

# SYMPOSIUM U

## Ferroelectric Thin Films XI

December 1 – 5, 2002

### Chairs

Sanjeev Aggarwal Texas Instruments, Inc  
Susanne Hoffmann-Eifert Forschungszentrum Julich GmbH  
Masaru Shimizu Himeji Inst of Technology  
David Y. Kaufman Argonne National Laboratory  
Stephen R. Gilbert Agilent Technologies Inc

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\* Invited paper

## TUTORIAL

### FT U: FERROELECTRIC THIN FILMS

Sunday, December 1, 2002

10:00 a.m. - 4:00 p.m.

Room 200 (Hynes)

The tutorial will cover the main issues of ferroelectric thin-film deposition, integration, properties, and applications. It will start with a general overview and introduction of ferroelectric materials. Deposition methods are discussed in view of relevant features and advantages for the major deposition methods CSD, MOCVD, sputtering, and PLD. The key issues of integration are presented: electrode choice; nucleation and seeding; barrier layers for stacked capacitors; etching processes; and resistance to forming gas anneals. The course will give an introductory overview on measurement and interpretation of dielectric and ferroelectric properties. Domains in ferroelectric thin films will be treated in more detail. The part on applications will cover memories, MEMS, infrared detectors, and optical devices.

#### Instructors:

**Paul Muralt**, Swiss Federal Institute of Technology EPFL  
**Alexander Tagantsev**, Swiss Federal Institute of Technology EPFL  
**Ulrich Boettger**, Aachen University  
**Herbert Schroeder**, FZJ Research Center Juelich

### SESSION U1: FERROELECTRIC NONVOLATILE MEMORIES: TECHNOLOGY AND FUNDAMENTALS

Chairs: Sanjeev Aggarwal and Rainer Waser  
Monday Morning, December 2, 2002  
Room 304 (Hynes)

#### 8:30 AM \*U1.1

NOVEL CHAIN STACK CAPACITOR FOR A HIGH DENSITY  
32Mb FeRAM AND BEYOND. **R. Bruchhaus**<sup>a</sup>, **T. Ozaki**<sup>b</sup>, **J. Lian**<sup>a</sup>,  
**Y. Kumura**<sup>b</sup>, **H. Kanaya**<sup>b</sup>, **M. Yabuki**<sup>b</sup>, **T. Tsuchiya**<sup>b</sup>, **A. Hilliger**<sup>a</sup>, **U.**  
**Egger**<sup>a</sup>, **K. Tomioka**<sup>b</sup>, **B. Moon**<sup>a</sup>, **H. Itokawa**<sup>b</sup>, **H. Zhuang**<sup>a</sup>, **K.**  
**Natori**<sup>b</sup>, **G. Beitel**<sup>a</sup>, **S. Sugimoto**<sup>b</sup>, **K. Yamakawa**<sup>b</sup>, **I. Kunishima**<sup>b</sup>, and  
**N. Nagel**<sup>a</sup>; <sup>a</sup>Infineon Technologies, JAPAN K.K.; <sup>b</sup>Toshiba Corp.  
Semiconductor Company.

#### 9:00 AM U1.2

NANOSCALE CHARACTERIZATION OF IMPRINT AND  
SWITCHING BEHAVIOR OF INTEGRATED FRAM

CAPACITORS. **A. Gruverman**, B.J. Rodriguez, R.J. Nemanich and  
A.I. Kingon, North Carolina State University, Raleigh, NC; J.S.  
Cross, Fujitsu Laboratories Ltd., Atsugi, JAPAN; Y. Horii, Fujitsu  
Limited, Atsugi, JAPAN.

#### 9:15 AM U1.3

OPTICALLY TRIGGERED ULTRA-FAST SWITCHING  
DYNAMICS IN THIN FILM Pb(Zr,Ti)O<sub>3</sub> FERROELECTRIC  
CAPACITORS. **J. Li**, **H. Liang**, **W. Cao**, **B. Nagaraj**, **C.H. Lee** and **R.**  
**Ramesh**, Materials Research Science and Engineering Center,  
University of Maryland, College Park, MD.

#### 9:30 AM U1.4

DYNAMICS OF RETENTION LOSS IN FERROELECTRIC THIN  
FILMS. **T.W. Noh**, B.S. Kang, J.-G. Yoon, Research Center for Oxide  
Electronics and School of Physics, Seoul National University, Seoul,  
KOREA; **T.K. Song**, Department of Ceramic Science and Engineering,  
Changwon National University, Changwon, Kyungnam, KOREA.

#### 9:45 AM BREAK

#### 10:15 AM \*U1.5

HIGH-DENSITY EMBEDDED NON-VOLATILE FERROELECTRIC  
MEMORIES. **K.R. Udayakumar**, **S.R. Summerfelt**, **T.S. Moise**, **H.**  
**McAdams**, **S. Aggarwal**, **F. Celii**, **S. Martin**, **J. Rodriguez**, **K.J.**  
**Taylor**, **L. Hall**, **G. Xing**, **T. Hurd**, **M. Yao**, **K. Remack**, **M.D. Khan**,  
**G. Stacey**, **G. Albrecht**, **E. Zielinski**, and **B. McKee**, Silicon  
Technology Development, Texas Instruments, Dallas, TX; **S.R.**  
**Gilbert**, **D.V. Taylor**, **J. Amano**, **R. Lanham**, **J. Rickes**, **J. Grace**, **J.**  
**Fong**, **A. Wang**, **D. Lee**, and **C. Pietrzyk**, Agilent Technologies, Santa  
Clara, CA; **G. Fox**, **R. Bailey**, **F. Chu**, **S. Sun**, and **T. Davenport**,  
Ramtron International Corporation, Colorado Springs, CO.

#### 10:45 AM U1.6

STUDY OF POLY-Si/TaSiN/PT STRUCTURE FOR STACKED  
CAPACITORS. **Franck Letendu**, **Marie-Christine Hugon**, **Olivier**  
**Voltaire**, **Bernard Agius**, LPGP, Universite Paris sud, Orsay,  
FRANCE; **Ian Vickridge**, GPS, Universite Paris 6 et 7, Paris,  
FRANCE; **Claire Berthier**, **Jean Michel Lameille** CEA Saclay,  
DEN/DPC/SCPA/LALES, Gif sur Yvette, FRANCE.

#### 11:00 AM U1.7

HIGH TEMPERATURE PLASMA ETCHING OF PZT CAPACITOR  
STACKS FOR HIGH DENSITY FeRAMS. **Ulrich Egger**, **Haoren**  
**Zhuang**, **Rainer Bruchhaus**, **Gerhard Beitel**, FeRAM Development  
Alliance (FDA), Yokohama, JAPAN, Infineon Technologies Japan  
K.K; **Kazuhiro Tomioka**, **Yasuyuki Taniguchi**, **Shigeki Sugimoto**,  
FeRAM Development Alliance (FDA), Yokohama, JAPAN, Toshiba  
Corp. Semiconductor Company; **George Stojakovic**, Infineon  
Technologies NA Corp., East Fishkill, NY.

#### 11:15 AM U1.8

PVD ALUMINUM OXIDE FILM CHARACTERIZATION AND  
PROCESS DEVELOPMENT FOR ENCAPSULATING  
FERROELECTRIC CAPACITORS. **J.S. Martin**, **S.R. Summerfelt**,  
**T.S. Moise**, **S. Kuchimanchi**, **S. Aggarwal**, **K.J. Taylor**, **K.R.**  
**Udayakumar**, and **S.S. Papa Rao**, Texas Instruments, Silicon  
Technology Development, Dallas, TX; **S. Sun**, Ramtron International  
Corporation, Colorado Springs, CO.

#### 11:30 AM \*U1.9

INTEGRATION ASPECTS OF STACKED SBT FeCAPS FOR  
EMBEDDED FeRAM. **Dirk Wouters**, IMEC, Leuven, BELGIUM.

SESSION U2: THIN FILM PROCESSING,  
PROPERTIES, AND CHARACTERIZATION  
Chairs: Rainer Bruchhaus and Stephen R. Gilbert  
Monday Afternoon, December 2, 2002  
Room 304 (Hynes)

#### 1:30 PM \*U2.1

NEW LINE OF SOLID SOLUTION SYSTEMS OF OXIDE  
FERROELECTRICS. **Takeshi Kijima**, Seiko Epson Co., Nagano,  
JAPAN; **Hiroshi Ishiware**, Tokyo Inst. of Tech., Nagatsuta, Midoriku,  
Yokohama, JAPAN.

#### 2:00 PM U2.2

CHARACTERIZATION OF EPITAXIAL SITE-ENGINEERED  
Bi<sub>4</sub>Ti<sub>3</sub>O<sub>12</sub>-BASED THIN FILMS GROWN BY MOCVD. **T. Sakai**,  
**H. Funakubo**, **T. Watanabe**, and **T. Kojima**, Dept of Innovative and  
Engineered Materials, Tokyo Inst of Tech, Kanagawa, JAPAN; **Y.**  
**Noguchi** and **M. Miyayama**, Inst of Industrial Science, Univ of Tokyo,  
Tokyo, JAPAN; **M. Osada**, PRESTO, Japan Science and Technology  
Corporation (JST), Kanagawa, JAPAN; **K. Saito**, Application  
Laboratory, Philips Analytical, Kanagawa, JAPAN.

**2:15 PM U2.3**

HIGH QUALITY SBT FERROELECTRIC CAPACITOR FABRICATION USING IRIIDIUM BOTTOM ELECTRODES. J.A. Johnson, S. Cella, J.G. Lisoni, J-L. Everaert, D.J. Wouters, IMEC, Leuven, BELGIUM.

**2:30 PM U2.4**

IN-PLANE LONG-RANGE LATTICE MATCHING OF A-/B-AXIS-ORIENTED EPITAXIAL BISMUTH LAYER-STRUCTURED FERROELECTRIC THIN FILMS. Takayuki Watanabe, Tomohiro Sakai, and Hiroshi Funakubo, Dept of Innovative and Engineered Materials, Tokyo Inst of Tech, Kanagawa, JAPAN; Keisuke Saito, Application Laboratory, Philips Japan Ltd., Kanagawa, JAPAN; Minoru Osada, PRESTO, Japan Science and Technology Corporation (JST), Kanagawa, JAPAN; Masato Kakihana, Materials & Structures Laboratory, Tokyo Inst of Tech, Kanagawa, JAPAN; Yuji Noguchi and Masaru Miyayama, Inst of Industrial Science, Univ of Tokyo, Tokyo, JAPAN.

