-Ll. Tamarit¹, A. Planes², Ll. Mañosa², N. D. Mathur³ and X. Moya³
¹Departament de Física i Enginyeria Nuclear, ETSEIB, Universitat Politècnica de Catalunya, Diagonal 647, Barcelona, 08028 Catalonia, Spain, ²Facultad de Física, Departament d’Estructura i Constituents de la Matèria, Universitat de Barcelona, Martí i Franquès 1, 08028 Barcelona, Catalonia, Spain, ³Department of Materials Science, University of Cambridge, Cambridge, CB3
16:30 – 16:45  30-1-36or  Oral

**Origin of the negative electrocaloric effect in antiferroelectrics**

Nikola Novak\(^1\), Florian Weyland\(^1\), Yangbin Ma\(^1\), Karsten Albe\(^1\), Xiaoli Tan\(^2\), Jürgen Rödel\(^1\), and Jurij Koruza\(^1\)

\(^1\)Institute of Materials Science, Technische Universität Darmstadt, Alarich-Weiss –Straße 2, Darmstadt, Germany, \(^2\)Department of Materials Science and Engineering, Iowa State University, Ames, Iowa 50011, USA

16:45 – 17:00  30-1-37or  Oral

**Thermal management materials based on pyroelectric behavior of niobate-based ceramics and their composites**

Daisuke Ando\(^1\), Franziska Eichhorn\(^2\), Tobias Fey\(^2\), Peter Greil\(^2\) and Ken-ichi Kakimoto\(^1,3\)

\(^1\)Department of Life Science and Applied Chemistry, Nagoya Institute of Technology, Nagoya 466-8555, Japan, \(^2\)Department of Materials Science and Engineering (Glass and Ceramics), University of Erlangen-Nuremberg, Erlangen 91058, Germany, \(^3\)Frontier Research Institute for Materials Science, Nagoya Institute of Technology, Nagoya 466-8555, Japan
Program on May 30  Room 2

Session 09  Ferroelectric and magnetic properties
Session Chair: X. Moya

10:00 – 10:30  30-2-16in  Invited
Emergent Structures and Properties in Epitaxial Ferroelectrics Thin Films
Lane W. Martin¹,²
¹Department of Materials Science & Engineering, University of California, Berkeley, Berkeley, CA 94720, USA, ²Materials Science Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA

10:30 – 10:45  30-2-18or  Oral
Polarization reversal mechanism in (Bi₁/₂Na₁/₂)TiO₃-based relaxor ceramics
Julia Glaum, John Daniels, Mark Hoffman, Hugh Simons, Matias Acosta
Department of Materials Science and Engineering, NTNU, Norwegian University of Science and Technology, Norway, School of Materials Science and Engineering, UNSW Australia, NSW 2052, Australia, Department of Physics, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark, Institute of Materials Science, Ceramics Group, Technische Universität Darmstadt, Germany

10:45 – 11:15  30-2-19in  Invited
Ferroelectricity and Magnetic Properties in k-Al₂O₃-type oxides
Mitsuru Itoh¹, Yosuke Hamasaki¹, Shintaro Yasui¹, Tsukasa Katayama¹, Takuya Osakabe¹, Tomoyasu Taniyama¹, Ayako Konishi², and Hiroki Moriwake²
¹Laboratory for Materials and Structures, Tokyo Institute of Technology, Yokohama 226-8503, Japan, ²Nanostructures Research Laboratory, Japan Fine Ceramics Center, Nagoya 456-8587, Japan
11:15 – 11:30  30-2-21or Oral

On the polarization in ferroelectric tungsten bronzes  
G. H. Olsen, S. Stubmo Aamlid, S. M. Selbach and T. Grande  
¹Department of Materials Science and Engineering, NTNU Norwegian  
University of Science and Technology, NO-7491 Trondheim, Norway

11:30 – 11:45  30-2-22or Oral

Charge ordering in CaCu₃Fe₄O₁₂: Raman spectroscopy investigation  
James Quilty¹, Vaibhav Sharma¹, Joe Trodahl², Takashi Saito³, and Yuichi  
Shimakawa³  
¹School of Engineering and Computer Science, Victoria University of  
Wellington, PO Box 600, Wellington 6140, New Zealand, ²MacDiarmid  
Institute for Advanced Materials and Nanotechnology, Victoria University of  
Wellington, PO Box 600, Wellington 6140, New Zealand, ³Institute for  
Chemical Research, Kyoto University, Gokasho, Uji, Kyoto 611-0011, Japan

Session 10  Composite materials and their properties

Session Chair: B. Malic

13:00 – 13:30  30-2-23in Invited

Enhancing the Electromechanical Response of Lead-Free  
Ferroelectrics with Multilayer Ceramic/Ceramic Composite Structures  
Azatuhi Ayrikyan¹ and Kyle G. Webber¹  
Departments of Materials Science and Engineering, Friedrich-Alexander  
Universität Erlangen-Nürnberg, Erlangen 91058, Germany

13:30 – 13:45  30-2-25or Oral

Dielectric spectroscopy of BaTiO₃-KNbO₃ composites: in search for  
artificial MPBs  
Maksim Ivanov¹, Sergejus Balčiūnas¹, Jūras Banys¹, Satoshi Wada²  
¹Faculty of Physics, Vilnius University, Sauletekio 9, 3 rumai, LT10222 Vilnius,  
Lithuania, ²Interdisciplinary Graduate School of Medical and Engineering,  
University of Yamanashi, Kofu, Yamanashi 400-8510, Japan
13:45 – 14:00  30-2-26or  Oral
**Novel high-temperature \((T_C>500^\circ C)\) perovskite-type piezoceramics**
Jian Yu
Institute of Functional Materials, Donghua University, Shanghai 201620, China

14:00 – 14:15  30-2-27or  Oral
**Dielectric behaviour in albite and anorthite micro-nanostructured**
Víctor Fuertes de la Llave\(^1\), J.F. Fernández\(^1\) and Esther Enríquez Pérez\(^2\)
\(^1\)Electroceramics Group, Ceramic and Glass Institute (CSIC) Madrid 28049, Spain, \(^2\)Vidres Technological Centre, 12540 Villareal, Castellón, Spain

**Session11  Dr. Cross Memorial Session**
Session Chair: S. Trolier-McKinstry

15:00 – 17:00  Dr. Cross Memorial Session
**Electroceramics According to Professor Eric Cross,**
Nava Setter
EPFL Swiss Federal Institute of Technology,

**Ionic conductors to relaxors, and returned to ionic conductors,**
Takaaki Tsurumi
Tokyo Institute of Technology, Japan

**Dr. Cross and Ferroelectricity in China,**
Xi Yao
Tongji University, China

**First, Strange & Unique Idea, and then became Acceptable one:**
**Dr. Cross in the Engineered Domain Crystals,**
Satoshi Wada
Tokyo Institute of Technology, Japan

**For Ferroelectrics, You are the Giant Who on Whose Shoulders We Still Stand,**
Soonil Lee
Korean Institute of Ceramic Engineering and Technology
Somewhere Over the RAINBOW,
Catherine Elissalde
CNRS, University of Bordeaux, France

The “SAGA” of Ferroelectric Materials ~ to the memory of the great pioneer, Prof. Leslie Eric Cross,
Akira Ando and Yukio Sakabe
Murata Manufacturing Co., Ltd.