**2:45 PM U2.5**

PERIODIC FERROELECTRIC HETEROSTRUCTURES WITH BROKEN INVERSE SYMMETRY RESULTING FROM LOCAL COMPOSITION GRADIENTS. Ho Nyung Lee, Hans M. Christen, Isao Ohkubo, Hong-Ying Zhai, and Douglas H. Lowndes, Solid State Division, Oak Ridge National Laboratory, Oak Ridge, TN.

**3:00 PM BREAK****3:30 PM \*U2.6**

METAL-ORGANIC CHEMICAL VAPOR DEPOSITION OF PZT THIN FILMS WITH DIFFERENT PRECURSOR SOLUTIONS FOR MASS-PRODUCTION COMPATIBILITY. Jin Shi-Zhao, Seehwa Jeong and Cheol Seong Hwang, Seoul National University, School of Materials Science and Engineering and Inter-university, Semiconductor Research Center, Seoul, KOREA; Young Ki Han, Cheol Hoon Yang and Ki Young Oh, Jusung Engineering Ltd, Kyunggi-Do, KOREA.

**4:00 PM U2.7**

PHASE PURE MOCVD Pb(Zr,Ti)O<sub>3</sub> THIN FILMS FOR FERROELECTRIC EMBEDDED MEMORIES. S. Aggarwal, A. Thomas, J.S. Martin, F. Celii, L. Hall, J. Rodriguez, K.R. Udayakumar, S.R. Summerfelt, T.S. Moise, K.J. Taylor, Texas Instruments Inc., Dallas, TX; F. Chu, S. Sun, Ramtron International Corporation, Colorado Springs, CO.

**4:15 PM U2.8**

SEED LAYERS OF THE TITANIA-LEAD OXIDE SYSTEM. Stephane Hiboux, Paul Murali, Marco Cantoni, Swiss Federal Institute of Technology Lausanne, Ceramics Laboratory, Lausanne, SWITZERLAND.

**4:30 PM U2.9**

FERROELECTRIC PROPERTIES OF 15-20nm-THICK PZT ULTRA-THIN FILMS PREPARED BY MOCVD. Hajime Nonomura, Hironori Fujisawa, Masaru Shimizu and Hirohiko Niu, Himeji Institute of Technology, Dept of Electrical, Electronic and Computer Engineering, Hyogo, JAPAN.

**4:45 PM U2.10**

EFFECTS OF APPLIED MECHANICAL STRAIN ON THE ELECTRICAL PROPERTIES OF POLYCRYSTALLINE MOCVD-GROWN PZT THIN FILMS. Maxim B. Kelman, Paul C. McIntyre, Department of Materials Science & Engineering, Stanford University, Stanford, CA; Bryan C. Hendrix, Steven M. Bilodeau, Jeffrey F. Roeder, ATMI Inc., Danbury, CT.

SESSION U3: POSTER SESSION  
FUNDAMENTAL PROPERTIES OF  
FERROELECTRIC THIN FILMS

Chairs: Jeffrey A. Eastman and Alexander K. Tagantsev  
Monday Evening, December 2, 2002  
8:00 PM  
Exhibition Hall D (Hynes)

**\*U3.1**

HETEROGENEOUS SWITCHING CHARACTER OF FATIGUED Pb(Zn<sub>1/3</sub>Nb<sub>2/3</sub>)O<sub>3</sub>-PbTiO<sub>3</sub> FERROELECTRIC SINGLE CRYSTALS. Metin Ozgul, Susan Trolier-McKinstry, and Clive A. Randall, Materials Research Institute, Pennsylvania State University, University Park, PA.

**\*U3.2**

CONTRIBUTION OF Pb TO FERROELECTRICITY IN

PEROVSKITE-TYPE OXIDES. Hiromu Miyazawa, Eiji Natori, Masaya Ishida, Tatsuya Shimoda, TPRC, Seiko Epson Corporation, Nagano-ken, JAPAN; Fumiyuki Ishii, Tamio Oguchi, ADSM, Hiroshima University, Hiroshima-ken, JAPAN.

**U3.3**

STUDIES OF POINT DEFECT REDISTRIBUTION AND EQUILIBRIUM IN DEUTERIUM-ANNEALED FERROELECTRIC THIN FILMS. Ruey-Ven Wang and Paul C. McIntyre, Department of Materials Science and Engineering, Stanford University, Stanford, CA.

**U3.4**

SWITCHING DYNAMICS OF SUBMICRON FERROELECTRIC CAPACITORS. S. Prasertchoung, V. Nagarajan, A. Stanishevsky, J. Melngailis and R. Ramesh, MRSEC, University of Maryland, College Park, MD; T. Schmitz and S. Teidke, Aixact Systems, Aachen, GERMANY.

**U3.5**

EFFECT OF THIN FILM STRESS ON STRUCTURAL AND ELECTRICAL PROPERTIES OF PZT THIN FILMS. Maxim B. Kelman, Paul C. McIntyre, Department of Materials Science & Engineering, Stanford University, Stanford, CA; Bryan C. Hendrix, Steven M. Bilodeau, Jeffrey F. Roeder, ATMI, Inc, Danbury, CT; Sean Brennan, Stanford Synchrotron Radiation Laboratory, Stanford, CA; Alexei Gruverman, North Carolina State University, Raleigh, NC.

**U3.6**

INFLUENCE OF CRYSTALLIZATION KINETICS DURING RAPID THERMAL ANNEALING ON THE PARAMETERS OF PZT AND PLZT THIN FILMS. Vladimir Shur, Stanislav Negashev, Andrey Barannikov, Ekaterina Nikolaeva, Eugene Shishkin, Ivan Baturin, Dmitrii Kuznetsov, Ural State Univ, Inst of Physics & Applied Mathematics, Ekaterinburg, RUSSIA; Theodor Schneller, Rainer Waser, IWE RWTH Aachen, Aachen, GERMANY.

**U3.7**

Transferred to U1.4

**U3.8**

OXYGEN VACANCY DIFFUSION AND ITS IMPACT ON SWITCHING AND FATIGUE IN FERROELECTRIC THIN FILMS. Yu Xiao, Kaushik Bhattacharya, California Institute of Technology, Division of Engineering and Applied Science, Pasadena, CA.

**U3.9**

SIMULATION OF STEADY STATE LEAKAGE CURRENTS IN THIN FILMS. Herbert Schroeder, Sam Schmitz, Paul Meuffels, EKM, Institut für Festkörperforschung, Forschungszentrum Jülich GmbH, Jülich, GERMANY.

**U3.10**

THERMODYNAMIC ANALYSIS OF THE HYSTERESIS OFFSET IN POLARIZATION-GRADED FERROELECTRIC MATERIALS. Z.-G. Ban and S.P. Alpay, Department of Metallurgy and Materials Engineering, Institute of Materials Science, University of Connecticut, Storrs, CT; N.W. Schubring and J.V. Mantese, Delphi Research Laboratories, Shelby Township, MI.

**U3.11**

SIZE EFFECT OF SOL-GEL DERIVED Pb<sub>0.76</sub>Ca<sub>0.24</sub>TiO<sub>3</sub> THIN FILMS BELOW 100nm. Z. Xie<sup>a,b</sup>, H.Y. Guo<sup>b</sup>, J. An<sup>b</sup>, J.B. Xu<sup>b</sup>, E.Z. Luo<sup>b</sup>, I.H. Wilson<sup>b</sup> and L.H. Zhao<sup>a</sup>; <sup>a</sup>Material Science & Engineering College, Hunan University, PEOPLES REPUBLIC OF CHINA; <sup>b</sup>Department of Electronic Engineering and Materials Science and Technology Research Center, The Chinese University of Hong Kong, Shatin, NT, Hong Kong, CHINA.

**U3.12**

ON SIZE EFFECTS OF Pb<sub>0.76</sub>Ca<sub>0.24</sub>TiO<sub>3</sub> THIN FILMS SYNTHESIZED BY SOL-GEL TECHNIQUE. J.B. Xu, Z. Xie<sup>a</sup>, H.Y. Guo, J. An, E.Z. Luo, and I.H. Wilson, Department of Electronic Engineering and Materials Science and Technology Research Center, The Chinese University of Hong Kong, Shatin, NT, Hong Kong, CHINA; <sup>a</sup>Also Material Science & Engineering College, Hunan University, Changsha, CHINA.

**U3.13**

POSSIBLE FERROELECTRICITY IN "SnTiO<sub>3</sub>" BY FIRST-PRINCIPLES CALCULATIONS. Yoshinori Konishi, Michio Ohsawa, Yoshiyuki Yonezawa, Fuji Electric Corporate Research and Development, Ltd.; Toyohiro Chikyow, National Institute for Materials Science; Hideomi Koimura, Tokyo Institute of Technology.

**U3.14**

INVESTIGATION OF PARTICLE-SIZE-DEPENDENT PHASE

TRANSITIONS IN BaTiO<sub>3</sub> NANOPARTICLES THROUGH MICRO-RAMAN SCATTERING. Richard D. Robinson, Vincent Chiang, Jonathan E. Spanier, Stephen O'Brien, and Irving P. Herman, Columbia University, Materials Research Science and Engineering Center, New York, NY.

### U3.15

THE XRD SCATTERING AND RAMAN SPECTRUM CHARACTERIZATION OF (Pb,Lu,Ca)TiO<sub>3</sub> FERROELECTRIC THIN FILMS PREPARED BY SOL-GEL PROCESS. Jianguo Zhu, Xiaowu Yuan, Xiangming Jia, and Dingquan Xiao, Dept of Materials Science, Sichuan University, Chengdu, P.R. CHINA.

### U3.16

INVESTIGATION OF FERROELECTRIC PROPERTIES OF VINYLIDENE FLUORIDE OLIGOMER EVAPORATED FILMS. K. Noda<sup>a</sup>, K. Ishida<sup>a,c</sup>, A. Kubono<sup>b</sup>, T. Horiuchi<sup>d</sup>, H. Yamada<sup>a</sup>, K. Matsushige<sup>a</sup>; <sup>a</sup> Kyoto University, Dept of Electronic Science and Engineering, Kyoto, JAPAN; <sup>b</sup> Kyoto Institute of Technology, Dept of Polymer Science and Engineering, Kyoto, JAPAN; <sup>c</sup> "Structural Ordering and Physical Properties", PRESTO, JST, JAPAN.

### U3.17

MICROSTRUCTURAL, VIBRATIONAL AND ELECTRICAL PROPERTIES OF FERROELECTRIC Pb<sub>1-x</sub>Sr<sub>x</sub>TiO<sub>3</sub> THIN FILMS. M. Jain, P.S. Dopal, A. Savvinov, S.B. Majumder, R.S. Katiyar, Department of Physics, University of Puerto Rico, San Juan, PR; A.S. Bhalla, Materials Research Institute, Pennsylvania State University, University Park, PA.

### SESSION U4: POSTER SESSION FERROELECTRIC NONVOLATILE MEMORIES: TECHNOLOGY AND FUNDAMENTALS

Chair: Dirk J. Wouters  
Monday Evening, December 2, 2002  
8:00 PM

Exhibition Hall D (Hynes)

### \*U4.1

RETENTION CHARACTERISTICS OF Pb(Zr,Ti)O<sub>3</sub> FILMS DEPOSITED BY VARIOUS METHODS FOR HIGH-DENSITY NONVOLATILE MEMORY. Sangmin Shin, Mirko Hofmann, Yong Kyun Lee, June Key Lee, Younsoo Park, Materials & Devices Laboratory, Samsung Advanced Institute of Technology, Suwon, KOREA; Kyu Mann Lee, Yoon Jong Song, Process Development Team, Samsung Electronics, Yongin, KOREA.

### \*U4.2

INVESTIGATIONS INTO MESOSCOPIC FERROELECTRIC STRUCTURES PREPARED BY NANOIMPRINT LITHOGRAPHY. Catalin Harnagea, Marin Alexe, Dietrich Hesse, and Ulrich Gösele, Max Planck Institute of Microstructure Physics, Halle(Saale), GERMANY.

### U4.3

INTERFACE STUDY ON ELECTRICAL PROPERTIES OF SUB-100nm THIN Pb(Zr,Ti)O<sub>3</sub> FILMS. Yong Kyun Lee, Young Soo Park, June Key Lee, Materials & Devices Lab., Samsung Advanced Institute of Technology, Suwon, REP. OF KOREA.

### U4.4

ORIGINS OF BROADENING OF THE POLARIZATION-ELECTRIC FIELD HYSTERESIS LOOP. D. Damjanovic, S.S.N. Bharadwaja, I. Stolichnov, and N. Setter, Ceramic Laboratory, Materials Institute, College of Engineering, Swiss Federal Institute of Technology-EPFL, Lausanne, SWITZERLAND.

### U4.5

SUBMICRON FERROELECTRIC ELEMENTS FABRICATED BY DIRECT ELECTRON BEAM LITHOGRAPHY. Dong-Joo Kim<sup>a</sup>, Jin Seo Im<sup>b</sup>, O. Auciello<sup>a</sup>, Carol Thompson<sup>a,c</sup>, S.K. Streiffer<sup>a</sup>; <sup>a</sup>Materials Science Division, Argonne National Laboratory, Argonne, IL; <sup>b</sup>Chemistry Division, Argonne National Laboratory, Argonne, IL; <sup>c</sup>Dept. of Physics, Northern Illinois University, DeKalb, IL.

### U4.6

FERROELECTRIC PROPERTIES OF PZT AND SBT CAPACITORS WITH NOVEL CrTiN/TiN BARRIER LAYER. Nohheon Park, Hyun-Jung Shin, Jiyoung Kim, School of Advanced Materials Eng., Kookmin University, Seoul, KOREA.

### U4.7

LOW-TEMPERATURE INTEGRATION OF PZT FILMS ON IrO<sub>2</sub>/Si WAFERS USING SrRuO<sub>3</sub> AS CONTACT ELECTRODES. Kazunari Maki, B.T. Liu, H. Vu, R. Ramesh, Department of Materials

and Nuclear Engineering, Center for Superconductivity Research, University of Maryland, College Park, MD; Y. Fujimori, S. Nakamura, H. Takasu, ROHM Semiconductor R&D, Kyoto, JAPAN.

### SESSION U5: POSTER SESSION DOMAINS AND NANOSTRUCTURES IN FERROELECTRIC THIN FILMS

Chair: Alexander L. Roytburd  
Monday Evening, December 2, 2002  
8:00 PM

Exhibition Hall D (Hynes)

### \*U5.1

HRTEM INVESTIGATION OF 90° DOMAIN CONFIGURATION AND P-E HYSTERESIS LOOP OF EPITAXIAL PZT MULTILAYERED THIN FILMS. Takanori Kiguchi, Tokyo Institute of Technology, Center for Advanced Materials Analysis, Naoki Wakiya, Kazuo Shinozaki, and Nobuyasu Mizutani, Tokyo Institute of Technology, Dept of Metallurgy and Ceramics Science, Tokyo, JAPAN.

### U5.2

INVESTIGATION OF DOMAIN WALL VELOCITY AND NUCLEATION RATE ON POLARIZATION SWITCHING OF EPITAXIAL Pb(Zr,Ti)O<sub>3</sub> THIN FILMS USING PIEZORESPONSE SCANNING FORCE MICROSCOPY. H. Fujisawa, T. Yagi, M. Shimizu and H. Niu, Himeji Inst. of Tech., Dept of Electrical, Electronic & Computer Eng., Graduate School of Eng., Hyogo, JAPAN.

### U5.3

DOMAIN VISUALIZATION IN Pb(Mg<sub>1/3</sub>Nb<sub>2/3</sub>)O<sub>3</sub>-PbTiO<sub>3</sub> SINGLE CRYSTALS NEAR THE CURIE TEMPERATURE BY CONTACT RESONANCE PIEZORESPONSE FORCE MICROSCOPY. Hirotake Okino, Takuya Matsushita, Takashi Yamamoto, National Defense Academy, Dept. of Communications Engineering, Kanagawa, JAPAN.

### U5.4

RELATIONSHIP BETWEEN ELECTRIC PROPERTIES OF PZT THIN FILM AND FERROELECTRIC DOMAIN STRUCTURE. Koichiro Honda, and Takahiro Kimura, Fujitsu Laboratories Ltd., Morinosato-wakamiya, Atsugi, JAPAN.

### U5.5

BASIC STUDY ON HIGH-DENSITY FERROELECTRIC DATA STORAGE USING SCANNING NONLINEAR DIELECTRIC MICROSCOPY. Yoshiomi Hiranaga, Kenjiro Fujimoto, Yasuo Wagatsuma, Yasuo Cho, Research Institute of Electrical Communication, Tohoku University, Sendai, Miyagi, JAPAN; Atsushi Onoe, Pioneer Corporation, Tsurugashima, Saitama, JAPAN; Kazuya Terabe, Kenji Kitamura, Nanomaterials Laboratory, National Institute for Materials Science, Tsukuba, Ibaraki, JAPAN.

### U5.6

FABRICATION OF SUBMICRON RESOLUTION FERROELECTRIC DOMAIN STRUCTURES BY HIGH VOLTAGE ATOMIC FORCE MICROSCOPY. Gil Rosenman, Yossi Rosenwaks, Michel Molotski, Ronen Urenski, Alex Agronin, Tel Aviv Univ, Dept of Electrical Engineering-Physical Electronics, Ramat-Aviv, ISRAEL.

### SESSION U6: POSTER SESSION HIGH PERMITTIVITY AND HIGH FREQUENCY APPLICATIONS

Chair: Wolfgang Donner  
Monday Evening, December 2, 2002  
8:00 PM

Exhibition Hall D (Hynes)

### \*U6.1

DIELECTRIC PROPERTIES OF (Ba,Sr)TiO<sub>3</sub> FILMS GROWN ON ALUMINA SUBSTRATES. I.P. Koutsaroff, P. Woo, M. Zelter, L. McNeil, A. Kassam, and A. Cervin-Lawry, Gennum Corporation, Burlington, Ontario, CANADA.

### U6.2

LEAKAGE CURRENT EXPERIMENTS IN STO AND BST THIN FILMS. Sam Schmitz, and Herbert Schroeder, EKM, Institut fuer Festkoerperforschung, Forschungszentrum Juelich GmbH, Juelich, GERMANY.

### U6.3

THE EFFECT OF GRAIN SIZE ON THE DIPOLAR RELAXATION OF BaTiO<sub>3</sub> THIN FILMS IN THE MICROWAVE-FREQUENCY RANGE. Yongjo Kim, Woo Young Ahn, Doyoung Lee, and Byungwoo Park, Seoul National University, School of Materials Science and Engineering, Seoul, KOREA.

### U6.4

SrTiO<sub>3</sub> THIN FILM VARACTORS ON Si FOR MICROWAVE APPLICATIONS. A. Vorobiev, P. Rundqvist, S. Gevorgian, Department of Microelectronics, Chalmers University of Technology, Gothenburg, SWEDEN; K. Khamchane, Department of Microelectronics and Nanoscience, Chalmers University of Technology and Gothenburgs University, Gothenburg, SWEDEN.

### U6.5

INFLUENCE OF Ta<sub>2</sub>O<sub>5</sub> INTER-LAYERS ON ELECTRICAL PROPERTIES OF LASER ABLATED Ba<sub>0.5</sub>Sr<sub>0.5</sub>TiO<sub>3</sub> THIN FILMS. Suprem R. Das, Rasmi R. Das, P. Bhattacharya, and Ram S. Katiyar, Department of Physics, University of Puerto Rico, San Juan, PR.

### U6.6

DIELECTRIC PROPERTIES OF PULSED EXCIMER LASER ABLATED BaBi<sub>2</sub>Nb<sub>2</sub>O<sub>9</sub> THIN FILMS. Apurba Laha and S.B. Krupanidhi, Materials Research Center, Indian Institute of Science Bangalore, INDIA; S. Saha, Materials Science Divisions, Argonne National Laboratory, Argonne, IL.