Eric Cross, “The Ferroelectrician”: A Legacy of Mentoring a Field,
Clive A. Randall
The Pennsylvania State University
Session 22 Fabrication process

Session Chair: N. Imanaka

10:00 – 10:30 30-3-16 Invited
Multifunctional properties of MgAl2O4 ceramic processed by Spark Plasma Sintering
M. Mouyanne1, B. Jaber1, B. Bendjemil2, J. Bernard1, D. Houivet1 and J.G. Noudem1,3*
1LUSAC EA 4253, Université de Caen Normandie, ESIX-GSI, BP 78, 50130 Cherbourg Octeville, France, 2LASEA, Faculty of Sciences, Univ-Badji Mokhtar, B.P.12, 23000 Annaba, Algeria, 3CRISMAT-CNRS/ENSICAEN- Université de Caen Normandie, 6 Boulevard du Maréchal Juin, 14050 CAEN Cedex 4, France

10:30 – 10:45 30-3-18 Oral
Improvement in sensing properties of WO3-based semiconductor gas sensors to methylmercaptan
Taro Ueda*1, Takuya Maeda1, Kuniyuki Izawa2, Kai Kamada1, Takeo Hyodo1, Yasuhiro Shimizu1
1Graduate School of Engineering, Nagasaki University, 1-14 Bunkyo-machi, Nagasaki 852-8521, Japan, 2Figaro Engineering Inc., 1-5-11 Senbanishi, Minoo, Osaka 562-8505, Japan

10:45 – 11:15 30-3-19 Invited
Achievement of High CO Sensing Performance of Solid Electrolyte Gas Sensors by Designing of Electrode Materials
Yasuhiro Shimizu* and Takeo Hyodo
Division of Chemistry and Materials Science, Graduate School of Engineering, Nagasaki University, 1-14 Bunkyo-machi, Nagasaki 852-8521, JAPAN
11:15 – 11:30  30-3-21 or  Oral
Fabrication of hollow quasi-hemispherical SnO₂ via chemical etching of SiO₂ from SiO₂-SnO₂ core-shell structures for detection of disease biomarkers in human exhaled breath
Peresi Majura Bulemo¹, Hee-Jin Cho¹ and Il-Doo Kim¹*
¹Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology (KAIST), 291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Republic of Korea

11:30 – 11:45  30-3-22 or  Oral
Facile synthesis of optically sintered Rh-SnO₂ hierarchical spheres for application in diagnosis of diabetes
Hee-Jin Cho¹, Seon-Jin Choi¹,², and Il-Doo Kim¹*
¹Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Republic of Korea, ²Applied Science Research Institute, Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Republic of Korea

Session 23  Electrochemical and semiconducting
Session Chair: K. Shimanoe

13:00 – 13:30  30-3-23 or  Invited
New Solid State Electrochemical Method for the Measurement of Dissolved Hydrogen Concentration in Al melt: Park-Rapp Probe
Chong O. PARK and Seongwan KIM
Dept. of MSE, KAIST, Daejon 34141, KOREA

13:30 – 13:45  30-3-25 or  Oral
Pt-loaded macroporous WO₃ nanofibers synthesized by Pt decorated colloid templates for daily halitosis monitoring
Seon-Jin Choi¹,², Kang Hee Ku³, Bumjoon J. Kim³, and Il-Doo Kim²
¹Applied Science Research Institute, Korea Advanced Institute of Science and Technology (KAIST), Daejeon 305-701, Republic of Korea, ²Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon 305-701, Republic of Korea, ³Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon 305-701, Republic of Korea
Sensor array optimization for discrimination of acetone applicable to human exhale breath analysis
Hyung Gi Byun$^1$ and Jin Young Jeon$^1$
$^1$Division of Electronics, Information & Communication Eng., Kangwon National University, 346, Jungang-ro, Samcheok, Kangwon-do, 25913, Korea

Catalytic Combustion-type Carbon Monoxide Gas Sensor Applying Oxide Ion Conducting Solids
Nobuhito Imanaka*, Ayaka Hosoya, and Shinji Tamura
Department of Applied Chemistry, Faculty of Engineering, Osaka University 2-1, Yamadaoka, Suita, Osaka 565-0871, Japan

Cr$_2$O$_3$/ZnCr$_2$O$_4$ hetero-nanostructures for highly selective xylene sensor
Jae-Hyeok Kim, Hyun-Mook Jeong, Chan Woong Na, Ji-Won Yoon, and Jong-Heun Lee
Department of Materials Science and Engineering, Korea University, Seoul 02841, Republic of Korea

Chemical Sensor Systems for Exhaled Breath Analysis
Kathy Sahner
Bosch Healthcare Solutions GmbH, P.O. Box 1127, 71301 Waiblingen, Germany
15:30 – 16:00  30-3-32
Invited
Highly Selective Detection of Benzene, Toluene, and Xylene using Oxide Semiconductor Chemiresistors
Jong-Heun Lee
Department of Materials Science and Engineering, Korea University, Seoul 02841, Republic of Korea

Session 25  Environmental
Session Chair: Y. Shimizu

16:00 – 16:30  30-3-34
Invited
High Performance of Semiconductor Gas Sensors: Which of transducer function and utility factor is effective for sensitivity?
Kengo Shimanoe
Faculty of Engineering Sciences, Kyushu University, 6-1 Kasuga-koen, Kasuga, Fukuoka 816-8580, Japan

16:30 – 17:00  30-3-36
Invited
Ceramic Exhaust Gas Sensors: Recent Developments
Ralf Moos
Bayreuth Engine Research Center (BERC), Department of Functional Materials, University of Bayreuth, 95440 Bayreuth, Germany
Program on May 30
Room 4

Session 35 Sodium ion battery
Session Chair: S. P. Ong

10:00 – 10:30 30-4-16in Invited
Exploring new insertion materials for rechargeable Li, Na, and K batteries
Kei Kubota\textsuperscript{1,2} and Shinichi Komaba\textsuperscript{1,2}
\textsuperscript{1}Dept. of Appl. Chem., Tokyo University of Science, Tokyo 162-8601, Japan,
\textsuperscript{2}ESICB, Kyoto University, Kyoto 615-8245, Japan

10:30 – 11:00 30-4-18in Invited
New structures and new compositions of electrochemically active vanadium-based phosphates for Na batteries
C. Masquelier\textsuperscript{a}, V.M. Kovrugin\textsuperscript{a}, F. Chen\textsuperscript{a}, F. Lalère\textsuperscript{a}, V. Seznec\textsuperscript{a}, O. Mentré\textsuperscript{d},
J.N. Chotard\textsuperscript{b}, F. Fauth\textsuperscript{c}, R. David\textsuperscript{a}, L. Croguennec\textsuperscript{d}
\textsuperscript{a}LRCS, Université de Picardie Jules Verne, F-80039 Amiens Cedex 1, France
\textsuperscript{b}UCCS, UMR 8181, Univ. Lille Nord de France, F-59655 Villeneuve d’Ascq, France,
\textsuperscript{c}ICMCB-CNRS, Univ. Bordeaux, Bordeaux INP, F-33608 Pessac cedex, France,
\textsuperscript{d}CELLS - ALBA Synchrotron, Cerdanyola del Vallès, E-08290 Barcelona, Spain