### SESSION U7/T2: JOINT POSTER SESSION FERROELECTRIC THIN FILMS ON SILICON

Chairs: Darrell G. Schlom and Stephen R. Gilbert

Monday Evening, December 2, 2002

8:00 PM

Exhibition Hall D (Hynes)

### U7.1/T2.1

COMPOSITION AND THICKNESS DEPENDENCE OF FERRO- AND PIEZO- ELECTRIC RESPONSE OF PbZr<sub>x</sub>Ti<sub>1-x</sub>O<sub>3</sub> THIN FILMS ON Si PREPARED BY PULSED LASER DEPOSITION. T. Zhao, B.T. Liu, N. Valanoor, S. Prasertchoung, L. Chen, L. DiAngelo, H.M. Zheng, L. Salamanca-Riba, R. Ramesh, Department of Materials and Nuclear Engineering, University of Maryland, College Park, MD; J.M. Finder, R. Droopad, K. Eisenbeiser, Physical Sciences Research Laboratories, Motorola Labs, Tempe, AZ.

### U7.2/T2.2

Sm DOPING EFFECTS ON ELECTRICAL PROPERTIES OF SOL-GEL DERIVED SrBi<sub>2</sub>Ta<sub>2</sub>O<sub>9</sub> FILMS. E. Tokumitsu, M. Kishi, Precision & Intelligence Laboratory, Tokyo Institute of Technology, Yokohama, JAPAN.

### U7.3/T2.3

MFS AND MFS STRUCTURES USING SrBi<sub>2</sub>Ta<sub>2</sub>O<sub>9</sub> FILMS FOR FRAM APPLICATIONS. P. Victor, S.B. Krupanidhi, Materials Research Center, Indian Institute of Science, Bangalore, INDIA; S. Bhattacharyya, Max-Planck-Institut für Mikrostrukturphysik, Halle, GERMANY; S. Saha, Materials Science Division, Argonne National Laboratory, Argonne, IL.

### U7.4/T2.4

EFFECT OF ULTRA-THIN (1nm) SiON BUFFER LAYERS AND/OR TIN LAYERS ON EPITAXIAL GROWTH AND ELECTRICAL PROPERTIES OF Bi-BASED FERROELECTRIC FILMS ON Si(100) AND (111) SURFACES. Hitoshi Tabata<sup>a,b</sup>, Eiji Rokuta<sup>a</sup>, Yasushi Hotta<sup>a</sup> and Tomoji Kawai<sup>a</sup>; Osaka Univ.<sup>a</sup>; PRESTO21 JST<sup>b</sup>; Osaka, JAPAN.

### U7.5/T2.5

HIGH-PRESSURE CRYSTALLIZATION OF CERAMIC OXIDE THIN FILMS AT LOW TEMPERATURES. Chung-Hsin Lu and Wen-Jeng Hwang, Electronic and Electro-optical Ceramics Lab, Dept of Chemical Engineering, National Taiwan University, Taipei, Taiwan, R.O.C.

### SESSION U8: FUNDAMENTAL PROPERTIES OF FERROELECTRIC THIN FILMS

Chairs: Jeremy Levy and Masaru Shimizu

Tuesday Morning, December 3, 2002

Room 304 (Hynes)

### 8:30 AM \*U8.1

SCALING PROPERTIES OF FeRAM COMPARED TO OTHER

NON-VOLATILE MEMORIES. R. Waser<sup>a,b</sup>, U. Böttger<sup>a</sup>, S. Tiedke<sup>c</sup>, and J. Rickes<sup>d</sup>; <sup>a</sup>IWE II, RWTH Aachen University, Aachen, GERMANY; <sup>b</sup>IFF, FZJ Research Center Juelich, GERMANY; <sup>c</sup>aixACCT Systems GmbH, Aachen, GERMANY; <sup>d</sup>Agilent Technologies.

### 9:00 AM U8.2

THICKNESS-DEPENDENCE OF THE COERCIVE FIELD IN FERROELECTRIC FILMS. P. Chandra, NEC Research Institute, Princeton, NJ; M. Dawber, P.B. Littlewood and J.F. Scott, Cambridge University, Cambridge, UNITED KINGDOM.

### 9:15 AM U8.3

FIRST PRINCIPLES STUDY OF PEROVSKITE FERROELECTRIC ULTRATHIN FILMS. Javier Junquera, Philippe Ghosez, Département de Physique, Université de Liège, BELGIUM.

### 9:30 AM U8.4

FUNCTIONAL PROPERTIES OF THIN FILMS CUT FROM SINGLE CRYSTALS USING FOCUSED ION BEAM MILLING. M.M. Saad, N.J. Donnelly, R.M. Bowman, J.M. Gregg, Queens Univ Belfast, Dept of Pure and Applied Physics, Belfast, UNITED KINGDOM.

### 9:45 AM BREAK

### 10:15 AM \*U8.5

POLARIZATION FATIGUE IN FERROELECTRIC THIN FILMS: FACTS AND INTERPRETATIONS. Alexander K. Tagantsev, Ceramics Laboratory, IMX, Swiss Federal Institute of Technology, EPFL, Lausanne, SWITZERLAND.

### 10:45 AM U8.6

OXYGEN TRACER DRIFT AND DIFFUSION IN PZT THIN FILMS. Lawrence F. Schloss and Paul C. McIntyre, Stanford University, Department of Materials Science and Engineering, Stanford, CA.

### 11:00 AM U8.7

FERROELECTRIC THIN FILM CHARACTERIZATION BY SWITCHING CURRENT ANALYSIS: A NEW APPROACH. Vladimir Shur, Ivan Baturin, Marina Belousova, Ural State Univ, Inst of Physics & Applied Mathematics, Ekaterinburg, RUSSIA.

### 11:15 AM U8.8

CRYSTAL AND ELECTRONIC STRUCTURES, AND THE PHYSICAL AND CHEMICAL PROPERTIES OF FERROELECTRIC OXIDES USED FOR FeRAMs. Y. Shimakawa and Y. Kubo, Fund. Res. Labs., NEC Corporation, Tsukuba, JAPAN.

### 11:30 AM U8.9

DOPING EFFECTS IN LAYERED STRUCTURED Bi<sub>4</sub>Ti<sub>3</sub>O<sub>12</sub> FERROELECTRICS: LATTICE DYNAMICS AND PROPERTIES DESIGN BY RAMAN SPECTROSCOPY. Minoru Osada, PRESTO, Japan Science and Technology Corporation (JST) and Materials and Structures Lab., Tokyo Institute of Technology, Yokohama, JAPAN; Masato Kakihana, Materials and Structures Lab., Tokyo Institute of Technology, Yokohama, JAPAN; Yuji Noguchi and Masaru Miyayama, Institute of Industrial Science, The University of Tokyo, Tokyo, JAPAN; Takayuki Watanabe and Hiroshi Funakubo, Dept of Innovative and Engineered Materials, Tokyo Institute of Technology, Yokohama, JAPAN.

### 11:45 AM U8.10

RAMAN SPECTROSCOPY OF FERROELECTRIC THIN FILMS. R. S. Katiyar and P.S. Dobal, Department of Physics, University of Puerto Rico, San Juan, PR.

### SESSION U9/T4: JOINT SESSION FERROELECTRIC THIN FILMS ON SILICON

Chairs: Ramamurthy Ramesh and Hiroshi Funakubo

Tuesday Afternoon, December 3, 2002

Room 304 (Hynes)

### 1:30 PM \*U9.1/T4.1

GROWTH AND PROPERTIES OF UNIFORMLY *a*-AXIS ORIENTED FERROELECTRIC Bi<sub>3.25</sub>La<sub>0.75</sub>Ti<sub>3</sub>O<sub>12</sub> THIN FILMS ON Si(100) SUBSTRATES. D. Hesse, H.N. Lee, N.D. Zakharov, and U. Gösele, Max-Planck-Institut für Mikrostrukturphysik, Halle (Saale), GERMANY.

### 2:00 PM U9.2/T4.2

EPITAXIAL La-DOPED SrTiO<sub>3</sub> ON SILICON: A CONDUCTIVE TEMPLATE FOR EPITAXIAL FERROELECTRICS ON SILICON.

B.T. Liu, K. Maki<sup>†</sup>, Y. So, V. Nagarajan, R. Ramesh, Department of Materials and Nuclear Engineering and Center for Superconductivity Research, University of Maryland, College Park, MD; J. Lettieri, J.H. Haeni, and D.G. Schlom, Dept of Materials Science and Engineering, Pennsylvania State University, University Park, PA; W. Tian and X.Q. Pan, Dept of Materials Science and Engineering, The University of Michigan, Ann Arbor, MI; F.J. Walker, R.A. Mckee, Oak Ridge National Laboratory, Oak Ridge, TN; <sup>†</sup>also at Mitsubishi Materials Corporation, Development Section, Sanda Plant, Sanda, Hyogo, JAPAN.

**2:15 PM U9.3/T4.3**

FABRICATION OF LEAD-BASED FERROELECTRIC CAPACITORS INTEGRATED ON SrTiO<sub>3</sub>/Si WAFERS BY CHEMICAL VAPOR DEPOSITION. S.Y. Yang, B.T. Liu, V. Nagarajan, S. Prasertchoung, A. Stanishevsky, J. Melngailis, and R. Ramesh, Department of Materials and Nuclear Engineering, Center for Superconductivity Research, University of Maryland, College Park, MD; J.N. Kidder Jr., Department of Mechanical Engineering, Vermont Technical College, Randolph Center, VT; J.M. FINDER, R. Droopad, and K. Eisenbeiser, Physical Sciences Research Laboratories, Motorola Laboratories, Tempe, AZ.

**2:30 PM U9.4/T4.4**

Abstract Withdrawn

**2:45 PM BREAK**

**3:15 PM \*U9.5/T4.5**

RECENT PROGRESS IN FERROELECTRIC-GATE FETs. Hiroshi Ishiura, Frontier Collaborative Research Center, Tokyo Institute of Technology, Yokohama, JAPAN.

**3:45 PM U9.6/T4.6**

INTEGRATION PROCESSES AND PROPERTIES OF ONE TRANSISTOR MEMORY DEVICES. Ting kai Li, Sheng Teng Hsu, Bruce Ulrich, Fengyan Zhang, Dave Evans, Sharp Laboratory of America, Inc., Camas, WA.

**4:00 PM U9.7/T4.7**

Pt/Bi<sub>3.25</sub>La<sub>0.75</sub>Ti<sub>3</sub>O<sub>12</sub>/Al<sub>2</sub>O<sub>3</sub>/Si<sub>3</sub>N<sub>4</sub>/Si MFIS STRUCTURE WITH LONG RETENTION CHARACTERISTICS. Yoshihisa Fujisaki, Kunie Iseki and Hiroshi Ishiura, Tokyo Institute of Technology, Frontier Collaborative Research Center, Yokohama, JAPAN.

**4:15 PM U9.8/T4.8**

X-RAY PHOTOELECTRON AND UV PHOTOYIELD SPECTROSCOPIC STUDIES ON BARRIER HEIGHTS OF SrBi<sub>2</sub>Ta<sub>2</sub>O<sub>9</sub> FILM SHOTTKY JUNCTIONS. Mitsue Takahashi, Minoru Noda, and Masanori Okuyama, Area of Materials and Device Physics, Department of Physical Science, Graduate School of Engineering Science, Osaka University, Toyonaka, Osaka, JAPAN.

**4:30 PM U9.9/T4.9**

EFFECTS OF HYDROGEN ANNEALING AT THE CURIE TEMPERATURE ON THE INTERFACE OF SrBi<sub>2</sub>Nb<sub>2</sub>O<sub>9</sub>/Si GATE STRUCTURES. Ik Soo Kim, Yong Tae Kim, Seong-Il Kim, Semiconductor Materials and Devices Lab., Korea Institute of Science and Technology, Seoul, KOREA; In-Hoon Choi, Dept. of Materials Science and Engineering, Korea Univ., Seoul, KOREA.

**4:45 PM U9.10/T4.10**

ATOMIC-LAYER-DEPOSITION OF SrTiO<sub>3</sub> THIN FILMS USING REMOTE-PLASMA ACTIVATED H<sub>2</sub>O AS AN OXIDANT. Oh Seong Kwon, Seong Keun Kim, Cheol Seong Hwang, Seoul National Univ, Dept of Materials Science and Engineering, Seoul, KOREA; Jae hak Jeong, Kwang Soo Hyun, Ever-tek, Sunnam, KOREA.

SESSION U10: DOMAINS AND NANOSTRUCTURES IN FERROELECTRIC THIN FILMS

Chairs: Paul C. McIntyre and Angus I. Kingon  
Wednesday Morning, December 4, 2002  
Room 304 (Hynes)

**8:30 AM \*U10.1**

IN SITU X-RAY STUDIES OF 180° STRIPE DOMAIN FORMATION AND FERROELECTRICITY IN EPITAXIAL PbTiO<sub>3</sub> THIN FILMS. J.A. Eastman, G.B. Stephenson, S.K. Streiffer, D.D. Pong, O. Auciello, P.H. Fuoss, Materials Science Division, Argonne National Laboratory, Argonne, IL; Carol Thompson, M.E.M. Aanerud, Department of Physics, Northern Illinois University, DeKalb, IL.

**9:00 AM U10.2**

MEASUREMENT OF THREE DIMENSIONAL POLARIZATION DIRECTION IN FERROELECTRIC THIN FILMS USING SCANNING NONLINEAR DIELECTRIC MICROSCOPY WITH ROTATING ELECTRIC FIELD. Hiroyuki Odagawa, Yasuo Cho, Research Inst of Electrical Communication, Tohoku Univ, Sendai, JAPAN.

**9:15 AM U10.3**

FERROELECTRIC LITHOGRAPHY OF MULTICOMPONENT NANOSTRUCTURES. D.A. Bonnell, S.V. Kalinin, X. Lei, Z. Hu, and J.H. Ferris, Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA.

**9:30 AM U10.4**

IN-SITU TEM OBSERVATIONS OF DOMAIN SWITCHING IN FERROELECTRIC CERAMICS. Xiaoli Tan, Zhengkui Xu, Jian-Ku Shang, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, IL.

**9:45 AM BREAK**

**10:15 AM \*U10.5**

NANOSCALE PHENOMENA IN SYNTHETIC FUNCTIONAL OXIDE HETEROSTRUCTURES. R. Ramesh and V. Nagarajan, Univ of Maryland-College Park, Department of Materials Science, College Park, MD.

**10:45 AM U10.6**

ELECTRON BEAM PATTERNING OF FERROELECTRIC DOMAINS. James H. Ferris, Sergei V. Kalinin, and Dawn A. Bonnell, Dept. of Materials Science and Engineering, Univ. of Pennsylvania, Philadelphia, PA.

**11:00 AM U10.7**

ORIGIN OF ANTIPHASE DOMAIN BOUNDARIES AND THEIR EFFECT ON THE DIELECTRIC CONSTANT OF BST FILMS GROWN MgO SUBSTRATES. Haimei Zheng, L. Salamanca-Riba, R. Ramesh, Dept of Materials Science and Engineering, University of Maryland, College Park, MD; I. Naumov, K. Rabe, Dept of Physics and Astronomy, Rutgers University, Piscataway, NJ.

**11:15 AM U10.8**

LATTICE-SCALE DOMAIN WALL DYNAMICS IN FERROELECTRICS. Hongzhou Ma, Jeremy Levy, Dept of Physics and Astronomy, Univ of Pittsburgh, Pittsburgh, PA; Won-Jeong Kim, Electronics and Telecommunications Research Institute, Kajeong-Dong, Yusung-Gu Taejeon, KOREA; Jim Horwitz, Naval Research Lab, Washington, DC.

**11:30 AM U10.9**

FERROELECTRIC DOMAIN STRUCTURES AND DYNAMICS IN EPITAXIAL PbTiO<sub>3</sub> THIN FILMS ON Pt(001)/MgO(001) SUBSTRATES. Yong Kwan Kim, Sunggi Baik, Dept. of Materials Science and Engineering, Pohang University of Science and Technology (POSTECH), Pohang, KOREA; Sang Sub Kim, Dept. of Materials Science and Metallurgical Engineering, Suncheon National University, Suncheon, KOREA.

**11:45 AM U10.10**

ELECTROMECHANICAL PROPERTIES OF CONSTRAINED FERROELECTRIC FILMS. Alexander L. Roytburd, Univ of Maryland, College Park, MD.

SESSION U11: PIEZOELECTRIC, PYROELECTRIC, AND OPTICAL PROPERTIES OF FERROELECTRIC THIN FILMS

Chairs: Paul Muralt and Cheol Seong Hwang  
Wednesday Afternoon, December 4, 2002  
Room 304 (Hynes)

**1:30 PM \*U11.1**

THIN FILM PYROELECTRIC IMAGING ARRAY. Howard Beratan, Charles Hanson, Raytheon Commercial Infrared, Dallas, TX.

**2:00 PM U11.2**

ELECTRO-OPTIC MACH-ZEHNDER MODULATORS WITH POLYCRYSTALLINE BaTiO<sub>3</sub> THIN FILMS ON MgO. A. Petraru, J. Schubert, M. Schmid, O. Trithavees and Ch. Buchal, Institut für Schichten und Grenzflächen, ISG1-IT, Forschungszentrum Jülich, Jülich, GERMANY.

**2:15 PM U11.3**

THIN Pb(Zr,Ti)O<sub>3</sub> FILM POCKELS CELL. Maria Ofelia Viitez, Sergey Khartsev, Alex Grishin, Dept of Condensed Matter Physics, Royal Institute of Technology, Stockholm-Kista, SWEDEN.

## 2:30 PM BREAK

### 3:00 PM \*U11.4

NEW MATERIALS FOR PIEZOELECTRIC MEMS. Susan Trolier-McKinstry, T. Yoshimura, J. Nino, N. Bassiri Gharb, Q. Zhou, and Q. Zhang, Materials Research Institute, Penn State University, State College, PA.

### 3:30 PM U11.5

FLEXURAL ACTUATION IN FREESTANDING SINGLE-CRYSTAL RELAXOR FERROELECTRIC FILMS. M. Levy, S. Ghimire, Michigan Technological University, Physics Dept., Houghton, MI; K.S. Moon, Y.K. Hong, Michigan Technological University, Dept. of Mechanical Engineering, Houghton, MI; H. Bakhru, SUNY at Albany, Dept. of Physics, Albany, NY.

### 3:45 PM U11.6

PIEZOELECTRIC CHARACTERIZATION OF SUB-MICRON EPITAXIAL PZT CAPACITORS. V. Nagarajan, A. Stanishevsky, L. Chen, T. Zhao, B. Liu, J. Melngailis, A.L. Roytburd and R. Ramesh, Materials Research Science and Engineering Center, University of Maryland, College Park, MD; J. Finder, Z. Yu, R. Droopad, and K. Eisenbeiser, Physical Sciences Research Laboratories, Motorola, Tempe, AZ.

### 4:00 PM U11.7

WAFER BONDING AND LAYER TRANSFER FOR THIN FILM FERROELECTRICS. Cecily A. Ryan, Harry A. Atwater, California Institute of Technology, Thomas J. Watson Laboratories of Applied Physics, Pasadena, CA; Jennifer Ruglovsky, Harvard University, Cambridge, MA.

### 4:15 PM U11.8

SINGLE-CRYSTALLINE OXIDE (FERROELECTRIC) LAYERS BY WAFER BONDING AND HYDROGEN/HELIUM IMPLANTATION. Ionut Radu, Izabela Szafraniak, Marin Alexe, Roland Scholz, Ulrich Goesele, Max Planck Institute of Microstructure Physics, Halle, GERMANY.

### 4:30 PM U11.9

FERROELECTRIC RELAXOR SUPERLATTICES - CONTROL OF THE ORDERED-DISORDERED STATE OF B-SITE IONS. Hitoshi Tabata<sup>a,b</sup>, Yasushi Hotta<sup>a</sup> and Tomoji Kawai<sup>a</sup>, Osaka Univ.<sup>a</sup>; PRESTO21<sup>b</sup>; Osaka, JAPAN.

### 4:45 PM U11.10

LOCAL ELECTROMECHANICAL PROPERTIES AND GRAIN SIZE EFFECTS IN FERROELECTRIC RELAXORS STUDIED BY SCANNING PIEZOELECTRIC MICROSCOPY. A.L. Kholkin, V.V. Shvartsman, M. Woitas, A. Yu. Emelyanov, Dept. of Ceramics and Glass Engineering, University of Aveiro, Aveiro, PORTUGAL; A. Safari, Dept. of Ceramic and Materials Engineering, Rutgers University, NJ.