11:00 – 11:30 30-4-20in Invited
Atomic Level Investigations of Na-Ion Battery Cathode Materials
Craig A. J. Fisher\textsuperscript{1}, Takafumi Ogawa\textsuperscript{1}, Akihide Kuwabara\textsuperscript{1}, Hiroki Moriwake\textsuperscript{1}
and M. Saiful Islam\textsuperscript{2}
\textsuperscript{1}Nanostructures Research Laboratory, Japan Fine Ceramics Center, Nagoya 456-8587, Japan,
\textsuperscript{2}Department of Chemistry, University of Bath, Bath BA2 7AY, UK

11:30 – 11:45 30-4-22or Oral
Preparation and characterization of all-solid-state Na/S batteries with Na\textsubscript{3}PS\textsubscript{4} electrolyte operating at room temperature
N. Tanibata\textsuperscript{1}, M. Deguchi\textsuperscript{1}, A. Hayashi\textsuperscript{1,2} and M. Tatsumisago\textsuperscript{1}
Crystal growth of advanced LIB materials in molten fluxes offer a new way for discovering cutting-edge materials
Katsuya Teshima\textsuperscript{1,2} and Nobuyuki Zettsu\textsuperscript{1,2}
\textsuperscript{1}Center for Energy and Environmental Science, Shinshu University, Nagano 380-8553, JAPAN, \textsuperscript{2}Department of Materials Chemistry, Shinshu University, Nagano 380-8553, JAPAN

Novel Alkali Superionic Conductor Solid Electrolytes for All-Solid-State Rechargeable Alkali-Ion Batteries
Shyue Ping Ong\textsuperscript{1}, Zhuoying Zhu\textsuperscript{1}, Iek-Heng Chu\textsuperscript{1}, Christopher Kompella\textsuperscript{1}, Han Nguyen\textsuperscript{1}, Zhi Deng\textsuperscript{1}, Ying Shirley Meng\textsuperscript{1}
\textsuperscript{1}Department of NanoEngineering, University of California, San Diego, 9500 Gilman Drive, Mail Code 0448, La Jolla, CA 92093, USA

Li-ion migration in pristine and Li-rich NASICON-type solid electrolytes
Yusuke Noda\textsuperscript{1} and Masanobu Nakayama\textsuperscript{1234}
\textsuperscript{1}Materials research by Information Integration” Initiative (MI2I), National Institute for Materials Science (NIMS), Tsukuba, Ibaraki 305-0047, Japan, \textsuperscript{2}Department of Life Science and Applied Chemistry, Nagoya Institute of Technology, Nagoya, Aichi 466-8555, Japan, \textsuperscript{3}Global Research Center for Environment and Energy based on Nanomaterials Science (GREEN), National Institute for Materials Science (NIMS), Tsukuba, Ibaraki 305-0047, Japan, \textsuperscript{4}Elements Strategy Initiative for Catalysts and Batteries (ESICB), Kyoto University, Kyoto 615-8245, Japan
14:15 – 14:30  30-4-27or    Oral
Rapid Fabrication of LiCoO$_2$ Cathode on LTAP Solid Electrolyte by Laser Flash Sintering
Koichi Hamamoto$^{(a)}$, Yuki Yamaguchi$^{(a)}$, Hiroyuki Shimada$^{(a)}$, Hirofumi Sumi$^{(a)}$, Toshiaki Yamaguchi$^{(a)}$ and Yoshinobu Fujishiro$^{(a)}$
$^{(a)}$National Institute of Advanced Industrial Science and Technology (AIST), Inorganic Functional Materials Research Institute, 2266-98, Shimo-shidami, Moriyama-ku, Nagoya 463-8560, JAPAN

14:30 – 14:45  30-4-28or    Oral
Ferroelectric SEIs for Ultrahigh Rate Lithium Ion Batteries
Takashi Teranishi$^{1}$, Yumi Yoshikawa$^{1}$, Hidetaka Hayashi$^{1}$, Akira Kishimoto$^{1}$, Sou Yasuhara$^{2}$, Shintaro Yasui$^{2}$, and Mitsuru Itoh$^{2}$
$^{1}$Okayama University, Okayama 700-8530, Japan, $^{2}$Tokyo Institute of Technology, Yokohama 226-8503, Japan

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**Session 37  Energy conversion materials 1**
Session Chair: K. Hamamoto

15:00 – 15:30  30-4-30in    Invited
Ultra-safe Lithium-ion Battery
Palani Balaya, Wang Chen, Srirama Hariharan and Vishwanathan Ramar
Department of Mechanical Engineering, National University of Singapore, Singapore 117576

15:30 – 16:00  30-4-32in    Invited
High Capacity Electrode Materials with Redox Reaction of Oxide Ions
Naoaki Yabuuchi
Department of Green and Sustainable Chemistry, Tokyo Denki University, 5 Senju Asahi-Cho, Adachi, Tokyo 120-8551, Japan

16:15 – 16:30  30-4-35or    Oral
High-throughput Evaluation of Ionic Conductivity by Bond-Valence based Approach
Masanobu Nakayama$^{1-3}$
1Nagoya Institute of Technology, Nagoya, Aichi, 466-8555, Japan, 2GREEN & Mi2i, National Institute of Materials Science (NIMS), Japan, 3ESICB-Kyoto University, Kyoto, Japan

16:30 – 17:00 30-4-36 in Invited

**Portable power generation based on micro-tubular SOFCs**

Masanobu Awano and Yoshinobu Fujishiro

Inorganic Functional Materials Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Nagoya 463-8560, Japan
30-W-01po

**Sensitive detection of chloramphenicol based on chemiluminescence immunoassays with the functionalized magnetic nanoparticles**

Linyu Wang¹, Manwen Yao², Xiangyi Fang³*, Xi Yao¹

¹School of Electronic and Information Engineering, Xi’an Jiaotong University, Xi’an710049, PR China, ²Tongji University, Shanghai 200092, PR China,
³School of Science, Xi’an Jiaotong University, Xi’an 710049, PR China

30-W-02po

**Pt catalyst-loaded WO₃ Nanobelts Using Eco-friendly bio-templated biological protein and Tea saponin for selective detection of H₂S**

Min-Hyeok Kim, Ji-Soo Jang, Won-Tae Koo, Seon-Jin Choi, Sang-Joon Kim, and Il-Doo Kim*

Department of Materials Science & Engineering, Korea Advanced Institute of Science & Technology, 291 Daehak-ro, Yuseong-gu, Daejeon 34141, Republic of Korea

30-W-03po

**Enhanced gas selectivity of Co₃O₄-based sensors by noble metal addition**

Takafumi Akamatsu¹, Toshio Itoh¹, Noriya Izu² and Woosuck Shin¹

¹Electroceramics Group, Inorganic Functional Materials Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Nagoya 463-8560, Japan, ²Tailored Liquid Integration Group, Inorganic Functional Materials Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Nagoya 463-8560, Japan
30-W-04po
Hierarchical Porosity Comprising WO$_3$ Nanofiber Scaffold Functionalized by Bio-Inspired Pt Catalyst for Early Diagnosis of Diabetes
Dong-Ha Kim, Ji-Soo Jang, Won-Tae Koo, Seon-Jin Choi, Sang-Joon Kim and Il-Doo Kim*
Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Republic of Korea

30-W-05po
Zirconia Solid Electrolyte for Steel Oxygen Sensor Utilizing Transitionable Composites for Performance Enhancement
Yonggang Hu, Jia-min Wu, Yusheng Shi and Jianzhong Xiao
$^1$State Key Laboratory of Materials Processing and Die & Mould Technology, School of Materials Science and Engineering, Huazhong University of Science and Technology, Wuhan 430074, China, $^2$School of Optical and Electronic Information, Huazhong University of Science and Technology, Wuhan 430074, China

30-W-06po
Ab initio Study on Polaron Hopping in the NTC thermistor material, Perovskite-type YCrO$_3$
Hirotsugu Nojima$^1$, Masanobu Nakayama$^1$ and Teiichi Suzuki$^2$
$^1$Nagoya Institute of Technology, Gokiso, Showa, Nagoya, Aichi 466-8555, Japan, $^2$SHIBAURA ELECTRONICS CO., LTD., 2-1-24 Ochiai, Tyuou, Saitama, Saitama 338-0001, Japan

30-W-07po
Substitution effects of Mn for Ru on electrical transport properties in CaCu$_3$Ru$_4$O$_{12}$ conducting oxide
Akihiro Tsuruta$^1$, Masashi Mikami$^1$, Yoshiaki Kinemuchi$^1$, Ichiro Terasaki$^{1,2}$, Norimitsu Murayama$^3$ and Woosuck Shin$^1$
$^1$Electroceramics Group, Inorganic Functional Materials R. I., National Institute of Advanced Industrial Science and Technology (AIST), Nagoya 463-8560, Japan, $^2$Department of Physics, Nagoya University, Nagoya
464-8602, Japan, ³National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba 305-8565, Japan

30-W-08po

**β-Ga₂O₃ field effect transistor with ferroelectric gate**

S. Itoh¹, A. Ozawa¹, I. D. Antoro¹, T. Nakajima² and T. Kawae¹

¹Kanazawa Univ., Kakuma-machi, Kanazawa, Ishikawa 920-1192, Japan
²Tokyo Univ. of Sci., 6-3-1 Nijuku, Katsushika, Tokyo, 125-8585, Japan

30-W-09po

**Flexible Inorganic-organic superlattice films for potential wearable energy harvesting devices**

Ruoming Tian¹, Chunlei Wan², Yifeng Wang³, Qingshuo Wei⁴, Takao Ishida⁴, Atsushi Yamamoto⁴, Akihiro Tsuruta⁵, Woosuck Shin⁵, Sean Li⁶, and Kunihiro Koumoto¹

¹Toyota Physical and Chemical Research Institute, Nagakute, 480-1192, Japan, ²Tsinghua University, Beijing 100084, China, ³Nanjing Tech University, Nanjing 210009, China, ⁴National Institute of Advanced Industrial Science and Technology, Tsukuba 305-8565, Japan, ⁵National Institute of Advanced Industrial Science and Technology, Nagoya 463-8560, Japan, ⁶School of Materials Science and Engineering, UNSW Australia, NSW 2052, Australia

30-W-10po

**Reduction of thermal conductivity in amorphous Si₀.₆₅G₀.₃₅₋ₓCuₓ synthesized by mechanical alloying process for thermoelectric applications**

Muthusamy Omprakash, Shunsuke Nishino, Manabu Inukai, Tsunehiro Takeuchi

Toyota Technological Institute, Nagoya 468-8511, Japan

30-W-11po

**Thermoelectric Properties of Yb-based Heavy-Fermion System**

Takuya Iizuka¹, Taro Hori¹, Masaharu Matsunami¹, and Tsunehiro Takeuchi¹

¹Energy Materials Laboratory, Toyota Technological Institute, Nagoya 468-8511, Japan
30-W-12po

**Improved Thermoelectric and Mechanical Properties of Doped n-type Mg_2Si**

Takeshi Matsuoka¹, Tsutomu Iida¹,², Mitsunobu Nakatani¹, Takashi Nakamura¹, Ryo Inoue¹,², Keishi Nishio¹,², and Yasuo Kogo¹,²

¹Dept. Materials Sci. Tech., Tokyo University of Science, Tokyo 125-8585, Japan, ²Div. Thermoelectrics for Waste Heat Recovery, RIST, Tokyo University of Science, Tokyo 125-8585, Japan

30-W-13po

**Evaluation of the thermoelectric properties of the rare earth-transition metal chalcogenide system GdCu_{1+x}Te_2**

Jean-Baptiste VANÉY¹, Emilie BENSON¹, and Takao MORI¹

¹NIMS-MANA, Ibaraki Tsukuba Namiki 1-1, 305-0044 Japan

30-W-14po

**Thermal-cycling-induced surface roughening and cracks in electroless nickel layers on copper-metallized substrates**

Shinji Fukuda¹, Kazuhiko Shimada¹, Noriya Izu¹, Hiroyuki Miyazaki¹, and Kiyoshi Hirao¹

¹Structural Materials Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Nagoya 463-8560, Japan, ²Inorganic Functional Materials Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Nagoya 463-8560, Japan

30-W-15po

**Ag nanowire-based transparent and conductive thin film with low yellowish index**

Chang Su Kim

Advanced Functional Thin Films Department, Korea Institute of Materials Science (KIMS), Changwon, Gyeongnam 51508, South Korea
30-W-16po  
**Fabrication of SOFC and Stack by the Application of 3D Printing**  
Koichi Kikut\(^1\), Shun Kudo\(^1\), and Soshu Kirihara\(^2\)  
\(^1\)Department of Applied Chemistry, Graduate School of Engineering, Nagoya University, Furo-cho, Chikusa, Nagoya, 464-8603, Japan, \(^2\)Joining and Welding Research Institute, Osaka University, 11-1, Mihogaoka, Ibaraki, Osaka, 567-0047, Japan

30-W-17po  
**Influence of Powder Pretreatment for Aerosol Deposition of Ceria based Diffusion Barrier Layers for Solid Oxide Fuel Cells**  
Jörg Exner\(^1\), Hendrik Pöpke\(^2\), Franz-Martin Fuchs\(^2\), Jaroslaw Kita\(^1\) and Ralf Moos\(^1\)  
\(^1\)Department of Functional Materials, University of Bayreuth, Universitätsstraße 30, 95440 Bayreuth, Germany, \(^2\)SOFC Department, Kerafol Keramische Folien GmbH, Koppe-Platz 1, Eschenbach 92676, Germany

30-W-18po  
**Study of initial oxidation process on titanium(0001) surface**  
Ji Liu\(^1\), Xiaofeng Fan\(^1\)\(^2\), Changqing Sun\(^1\) and Weiguang Zhu\(^1\)  
\(^1\)NOVITAS, School of Electrical and Electronic Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798, \(^2\)College of Materials Science and Engineering, Jilin University, Changchun, 130012, China

30-W-19po  
**Laplace Transform Impedances Analysis of the Two-phase Coexistence Reaction in Li\(_{1+x}\)Mn\(_2\)O\(_4\) Cathode Materials**  
Riku Morimoto\(^1\), Norimitsu Nishimura\(^1\), and Masanobu Nakayama\(^1\)\(^-4\)  
\(^1\)Nagoya Institute of Technology, Gokiso, Showa, Nogoya, Aichi 466-8555, Japan, \(^2\)National Institute of Materials Science, 1-1 Namiki, Tsukuba, Ibaraki, 305-0044, Japan, \(^3\)Unit of Elements Strategy Initiative for Catalysis & Batteries.Kyoto Univ., Katsura, Saikyo-ku, Ktoto 615-8520, Japan, \(^4\)JST-PRESTO, 4-1-8 Honcho Kawaguchi, Saitama 332-0012, Japan
30-W-20po