## SESSION U12: POSTER SESSION THIN FILM PROCESSING, PROPERTIES, AND CHARACTERIZATION

Chairs: K. R. Udayakumar and Vikram Joshi  
Wednesday Evening, December 4, 2002  
8:00 PM  
Exhibition Hall D (Hynes)

### \*U12.1

ENHANCEMENT OF REMANENT POLARIZATION OF BIT-BASED THIN FILMS BY Ti-SITE SUBSTITUTION USING IONS WITH HIGHER CHARGE VALENCES. Hiroshi Uchida, Isao Okada, Sophia Univ, Dept of Chemistry, Tokyo, JAPAN; Hirofumi Matsuda, Takashi Iijima, AIST, Tsukuba, JAPAN; Takayuki Watanabe, Hiroshi Funakubo, T.I. Tech., Yokohama, JAPAN.

### U12.2

GROWTH OF Zr SUBSTITUTED BARIUM TITANATE THIN FILMS FROM THE VAPOR PHASE. R. Ganster, S. Hoffmann-Eifert, and R. Waser, Institut für Festkörperforschung, Forschungszentrum Jülich GmbH, Jülich, GERMANY.

### U12.3

DEVELOPMENT OF IMPROVED PRECURSORS FOR THE MOCVD OF BISMUTH TITANATE. A.C. Jones, N.L. Tobin, P.R. Chalker, University of Liverpool, Liverpool, UNITED KINGDOM; T.J. Leedham, H.O. Davies, P.A. Williams, Inorgtech Limited, Mildenhall, UNITED KINGDOM; L.M. Smith, Epichem Limited, Bromborough, UNITED KINGDOM.

### U12.4

INVESTIGATION OF FILMS OF THE SOLID SOLUTION BaTiO<sub>3</sub>-CaTiO<sub>3</sub>-BaZrO<sub>3</sub> PREPARED BY MOCVD. Rémi Pantou, Catherine Dubourdieu, Francois Weiss, Jens Kreisel, Laboratoire des Matériaux et du Génie Physique, St. Martin d'Heres, FRANCE; Wolfgang Hässler, Gert Köbernik, IFW, Dresden, GERMANY.

### U12.5

PLATINUM, RUTHENIUM AND RUTHENIUM DIOXIDE ELECTRODES FOR OXIDE APPLICATIONS BY LIQUID INJECTION METAL ORGANIC CHEMICAL VAPOR DEPOSITION. P.K. Baumann, AIXTRON AG, Aachen, GERMANY; K. Froehlich, Slovak Academy of Sciences, Bratislava, SLOVAK REPUBLIC; O. Valet, P. Doppelt, ESPCI-CNRS University, Paris, FRANCE; F. Schienle, M. Schumacher, J. Lindner, G. Strauch, H. Juergensen, AIXTRON AG, Aachen, GERMANY; H. Guillon, J.I.P.ELEC, Meylan, FRANCE.

### U12.6

CHEMICAL SOLUTION DEPOSITION OF EPITAXIAL PEROVSKITE ABO<sub>3</sub> THIN FILMS. Ryan J. Ong, University of Illinois, Dept. of Materials Science and Engineering, Urbana, IL; Jeffrey T. Dawley, Sandia National Laboratories, Albuquerque, NM; Paul G. Clem, Sandia National Laboratories, Albuquerque, NM; David A. Payne, University of Illinois, Dept. of Materials Science and Engineering, Urbana, IL.

### U12.7

A NOVEL RUTHENIUM PRECURSOR FOR MOCVD WITHOUT SEED RUTHENIUM LAYER. Tetsuo Shibutami, Kazuhisa Kawano and Noriaki Oshima, TOSOH Corporation, Tokyo Research Center, Yokohama, JAPAN; Shintaro Yokoyama and Hiroshi Funakubo, Tokyo Institute of Technology, Dept. Innov. Engr. Mater., Yokohama, JAPAN.

### U12.8

PREPARATION OF Bi<sub>2</sub>SiO<sub>5</sub>-SrBi<sub>2</sub>Ta<sub>2</sub>O<sub>9</sub> FERROELECTRIC THIN FILMS BY RF MAGNETRON SPUTTERING. S. Kikuchi<sup>a,b</sup> and H. Ishiwara<sup>b</sup>; <sup>a</sup>R&D Association for Future Electron Devices; <sup>b</sup>Frontier Collaborative Research Center, Tokyo Institute of Technology, Yokohama, JAPAN.

### U12.9

BIAXIAL TEXTURING AND FERROELECTRIC PROPERTIES OF SOL-GEL DEPOSITED Pb<sub>x</sub>Ba<sub>1-x</sub>TiO<sub>3</sub> ON BIAXIALLY TEXTURED MgO. Rhett T. Brewer, Cecily A. Ryan, and Harry A. Atwater, California Institute of Technology, Thomas J. Watson Laboratory of Applied Physics, Pasadena, CA; Wein-Duo Yang and Sossina M. Haile, California Institute of Technology, Department of Materials Science, Pasadena, CA.

### U12.10

FABRICATION AND CHARACTERIZATION OF SILICATE MODIFIED PZT THIN FILMS. Junichi Karasawa, Yasuaki Hamada, Koji Ohashi, Takeshi Kijima, Eiji Natori and Tatsuya Shimoda, Technology Platform Research Center, Seiko Epson Corporation, Fujimi-machi, Nagano-ken, JAPAN.

### U12.11

ELLIPSOMETRIC CHARACTERIZATION OF PEROVSKITE THIN FILMS OBTAINED BY A NOVEL COMPOSITIONAL SPREAD TECHNIQUE. Hans M. Christen, Gerald E. Jellison Jr., Isao Ohkubo, Christopher M. Rouleau, Hong-Ying Zhai, Ho Nyung Lee, and Douglas H. Lowndes, Oak Ridge National Laboratory, Oak Ridge, TN.

### U12.12

PHASE FORMATION KINETICS OF NANOPARTICLE SEEDED SBT THIN FILMS. Woo-Chul Kwak, G.M. Anilkumar, Yun-Mo Sung, Daejin Univ, Dept of Materials Science & Engineering, Pochun-koon, Kyunggi-do, SOUTH KOREA.

### U12.13

PLATINUM-ACCELERATED PHASE TRANSITIONS IN BISMUTH-BASED LAYER-STRUCTURED FERROELECTRIC THIN FILMS. Kazumi Kato<sup>a,b</sup>, Kazuyuki Suzuki<sup>a</sup>, Desheng Fu<sup>a</sup>, Kaori Nishizawa<sup>a</sup>, Takeshi Miki<sup>a</sup>; <sup>a</sup>National Institute of Advanced Industrial Science and Technology, Nagoya, JAPAN; <sup>b</sup>Frontier Collaborative Research Center, Tokyo Institute of Technology, Yokohama, JAPAN.

### U12.14

GROWTH AND CHARACTERIZATION OF TRANSITION METAL DOPED (Ba,Sr)TiO<sub>3</sub> THIN FILMS DEPOSITED BY OXYGEN RADICAL ASSISTED PLD. Yoshiyuki Yonezawa, Megumi Kato, Yoshinori Konishi, Takeshi Suzuki, Shizuyasu Yoshida, Nobuhiro Okuda, Ryohei Tanuma, Michio Ohsawa, Fuji Electric Corporate Research and Development, Ltd., Yokosuka, JAPAN; Tomoya Uruga,

Japan Synchrotron Radiation Research Institute (JASRI), JAPAN;  
Toyohiro Chikyow, National Institute for Materials Science (NIMS),  
Tsukuba, JAPAN; Hideomi Koinuma, Materials and Structures  
Laboratory, Tokyo Institute of Technology, JAPAN.

SESSION U13: POSTER SESSION  
EPITAXIAL FERROELECTRIC THIN FILMS  
Wednesday Evening, December 4, 2002  
8:00 PM  
Exhibition Hall D (Hynes)

**U12.15**  
DIELECTRIC STUDIES OF LASER ABLATED Ca DOPED BaTiO<sub>3</sub>  
THIN FILMS. P. Victor, R. Ranjith, Asis Sarkar and S.B.  
Krupanidhi, Materials Research Center, Indian Institute of Science,  
Bangalore, INDIA; R. Vinayak, Department of Metallurgical  
Engineering and Materials Science, Indian Institute of Technology,  
Bombay, INDIA; S. Saha, Materials Science Division, Argonne  
National Laboratory, Argonne, IL.

**U12.16**  
ENHANCED FERROELECTRIC PROPERTIES IN Ca  
SUBSTITUTED SrBi<sub>2</sub>Nb<sub>2</sub>O<sub>9</sub> THIN FILMS. Rasmii R. Das, W. Perez,  
P. Bhattacharya and Ram S. Katiyar, Physics Department, University  
of Puerto Rico, San Juan, PR.

**U12.17**  
PZT THIN FILMS ON (La,Sr)CoO<sub>3</sub> BOTTOM ELECTRODES  
PREPARED BY CHEMICAL SOLUTION DEPOSITION.  
Barbara Malič, Sasa Javorič, Marija Kosec, Jožef Stefan Institute,  
Ljubljana, SLOVENIA; Ricardo Jimenez, Carlo Alemany, Instituto de  
Ciencia de Materiales de Madrid, CSIC, Madrid, SPAIN.

**U12.18**  
COMBINATORIAL SYNTHESIS OF DIELECTRIC/FERRO-  
ELECTRIC THIN AND THICK FILMS. R.N. Das, C. Lew, M.O.  
Thompson, E.P. Giannelis, Cornell University, Department of  
Materials Science and Engineering, Ithaca, NY; I. Zergioti,  
Foundation for Research and Technology-Hellas, Institute of  
Electronic Structure and Laser, Crete, GREECE.

**U12.19**  
THE CRYSTALLINE, OPTICAL AND FERROELECTRIC  
PROPERTIES OF CALCIUM MODIFIED LEAD LANTHANUM  
TITANATE FERROELECTRIC THIN FILMS. Xiaowu Yuan,  
Jianguo Zhu, Wen Zhang, Ping Yu, Xi Yue, Dingquan Xiao,  
Department of Materials Science, Sichuan University, Chengdu, P.R.  
CHINA; Yongqiang Wang, Institute of Technology Characterization  
Facility, University of Minnesota, Minneapolis, MN; Jack H. Judy,  
Department of Electric and Computer Engineering, University of  
Minnesota, Minneapolis, MN.