**Chemical Stability against Li Metal for NASICON type LiZr₂(PO₄)₃ as Solid Electrolyte for Li ion Battery by *ab initio* Calculation**

Koki Nakano¹, Yusuke Noda² and Masanobu Nakayama¹⁻³

¹Nagoya Institute of Technology, Gokiso, Showa, Nogoya, Aichi 466-8555, Japan, ²National Institute of Materials Science, 1-1 Namiki, Tsukuba, Ibaraki, 305-0044, Japan, ³Unit of Elements Strategy Initiative for Catalysis & Batteries,Kyoto Univ., Katsura, Sakyoku, Kyoto 615-8520, Japan

30-W-21po

**Electrochemical Stability of Garnet-type Solid Electrolytes by DFT**

Randy Jalem¹⁻² and Masanobu Nakayama²⁻⁴

¹PRESTO-program, Japan Science and Technology Agency (JST), Japan, ²GREEN & Mi2i, National Institute of Materials Science (NIMS), Japan, ³Nagoya Institute of Technology, Nagoya, Aichi, 466-8555, Japan, ⁴ESICB-Kyoto University, Kyoto, Japan
**Program on May 31**

**Room 1**

**Plenary**
Session Chair: W. Shin

09:00 - 09:45  31-0-04pl  Plenary

**Design and development of highly conductive ceramic oxides**
Ichiro Terasaki\(^1,2\), Akihiro Tsuruta\(^2\), Masashi Mikami\(^2\), Yoshiaki Kinemuchi\(^2\), Norimitsu Murayama\(^2\) and Woosuck Shin\(^2\)
\(^1\)Department of Physics, Nagoya University, Nagoya 463-8560, Japan,
\(^2\)National Institute of Advanced Industrial Science and Technology, Nagoya 463-8560, Japan

**Session 12 Low temperature process of functional oxides**
Session Chair: T. Yamada

10:00 – 10:30  31-1-37in  Invited

**An Update on the Progress of Cold Sintering**
Clive A Randall\(^1\), Hanzheng Guo\(^1\), Jing Guo\(^1\), Shuichi Funahashi\(^1,2\), Amanda Baker\(^1\)
\(^1\)The Pennsylvania State University, University Park, PA 16802 USA, \(^2\)Murata Mfg. Co., Ltd., Nagaokakyopshi, Kyoto 617-0832, Japan

10:30 – 10:45  31-1-39or  Oral

**Interface and Grain Boundary in the Cold Sintered Co-fired Ceramics**
Shuichi Funahashi\(^1\) and Clive A. Randall\(^2\)
\(^1\)Murata Mfg. Co., Ltd., 1-10-1 Higashikotari, Nagaokakyoyo-shi, Kyoto 617-0832, Japan, \(^2\)Materials Research Institute, Pennsylvania State University, University Park, State College, PA 16802, USA
10:45 – 11:15  31-1-40  Invited

**Non-linear dielectrics: from electronics to biological communication**
Paula M. Vilarinho
Department of Materials and Ceramic Engineering, CICECO – Aveiro
Materials Institute, University of Aveiro, Campus Santiago, 3810-193 Aveiro, Portugal

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**Session 13  Microwave dielectric ceramics**
Session Chair: T. Yamada

11:15 – 11:30  31-1-42  Oral

**Structure, chemistry and properties of CuO-xCu2O quasi-liquid grain boundary layer of CaTiO3-NdAlO3 based dielectric ceramics**
Li-Jin Cheng1,2,**, Zong-Lian Huang2, Jia-Min Wu1, Yu-Sheng Shi1, Shao-Jun Liu2
1State Key Laboratory of Material Processing and Die & Mould Technology, Huazhong University of Science and Technology, Wuhan 430074, China,
2State Key Laboratory for Powder Metallurgy, Central South University, Changsha 410083, China

11:30 – 11:45  31-1-43  Oral

**Volume crystallization and improved TCf of indialite/cordierite glass ceramics by TiO2 addition**
H. Ohsato1,2, A. Kan3, J. Varghese3, J-S. Kim4, I. Kagomiya5, H. Ogawa3, M. T. Sebastian2, and H. Jantunen2
1Department of Research, Nagoya Industrial Science Research Institute, Nagoya 464-0819, Japan, 2Microelectronics Research Unit, Faculty of Information Technology and Electrical Engineering, University of Oulu, 90014 Oulu, Finland, 3Faculty of Science and Technology, Meijo University, Nagoya 468-8502, Japan, 4Department of Material Science and Engineering, Hoseo University, Asan 336-795, Korea, 5Department of Material Science and Engineering, Nagoya Institute of Technology, Nagoya 466-8555, Japan
**Session 14   Novel approaches for characterizations and applications**

Session Chair: K. G. Webber

13:00 – 13:30  31-1-44in    Invited

**Merging Nonlinear Optics and Ferroelectric Heterostructure Design**

Manfred Fiebig

Department of Materials, ETH Zurich, 8093 Zurich, Switzerland

13:30 – 13:45  31-1-46or    Oral

**New detection mode based on metal oxide MEMS gas sensors**

Ken Watanabe¹, Tokiharu Ohyama², Koichi Suematsu¹, Maiko Nshibori¹, Kengo Shimanoe¹

¹Department of Energy and Material Sciences, Kyushu University, Kasuga 816-8580, Japan, ²Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Kasuga 816-8580, Japan

13:45 – 14:00  31-1-47or    Oral

**Effects of Fe₂O₃ doping and static external field on the electrical properties of 0.94NBT-0.06BT ceramics**

In-Tae Seo¹, Sebastian Steiner¹ and Till Frömling¹

¹Institute of Materials Science, Technische Universität Darmstadt, Darmstadt, Germany

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**Session 15   Multiferroic materials**

Session Chair: K. G. Webber and M. Fiebig

14:00 – 14:30  31-1-48in    Invited

**Symmetry Evaluation and Enhanced Magnetoelectric Coupling in BiFeO₃-Based Multiferroic Ceramics**

X.M. Chen, X.X. Shi and X.Q. Liu

Laboratory of Dielectric Materials, School of Materials Science and Engineering, Zhejiang University, 38 Zheda Road, Hangzhou 310027, China
Session Chair: M. Fiebig

14:30 – 14:45 31-1-50or Oral

**Ferroelectric Domain Structures in BiFeO$_3$ Ceramics**
Liwei Zhang, Hongjun Zhang and Hua Ke
Institute for Advanced Ceramics, School of Materials Science and Engineering, Harbin Institute of Technology, Harbin 150080, China

14:45 – 15:00 31-1-51or Oral

**Effects of Fe 3d–O 2p and Bi 6sp–O 2p orbital hybridizations in neodymium doped BiFeO$_3$ ceramics**
Chi-Shun Tu$^1$, Chun-Yen Lin$^1$, Yi Lin Hsieh$^1$, You Syuan Huan$^1$, Pin-Yi Chen$^2$, Cheng-Sao Chen$^3$, and Wei Sea Chang$^4$
$^1$Department of Physics, Fu Jen Catholic University, New Taipei City 24205, Taiwan, $^2$Department of Mechanical Engineering, Ming Chi University of Technology, New Taipei City 24301, Taiwan, $^3$Department of Mechanical Engineering, Hwa Hsia University of Technology, New Taipei City 23567, Taiwan, $^4$School of Engineering, Monash University, Bandar Sunway, 47500 Selangor, Malaysia

15:15 – 15:30 31-1-52or Oral
withdrawn

15:30 – 15:45 31-1-53or Oral

**DFT for characterizing charged ferroelectric domain wall structures in hexagonal YMnO$_3$**
Didrik. R. Småbråten$^1$, Dennis Meier$^1$, Tsuyoshi Miyazaki$^2$, and Sverre M. Selbach$^1$
$^1$Department of Materials Science and Engineering, NTNU, Norwegian University of Science and Technology, Trondheim, Norway, $^2$International Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS), 1-1 Namiki, Tsukuba, Ibaraki 305-0044, JAPAN
15:45 – 16:00  31-1-54or  Oral

**Oxygen Vacancies Induced Effects in Lead Based Single Phase Ferroeletrics and Multiferroics**

Roney C. Silva¹, William J. Nascimento², B. Fraygola³ and J. A. Eiras⁴
¹Physics Institute, Federal University of Mato Grosso, Cuiabá, 78060-900, Brazil, ²Physics Institute, Paraná Federal University - Jandaia do Sul - PR, 86900-000, Brazil, ³École Polytechnique Fédérale de Lausanne, 1015 Lausanne, Switzerland, ⁴Physics Department, São Carlos Federal University, São Carlos/SP, 13565-905, Brazil

16:00 – 16:20  Closing Remarks
Program on May 31

Session 16  Physical characterizations
Session Chair: M. Itoh

10:00 – 10:15  31-2-37Oral
Ferroelectric Properties and Polarization Dynamics in Ba$_4$Sm$_2$Ti$_4$Ta$_6$O$_{30}$
Tungsten Bronze Ceramics
Xiao Li Zhu, and Xiang Ming Chen
Laboratory of Dielectric Materials, School of Materials Science and
Engineering, Zhejiang University, Hangzhou 310027, China

10:15 – 10:30  31-2-38Oral
Damping Constant and the Inverse Relaxation Time Calculated as a
Function of Pressure from the Intensity Close to the Cubic-Tetragonal
Phase Transition in SrTiO$_3$
Hamit Yurtseven$^1$ and Ali Kiraci$^2$
$^1$Department of Physics, Middle East Technical University, Ankara 06531,
Turkey, $^2$Inter-Curricular Courses Department, Cankaya University, Ankara
06790, Turkey

10:30 – 10:45  31-2-39Oral
Local structure analysis of (1-x)BKT-xBFO by X-ray pair distribution
function method
Bo Jiang, Tor Grande, Sverre M. Selbach*
Department of Materials Science and Engineering, NTNU Norwegian
University of Science and Technology, 7491 Trondheim, Norway
Session 17  Defects and Interface

Session Chair: M. Itoh and P. M. Viarinho

Session Chair: M. Itoh

10:45 – 11:00  31-2-40 or Oral

Insulation-resistance degradation kinetics of bulk BaTi$_{1-x}$A$_x$O$_{3-x}$ and defect-chemical origin of acceptor-type(A) and doping-level($\xi$) effect

Hyung-Soon Kwon$^1$, Seok-Hyun Yoon$^1$, and Han-Ill Yoo$^2$

$^1$LCR R&D Group, LCR Division, Samsung Electro-Mechanics Co. Ltd., Suwon, Gyunggi-do, 443-743, Korea,  $^2$Department of Materials Science and Engineering, Seoul National University, Seoul 151-744, Korea

11:00 – 11:15  31-2-41 or Oral

Interactions between point defects and ferroelectric domain walls

Didrik R. Småbråten$^1$, Lu Xia$^1$, Sandra H. Skjærvø$^1$, Thomas Tybell$^2$ and Sverre M. Selbach$^1$

$^1$Department of Materials Science and Engineering, NTNU Norwegian University of Science and Technology, N7491 Trondheim, Norway, $^2$Department of Electronics and Telecommunications, NTNU Norwegian University of Science and Technology, N7491 Trondheim, Norway

11:15 – 11:30  31-2-42 or Oral

Impact of one grain boundary on resistance degradation: a bicrystal study

Thorsten J. M. Bayer$^1$, Jared J. Carter$^1$ and Clive A. Randall$^1$

$^1$Material Science and Engineering, and Materials Research Institute, The Pennsylvania State University, University Park, PA 16802, USA

11:30 – 11:45  31-2-43 or Oral

Suppression of Silver Diffusion in Borosilicate Glass Based Low Temperature Co-fired Ceramics by Copper Oxide Addition

Mingsheng Ma, Faqiang Zhang, Feng Liu, Zhifu Liu*, Yongxiang Li*

The Key Laboratory of Inorganic Functional Materials and Devices, Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 200050, China
Session Chair: P. M. Vilarinho

13:00 – 13:15  31-2-44 or Oral

**COG Dielectric Composition for Use with Copper Electrode**
Mohammed Megherhi, Walt Symes and Peter Marley
Ferro Corporation, 1789 Transelco Drive, Penn Yan New York 14527, USA

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**Session 18 Nanocrystals and their properties**

Session Chair: P. M. Vilarinho

13:15 – 13:30  31-2-45 or Oral

**Synthesis, characterization and magnetic properties of La/Pr doped bismuth ferrite nanoparticles**
Heng Wu, Xinhua Zhu
National Laboratory of Solid State Microstructures, School of Physics, Nanjing University, Nanjing 210093, China

13:30 – 13:45  31-2-46 or Oral

**Synthesis of barium titanate using deep eutectic solvents**
Rebecca Boston¹, Philip Y. Foeller¹, Derek C. Sinclair¹, Ian M. Reaney¹
¹Functional Materials and Devices, Materials Science and Engineering, University of Sheffield, Sheffield, S1 3JD, UK

13:45 – 14:00  31-2-47 or Oral

**Nanocapacitors of Metal Oxides**
Dewei Chu, Adnan Youins and Sean Li
School of Materials Science and Engineering, The University of New South Wales, NSW 2052, Australia

14:00 – 14:15  31-2-48 or Oral

**Fabrication and electrical properties of BaTiO₃-based nanocube 3D highly-ordered assemblies**
Ken-ichi Mimura¹, Kazumi Kato²
¹Tailored Liquid Integration Research Group, Inorganic Functional Materials Research Institute, National Institute of Advanced Industrial Science and Technology, Nagoya 463-8560, Japan, ²National Institute of Advanced
14:15 – 14:30 31-2-49or Oral
High dielectric constant due to the strain-induced phase transition of an ordered assembly of BaTiO$_3$ nanocubes
Kyuichi Yasui, Ken-ichi Mimura, and Kazumi Kato
National Institute of Advanced Industrial Science and Technology (AIST), Inorganic Functional Materials Research Institute, Nagoya 463-8560, Japan

Session 19  Single crystals and their properties
Session Chair: C. Randall

14:30 – 14:45 31-2-50or Oral
Growth and Domain Structures in PZN-PT Ferroelectric Crystal
Xuxiang Li$^1$, Tian Tian$^1$, Jiayue Xu$^1$, Jun Qian$^2$
$^1$Institute of Crystal Growth, School of Materials Science and Engineering, Shanghai Institute of Technology, Shanghai 201418, China, $^2$Department of Physics, Shanghai Jiao Tong University, Shanghai 200240, China