**U12.20**  
STRESS INDUCED POLARIZATION-GRADED FERRO-  
ELECTRICS. J.V. Mantese, N.W. Schubring, A.L. Micheli, M.P.  
Thompson, Delphi Research Laboratories, Shelby Township, MI; R.  
Naik, Department of Physics and Astronomy, Wayne State University,  
Detroit, MI; G.W. Auner, Department of Electrical and Computer  
Engineering, Wayne State University, Detroit, MI; I.B. Misirlioglu,  
Z.-G. Ban, S.P. Alpay, Department of Metallurgy and Materials  
Engineering and Institute of Materials Science, University of  
Connecticut, Storrs, CT.

**U12.21**  
PARAMETRIC OPTIMIZATION OF HIGHLY-ORIENTED  
(Pb,Ba)TiO<sub>3</sub> THIN FILMS USING SOL-GEL PROCESS. Wein-Duo  
Yang, Suresh C. Pillai, Stacey W. Boland and Sossina M. Haile, Dept  
of Materials Science, California Institute of Technology, Pasadena,  
CA.

**U12.22**  
LOW-TEMPERATURE CRYSTALLIZATION OF P(L)ZT THIN  
FILMS. Marija Kosec, Mira Mandeljc, Barbara Malič, Goran Dražič  
Jožef Stefan Institute, Ljubljana, SLOVENIA.

**\*U12.23**  
FERROELECTRIC AND DIELECTRIC PROPERTIES OF  
CHEMICAL-SOLUTION-DERIVED BISMUTH LANTHANUM  
TITANATE THIN FILMS WITH VARIOUS BISMUTH OXIDE  
TEMPLATE LAYERS. Dinghua Bao, Naoki Wakiya, Kazuo  
Shinozaki, and Nobuyasu Mizutani, Tokyo Institute of Technology,  
Dept of Metallurgy and Ceramics Science, Tokyo, JAPAN.

**U12.24**  
SELF-POLING EFFECTS IN SOL-GEL DERIVED Pb(Zr<sub>1-x</sub>Ti<sub>x</sub>)O<sub>3</sub>  
THIN FILMS. Jinrong Cheng, L. Eric Cross, Materials Research  
Institute, The Pennsylvania State Univ, PA; Zhongyan Meng, School of  
Materials Sci and Eng, Shanghai Univ, Shanghai, P.R. CHINA.

**\*U13.1**  
EPITAXIAL BiFeO<sub>3</sub> MULTIFERROIC THIN FILM HETERO-  
STRUCTURES. J. Wang, H. Zheng, V. Nagarajan, B. Liu, S. Ogale<sup>a</sup>,  
M. Wuttig, R. Ramesh<sup>a</sup>, Department of Materials Science and  
Engineering and <sup>a</sup>Department of Physics University of Maryland,  
College Park, MD.

**U13.2**  
MICROSTRUCTURE AND DIELECTRIC PROPERTIES OF  
EPITAXIAL BaTiO<sub>3</sub>/SrTiO<sub>3</sub> MULTILAYERS. A. Visinoini,  
M. Alexe, R. Scholz, D. Hesse, Max Planck Institute of  
Microstructure Physics, Halle, GERMANY.

**U13.3**  
NATURAL-SUPERLATTICE-STRUCTURED FERROELECTRIC  
Bi<sub>4</sub>Ti<sub>3</sub>O<sub>12</sub>-SrBi<sub>4</sub>Ti<sub>4</sub>O<sub>15</sub> THIN FILMS PREPARED BY PLD.  
Akira Shibuya, Minoru Noda, Masanori Okuyama, Osaka Univ,  
Graduate School of Engineering Science, Dept of Physical Science,  
Osaka, JAPAN.

**U13.4**  
TETRAGONAL AND RHOMBOHEDRAL MIXTURE PHASE  
COMPOSITION IN Pb(Zr<sub>x</sub>Ti<sub>1-x</sub>)O<sub>3</sub> SYSTEM. Keisuke Saito,  
Toshiyuki Kurosawa, Takao Akai, Philips Analytical Japan, JAPAN;  
Takahiro Oikawa, Shintaro Yokoyama, Hiroshi Funakubo, Tokyo  
Institute of Technology, JAPAN.

**U13.5**  
PROPERTIES OF CaCu<sub>3</sub>Ti<sub>4</sub>O<sub>12</sub> THIN FILMS GROWN ON LaAlO<sub>3</sub>  
SUBSTRATES BY PULSED LASER DEPOSITION. A. Tselev, H.  
Zheng, J.L. Wang, C. Brooks, R.P. Sharma, L. Salamanca-Riba, S.M.  
Anlage, and R. Ramesh, MRSEC, Physics Department, Univ. of  
Maryland, College Park, MD; M. Subramanian, DuPont Central  
Research and Development, Experimental Station, Wilmington, DE.

SESSION U14: POSTER SESSION  
PIEZOELECTRIC, PYROELECTRIC, AND  
OPTICAL PROPERTIES  
Chairs: Susan Trolier-McKinstry and  
Howard R. Beratan  
Wednesday Evening, December 4, 2002  
8:00 PM  
Exhibition Hall D (Hynes)

**\*U14.1**  
PIEZOELECTRIC PROPERTY INVESTIGATION FOR SOL-GEL  
DERIVED Bi<sub>4</sub>Ti<sub>3</sub>O<sub>12</sub> THICK FILMS. Hirofumi Matsuda, Sachiko  
Ito, and Takashi Iijima, Smart Structure Research Center, National  
Institute of Advanced Industrial Science and Technology, Tsukuba,  
JAPAN.

**U14.2**  
TOP ELECTRODE AREA DEPENDENCE ON DISPLACEMENT  
PROPERTIES OF LEAD ZIRCONATE TITANATE FILMS  
PREPARED BY CHEMICAL SOLUTION DEPOSITION PROCESS.  
Takashi Iijima, Sachiko Ito, Hirofumi Matsuda, Smart Structure  
Research Center, AIST, Tsukuba, JAPAN.

**U14.3**  
NON-LINEAR DIELECTRIC RESPONSE OF PIEZOELECTRIC  
MATERIALS. S.S.N. Bharadwaja, D. Damjanovic, N. Setter,  
Ceramics Laboratory, Swiss Federal Institute of Technology-EPFL,  
Lausanne, SWITZERLAND.

**U14.4**  
PMN-PT THIN FILMS: ELECTROMECHANICAL BEHAVIOUR,  
POLARIZABILITY AND MICROSTRUCTURE. Niall J. Donnelly,  
Gustau Catalan, Carles Morros, R.M. Bowman and J.M. Gregg,  
Queens University, Belfast, N. IRELAND.

**U14.5**  
MONOCLINIC PHASE OBSERVED IN UNDOPED  
Pb(Mg<sub>1/3</sub>Nb<sub>2/3-δ</sub>)O<sub>3</sub> THIN FILMS GROWN BY  
RADIO-FREQUENCY MAGNETRON SPUTTERING. S.H. Seo,  
H.C. Kang, D.Y. Noh, Kwangju Institute of Science and Technology,  
Dept. of Materials Science and Engineering, Kwangju, KOREA; Y.  
Yamada, K. Wasa, Yokohama City University, Faculty of Science,  
Yokohama, JAPAN.

**U14.6**

DIELECTRIC AND PIEZOELECTRIC PROPERTIES OF SOL-GEL DERIVED (001)  $0.5\text{Pb}[\text{Yb}_{1/2}\text{Nb}_{1/2}]\text{O}_3$ - $0.5\text{PbTiO}_3$  THIN FILMS. Qifa Zhou, Qingqi Zhang, Nazanin Bassiri Gharb and Susan Trolier-McKinstry, Materials Research Institute, The Pennsylvania State University, University Park, PA.

**\*U14.7**

PREPARATION AND CHARACTERIZATION OF BISMUTH BASED HIGH  $T_C$  PEROVSKITE FERROELECTRIC THIN FILMS. Juan Nino, Takeshi Yoshimura, Susan Trolier-McKinstry, The Pennsylvania State University, Materials Research Institute, University Park, PA.

**U14.8**

ROOM TEMPERATURE PYROELECTRICITY IN SUBSTRATE-FREE GROWN HEXAGONAL  $\text{BaTiO}_3$  THIN FILMS. N. Stavitski, V. Lyahovitskaya, J. Nair, I. Zon and I. Lubomirsky, Weizmann Institute of Science, Rehovot, ISRAEL.

**U14.9**

SOL-GEL-DERIVED PZT THICK FILMS FOR FABRICATION OF PIEZOELECTRIC DIAPHRAGM. Changlei Zhao, Zhihong Wang, Weiguang Zhu and Ooi Kiang Tan, Microelectronics Center, School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, SINGAPORE.

**U14.10**

GROWTH OF  $\text{Ti/PbZr}_x\text{Ti}_y\text{O}_3$  / $\text{LaNiO}_3$  ON TEXTURED  $\text{MgO}$  BUFFER LAYERS ON SILICON SUBSTRATES FOR IR DETECTORS/FERROELECTRIC APPLICATIONS. R. Vallejo, S.H. Yun, J.Z. Wu, Univ. of Kansas, Dept of Physics and Astronomy, Lawrence, KS; M. Tidrow, Advanced Concept Depurate, Missile Defense Agency, Washington, DC; H. Brateen, C.H. Hansen, Raytheon Commercial Infrared, Dallas, TX; P. Arendt, Los Alamos National Laboratory, Los Alamos, NM.

**U14.11**

ELECTRIC FIELD INDUCED CHANGES IN DIELECTRIC PROPERTIES OF  $0.7\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ - $0.3\text{PbTiO}_3$  THIN FILMS. Apurba Laha and S.B. Krupanidhi, Materials Research Center, Indian Institute of Science, Bangalore, INDIA; S. Saha, Materials Science Divisions, Argonne National Laboratory, Argonne, IL.

**\*U14.12**

EPITAXIAL  $\text{BaTiO}_3$ -THIN FILMS GROWN ON  $\text{GdScO}_3(110)$  SUBSTRATES FOR OPTICAL APPLICATIONS. J. Schubert, A. Petraru, O. Trithaavesak, Institut fuer Schichten und Grenzflaechen (ISG-IT), Forschungszentrum Juelich GmbH, Juelich, GERMANY; C.L. Jia, Institut fuer Festkoerperforschung (IMF), Forschungszentrum Juelich GmbH, Juelich, GERMANY; D. Schlom, Department of Materials Science and Engineering, The Pennsylvania State University, University Park, PA.