14:45 – 15:00 31-2-51or Oral
Landau expansion parameters for Pb(Mg$_{1/3}$Nb$_{2/3}$)O$_3$-$x$PbTiO$_3$ single crystal
Hangbo Zhang$^1$, Xiaoyan Lu$^1$, and Wenwu Cao$^{2,3}$
$^1$School of Civil Engineering, Harbin Institute of Technology, Harbin, 150001, China, $^2$Condensed Matter Science and Technology Institute, Harbin Institute of Technology, Harbin, 150080, China, $^3$Department of Mathematics and Materials Research Institute, The Pennsylvania State University, University Park, Pennsylvania 16802, USA

15:15 – 15:30 31-2-52or Oral
Investigation of the kerf filler on the structural deformation of 0.74Pb(Mg$_{1/3}$Nb$_{2/3}$)O$_3$-0.26PbTiO$_3$ single crystal and poling condition in 1-3 composites
Chunying Wang$^1$, Yingchun Liu$^1$, and Wenwu Cao$^{1,2}$
Condensed Matter Science and Technology Institute, Harbin Institute of Technology, Harbin 150080, China\textsuperscript{1}, Department of Mathematics and Materials Research Institute, The Pennsylvania State University, University Park, Pennsylvania 16802, USA\textsuperscript{2}

15:30 – 15:45  31-2-53or  Oral

\textbf{Temperature and stress-dependent single crystal properties for high power SONAR applications}
Thomas Leissing\textsuperscript{1}, Thomas Pastureaud\textsuperscript{1} and Raphaël Lardat\textsuperscript{1}
Thales Underwater Systems, Sophia Antipolis 06903, France

15:45 – 16:00  31-2-54or  Oral

\textbf{High-Temperature Electrical Resistivity of Langasite $\text{Ca}_3\text{NbGa}_3-x\text{Al}_x\text{Si}_2\text{O}_{14}$ Single Crystals}
Tomoaki Karaki\textsuperscript{1}, Masakazu Kobayashi\textsuperscript{1}, Yuki Kiyohara\textsuperscript{1}, Tadashi Fujii\textsuperscript{1}, Masatoshi Adachi\textsuperscript{1}, Yuji Ohashi\textsuperscript{2}, Jun-ichi Kushibiki\textsuperscript{2}, and Akira Yoshikawa\textsuperscript{2}
\textsuperscript{1}Faculty of Engineering, Toyama Prefectural University, Toyama 939-0398, Japan, \textsuperscript{2}Faculty of Engineering, Tohoku University, Sendai 980-8579, Japan
Program on May 31

**Session 26  Thermoelectric devices**

Session Chair: Y. Kinemuchi

10:00 – 10:30  31-3-37  Invited

**TiS₂/Organics Hybrid Superlattices for Flexible Thermoelectrics**

Kunihito Koumoto¹, Ruoming Tian¹, Chunlei Wan², Yifeng Wang³, Qingshuo Wei⁴, Takao Ishida⁴, Atsushi Yamamoto⁴, Akihiro Tsuruta⁴, Woosuck Shin⁵, Sean Li⁶

¹Toyota Physical and Chemical Research Institute, Nagakute 480-1192, Japan, ²Tsinghua University, Beijing 100084, China, ³Nanjing Tech University, Nanjing 210009, China, ⁴National Institute of Advanced Industrial Science and Technology, Tsukuba 305-8564, Japan, ⁵National Institute of Advanced Industrial Science and Technology, Nagoya 463-8560, Japan, ⁶University of New South Wales, NSW 2052, Australia

10:30 – 10:45  31-3-39  Oral

**Oxide multilayer transversal thermoelectric generators**

Jörg Töpfer¹, Timmy Reimann¹, Thomas Schulz¹, Arne Bochmann², Christian Dressler¹, Beate Capraro², Andy Vogel² and Steffen Teichert¹

¹Ernst-Abbe-Hochschule Jena, Jena, 07745, Germany, ²Fraunhofer IKTS, Hermsdorf, 07629, Germany

**Session 27  Thermoelectric oxides**

Session Chair: K. Koumoto

10:45 – 11:15  31-3-40  Invited

**Enhanced thermopower originated in surface structure of oxide nano-particles**

Yoshiaki Kinemuchi¹, Ken-ichi Mimura¹, Kazumi Kato² and Woosuck Shin¹

¹National Institute of Advanced Industrial Science and Technology, Inorganic Functional Materials Research Institute, Nagoya 463-8560, Japan, ²National Institute of Advanced Industrial Science and Technology, Tsukuba 305-8661,
Nonstoichiometry Effects on Thermoelectric Properties of Oxide Materials
Soonil Lee\textsuperscript{1,*}, Jamil Ur Rahman\textsuperscript{1,2}, Won-Seon Seo\textsuperscript{1}, and Myong Ho Kim\textsuperscript{2}
\textsuperscript{1}Energy & Environmental Materials Division, Korea Institute of Ceramic Engineering and Technology, Jinju 52861, Korea, \textsuperscript{2}School of Advanced Material Engineering, Changwon National University, Changwon 51140, Korea

Ultraviolet-light sensing using a ZnO layer with impedance change
Daisuke Fukushima\textsuperscript{1}, Chiharu Onishi\textsuperscript{1}, Tomomi Matsuda\textsuperscript{2} and Yuta Matsushima\textsuperscript{1}
\textsuperscript{1}Department of Chemistry and Chemical Engineering, Yamagata University, Yonezawa 992-8510, Japan, \textsuperscript{2}NEC Embedded Products, Ltd, Yonezawa 992-0119, Japan

Session 28 Noble thermoelectric materials
Session Chair: T. Takeuchi

n-type thermoelectric ceramics: the CuFeS\textsubscript{2} chalcopyrite and the CuFe\textsubscript{2}S\textsubscript{3} isocubanite
Antoine Maignan\textsuperscript{1}, David Berthebaud\textsuperscript{1}, Tristan Barbier\textsuperscript{1}, Emmanuel Guilmeau\textsuperscript{1}, Ramzy Daou\textsuperscript{1}, Oleg Lebedev\textsuperscript{1} and Sylvie Hebert\textsuperscript{1}
Laboratoire CRISMAT, UMR 6508 CNRS ENSICAEN, 14000 Caen, France

Intercalation of proton defect in layered perovskite Sr\textsubscript{3}Fe\textsubscript{2}O\textsubscript{5}Cl\textsubscript{2} and its effects on the electrical properties
Yutarō Yagi\textsuperscript{1}, Isao Kagomiya\textsuperscript{1} and Ken-ichi Kakimoto\textsuperscript{1}
Nagoya Institute of Technology, Nagoya 466-8555, Japan
13:45 – 14:15  31-3-47in  Invited
**Utilizing Magnetic Semiconductors and Bottom-up Nanostructuring for Enhancing Thermoelectric Properties**
Takao Mori
1International Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS), Tsukuba 305-0044, Japan, 2Graduate School of Pure and Applied Sciences, University of Tsukuba, 1-1-1 Tennoudai, Tsukuba 305-8671, Japan

Session 29  Semi-metalic thermoelectric
Session Chair: T. Mori

14:15 – 14:30  31-3-49or  Oral
**Thermoelectric properties of half Heusler FeV$_{1-x}$Ti$_x$Sb**
Kévin Delime-Codrin$^1$, Tatsuya Yamada$^1$, Akio Yamamoto$^1$, Tsunehiro Takeuchi$^{1,2,3}$
$^1$Toyota Technological Institute, Nagoya 468-8511, Japan, $^2$PRESTO, Japan Science and Technology Agency, Tokyo 102-0076, Japan, $^3$GREMO, Nagoya University, Nagoya 464-8603, Japan

14:30 – 14:45  31-3-50or  Oral
**High thermoelectric performance of bulk n-type higher manganese silicide**
Swapnil Ghodke$^1$, Akio Yamamoto$^2$, Tsunehiro Takeuchi$^{1,3}$
$^1$Toyota Technological Institute, Nagoya 468-8511, Japan, $^2$The National Institute of Advanced Industrial Science and Technology, Nagoya 463-8560, Japan, $^3$PRESTO, Japan Science and Technology Agency, Tokyo 102-0076, Japan

14:45 – 15:00  31-3-51or  Oral
**Electronic states of transition metal elements in Si-Ge alloys**
Manabu Inukai and Tsunehiro Takeuchi
Toyota Technological Institute, Nagoya 468-8511, Japan
15:15 – 15:45  31-3-52
Invited
Guiding principle to develop high-performance thermoelectric materials
Tsunehiro Takeuchi¹,²
¹Toyota Technological Institute, Nagoya 468-8511, Japan, ²Institute of Materials and System for Sustainability, Nagoya University, Nagoya 464-8603, Japan

15:45 – 16:00  31-3-54
Oral
Thermoelectric properties of Si-Ge-TM thin film (TM = Au, Cu) grown by molecular beam epitaxy method
Shunsuke Nishino, Satoshi Ekino, Manabu Inukai, Muthusamy Omprakash, and Tsunehiro Takeuchi
Toyota Technical Institute, Nagoya 468-8511, Japan
**Program on May 31**

**Session 38**  
**Energy conversion materials 2**

**Session Chair:** M. Nakayama

10:00 – 10:30  
31-4-37in  
**Invited**  

*Protected Lithium Electrode with Lithium Ion Conducting Ceramic*

Nobuyuki Imanishi, Mitsuhiro Matsumoto and Yasuaki Matsuda  
Department of Chemistry, Mie University, Tsu, Mie 514-8507, Japan

10:30 – 10:45  
31-4-39or  
**Oral**  

*KOH-Activated Porous Carbons Derived from Salacca Peel as Promising Cathode’s Materials for Supercapacitors*

Arenst Andreas Arie*1, Hans Kristianto1, Ongky Widjaja1, Martin Halim2 and Joong Kee Lee2  
1Department of Chemical Engineering, Parahyangan Catholic University, Ciumbuleuit 94 Bandung 40141 Indonesia, 2Advanced Energy Material Processing Laboratory, Korea Institute of Science and Technology, Hwarangno 14-gil 5, Seongbuk-gu, Seoul 136-791, Republic of Korea

10:45 – 11:00  
31-4-40or  
**Oral**  

*Synergistic Coupling of Cobalt Nitrides and Iridium based Catalysts for Efficient Electrocatalysis Toward Oxygen Evolution Reaction*

Su-Ho Cho1, Ki Ro Yoon1 and Il-Doo Kim1*  
1Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology (KAIST), 291 Daehak-ro, Yuseong-gu, Daejeon, 305-701, Republic of Korea

11:00 – 11:15  
31-4-41or  
**Oral**  

*In situ electrical and dilatometric characterization of hematite nanorods: A defect, transport and stability analysis*

Jian Wang1,2, Nicola H. Perry2, and Harry L. Tuller2  
1International Research Center for Renewable Energy, State Key Laboratory of Multiphase Flow in Power Engineering, Xi’an Jiaotong University, Xi’an, Shaanxi 710049, China, 2Department of Materials Science & Engineering,
Session 30  Catalytic sensors
Session Chair: J. H. Lee

11:15 – 11:30  31-4-42or  Oral
A new approach of antimicrobial agents: Physical interactions of ZnO structures
Eva de Lucas-Gil, Julián J. Reinoso, Esther Enríquez, Adolfo Del Campo, and José F. Fernández and Fernando Rubio-Marcos
Electroceramic Department, Instituto de Cerámica y Vidrio, CSIC, Madrid 28049, Spain

11:30 – 11:45  31-4-43or  Oral
Semiconductive cerium oxide gas sensors working at high temperatures
Toshio Itoh, Noriya Izu, Takafumi Akamatsu, and Woosuck Shin
Inorganic Functional Materials RI, National Institute of Advanced Industrial Science and Technology, Shimo-shidami, Moriyama-ku, Nagoya 463-8560, Japan

Session 31  Superconductors
Session Chair: Y. Yoshida

13:00 – 13:30  31-4-44in  Invited
Nano-structure Control in REBCO Superconducting Coated Conductors for High In-field Performance
Teruo Izumi¹, Takato Machi¹, Akira Ibi¹, Koichi Nakaoka¹, Yoshiyuki Yoshida¹, Takeharu Kato², Yutaka Yoshida³, Masashi Miura⁴, Takanobu Kiss⁵, Masataka Iwakuma⁶ and Satoshi Awaji⁶
¹Advanced Industrial Science and Technology (AIST), Tsukuba 305-8564, Japan, ²Japan Fine Ceramics Center (JFCC), Nagoya 456-8587, Japan, ³Nagoya University, Nagoya 464-8601, Japan, ⁴Seikei University, Musashino-shi 180-8633, Japan, ⁵Kyushu University, Fukuoka 819-0395,
Synthesis and Thermoelectric Properties of Mn doped CuGaTe$_2$: Effect of magnetic moment and charge carriers interactions
Fahim Ahmed$^{1,2}$, Naohito Tsujii$^1$ and Takao Mori$^{1,2}$
$^1$International Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS), Namiki 1-1, Tsukuba 305-0047, Japan, $^2$Graduate School of Pure and Applied Sciences, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki 305-8577, Japan

Enhancement of T$_c$ in FeSe family layered superconductors
Yoshihiko Takano
$^1$MANA, National Institute for Materials Science, Tsukuba 305-0047, Japan, $^2$University of Tsukuba, Tsukuba 305-8577, Japan

Morphology of Perovskite Oxide Nanorods in High-Temperature Cuprate Superconducting Films Fabricated by Vapor Phase Epitaxy
Yuji Tsuchiya$^1$, Yusuke Ichino$^1$, and Yutaka Yoshida$^1$
Department of Electrical, Electronic Engineering and Information Engineering, Nagoya Univ., Nagoya 464-8603, Japan

Enhancement of Magnetism in Perovskite Ferromagnetic Insulator LaMnO$_3$ via Interface Engineering
Liang Wu$^1$, Changjiang Li$^2$, Xiao Wang$^3$, Mingfeng Chen$^1$, Jing Ma$^1$, and Ce-Wen Nan$^1$
$^1$School of Materials Science and Engineering, Tsinghua University, Beijing, China, $^2$NUS Nanoscience and Nanotechnology Initiative, National University of Singapore, Singapore, $^3$Nanyang Technological University, Singapore