**SESSION U15: HIGH PERMITTIVITY MATERIALS**

Chairs: David Y. Kaufman and  
Susanne Hoffmann-Eifert  
Thursday Morning, December 5, 2002  
Room 304 (Hynes)

**8:30 AM \*U15.1**

BARIUM STRONTIUM TITANATE THIN FILM CAPACITORS FOR LOW INDUCTANCE DECOUPLING APPLICATIONS. J.D. Baniecki, T. Shioga, K. Kurihara, Fujitsu Laboratories Atsugi, JAPAN.

**9:00 AM U15.2**

NOVEL CANDIDATE OF C-AXIS ORIENTED BLSF THIN FILMS FOR HIGH-CAPACITANCE CONDENSER. Takashi Kojima, Takayuki Watanabe, Hiroshi Funakubo, Department of Innovative and Engineered Materials, Tokyo Institute of Technology, Yokohama, JAPAN; Yukio Sakashita, TDK Corporation, Chiba, JAPAN; Kazumi Kato, National Institute of Advanced Industrial Science and Technology, Nagoya, JAPAN.

**9:15 AM U15.3**

PULSED LASER DEPOSITION OF BISMUTH-ZINC-NIOBATE THIN FILMS FOR DECOUPLING CAPACITOR APPLICATIONS. Lisa F. Edge, Ryan Thayer, Susan Trolier-McKinstry, Materials Research Institute and Materials Science and Engineering Department, Pennsylvania State University, University Park, PA; Jon-Paul Maria, North Carolina State University, Raleigh, NC.

**9:30 AM U15.4**

CHEMICAL SOLUTION DEPOSITION OF PLZT FILMS ON BASE METAL FOILS. Dong-Joo Kim<sup>a</sup>, D.Y. Kaufman<sup>b</sup>, S.K. Streiffer<sup>a</sup>, and O. Auciello<sup>a</sup>; <sup>a</sup>Materials Science Division, Argonne National Laboratory, Argonne, IL; <sup>b</sup>Energy Technology Division, Argonne National Laboratory, Argonne, IL.

**9:45 AM BREAK****10:15 AM U15.5**

POSITIVE TEMPERATURE COEFFICIENT OF RESISTANCE IN MOCVD  $(\text{Ba}_{0.7}\text{Sr}_{0.3})\text{Ti}_{1+y}\text{O}_{3+z}$  FILMS. S. Saha<sup>a</sup>, S.K. Streiffer<sup>a</sup>, D.Y. Kaufman<sup>b</sup>, R.A. Erck<sup>b</sup>, and O. Auciello<sup>a</sup>; <sup>a</sup>Materials Science Division and <sup>b</sup>Energy Technology Division, Argonne National Laboratory, Argonne, IL.

**10:30 AM U15.6**

NUCLEATION AND GROWTH OF THIN  $(\text{Ba,Sr})\text{TiO}_3$  FILMS IN A MOCVD REACTOR. Stephan Regnery, Peter Ehrhart, Fotis Fitsilis, Rainer Waser, Forschungszentrum Juelich, IFF/EKM, Juelich, GERMANY; Frank Schienle, Marcus Schumacher, Holger Juergensen, Aixtron AG, Aachen, GERMANY.

**10:45 AM U15.7**

THE IMPACT OF OXIDE ELECTRODES ON THE THICKNESS-DEPENDENT ELECTRICAL PROPERTIES OF BST THIN FILMS. J.-P. Maria, C.B. Parker, A.I. Kingon, North Carolina State University, Department of Materials Science and Engineering, Raleigh, NC; G. Stauff, Advanced Technology Materials, Danbury, CT.

**11:00 AM U15.8**

ORIGIN OF THE 'DEAD-LAYER' EFFECT IN FERROELECTRIC THIN FILMS. L.J. Sinnamon, J. McAneney, M.M. Saad, R.M. Bowman, J.M. Gregg, Queens University Belfast, Dept of Pure and Applied Physics, Belfast, N. IRELAND.

**11:15 AM U15.9**

EFFECT OF TEMPERATURE, THICKNESS, AND STRAIN ON THE PERMITTIVITY OF BARIUM STRONTIUM TITANATE THIN FILMS. C.B. Parker, J.-P. Maria, and A.I. Kingon, North Carolina State University, Raleigh, NC.

**11:30 AM U15.10**

TRANSPORT MECHANISM AND NON-LINEAR DIELECTRIC BEHAVIOR AT  $\text{SrTiO}_3$  GRAIN BOUNDARIES. Sergei V. Kalinin and Dawn A. Bonnell, Univ of Pennsylvania, Philadelphia, PA.

**11:45 AM U15.11**

THE CORRELATION BETWEEN INTERNAL INTERFACES AND THE HIGH TEMPERATURE CONDUCTION BEHAVIOR OF NANOCRYSTALLINE AND THIN FILM TITANATES. Christian Ohly, Susanne Hoffmann-Eifert and Rainer Waser, Institut für Festkörperforschung, Elektrokeramische Materialien, Forschungszentrum Jülich GmbH, GERMANY.

**SESSION U16: EPITAXIAL FERROELECTRIC THIN FILMS**

Chair: Jon-Paul Maria  
Thursday Afternoon, December 5, 2002  
Room 304 (Hynes)

**1:30 PM \*U16.1**

STRAIN PROFILES OF  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{TiO}_3$  FILMS BY CRYSTAL TRUNCATION ROD DIFFRACTION. W. Donner, F. Amir, S. Moss, University of Houston, Dept. of Physics, Houston, TX; M. Aspelmeyer, LMU Munich, GERMANY; B. Noheda, Brookhaven National Laboratory, Upton, NY; X.X. Xi, Pennsylvania State University, University Park, PA.

**2:00 PM U16.2**

IMPROVED ROOM TEMPERATURE DIELECTRIC TUNABILITY IN STRAINED  $\text{SrTiO}_3$  THIN FILMS. J.H. Haeni, V. Vaithyanathan, and D.G. Schlom, Department of Materials Science and Engineering, The Pennsylvania State University, University Park, PA; W. Chang, and S.W. Kirchoefer, Navy Research Labs, Washington, DC .

**2:15 PM U16.3**

TUNING THE TUNABILITY IN EPITAXIAL BARIUM STRONTIUM TITANATE FILM VIA INTERNAL STRESSES. Z.-G. Ban, S.P. Alpay, Department of Metallurgy and Materials Engineering, Institute of Materials Science, University of Connecticut, Storrs, CT.

**2:30 PM U16.4**

DIELECTRIC PROPERTIES OF  $\text{BaTiO}_3/\text{SrTiO}_3$  OXIDE ARTIFICIAL SUPERLATTICE. Jaichan Lee, Juho Kim and Young Sung Kim, Dept. of Materials Science and Engineering, Sung Kyun Kwan University, Suwon, KOREA; Leejun Kim and Donggeun Jung, Dept. of Physics, Brain Korea21 Physics Research Division and Institute of Basic Science, Sung Kyun Kwan University, Suwon, KOREA.

**2:45 PM BREAK**

SESSION U17: HIGH-FREQUENCY APPLICATIONS  
OF FERROELECTRICS

Chair: John David Baniecki  
Thursday Afternoon, December 5, 2002  
Room 304 (Hynes)

**3:15 PM \*U17.1**

ROOM TEMPERATURE FERROELECTRICITY IN  $\text{SrTiO}_3$  THIN FILMS. Jeremy Levy, Patrick Irvin, Dept of Physics and Astronomy, Univ of Pittsburgh; Jeffrey Haeni, Darrell G. Schlom, Dept of Materials Science, Penn State Univ; Wontae Chang, Steve Kirchoefer, Naval Research Laboratory.

**3:45 PM U17.2**

ORIGINS OF MICROWAVE FREQUENCY LOSS AND DISPERSION IN TUNABLE FERROELECTRIC THIN FILMS. James C. Booth, Kenny Leong, R.H. Ono, National Institute of Standards and Technology, Boulder, CO; Ichiro Takeuchi, Kao-Shuo Chang, Department of Materials Science and Engineering and Center for Superconductivity Research, Department of Physics, University of Maryland, College Park, MD.

**4:00 PM U17.3**

RAMAN SPECTROSCOPY OF  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  THIN FILMS AND SINGLE CRYSTALS. D.A. Tenne, A. Soukiassian, A.M. Clark, M.H. Zhu, X.X. Xi, Department of Physics, the Pennsylvania State University, University Park, PA; R. Guo, H. Choosuwana, and A. Bhalla, Materials Research Laboratory, the Pennsylvania State University, University Park, PA.

**4:15 PM U17.4**

IMPROVED DIELECTRIC PROPERTIES OF HETERO-STRUCTURED  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{TiO}_3$  THIN FILMS FOR HIGH FREQUENCY APPLICATIONS. M. Jain, S.B. Majumder, R.S. Katiyar, Department of Physics, University of Puerto Rico, San Juan, PR; A.S. Bhalla, Materials Research Laboratory, MRI, Penn State University, University Park, PA; F. Fernandez, Department of Physics, University of Puerto Rico, Mayaguez, PR; V.N. Kulkarni, D.C. Agrawal, Indian Institute of Technology, Kanpur, INDIA; F. Miranda, R. Romanofsky, F. Van Keul, C. Mueller, Communications Technology Division, NASA, GRC, Cleveland, OH.

**4:30 PM U17.5**

INTEGRATION OF Cu-BASED ELECTRODES INTO  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  THIN FILM CAPACITORS FOR HIGH-FREQUENCY DEVICES. Wei Fan, Orlando Auciello, Sanjib Saha, John Carlisle, Materials Science Division, Argonne National Laboratory, Argonne, IL; R.P.H. Chang, Department of Materials Science and Engineering, Northwestern University, Evanston, IL; Ramamoorthy Ramesh, Department of Materials and Nuclear Engineering, University of Maryland, College Park, MD.

**4:45 PM U17.6**

CHARACTERIZATION OF  $\text{Bi}_{1.5}\text{Zn}_{1.0}\text{Nb}_{1.5}\text{O}_7$  DIELECTRIC THIN FILMS DEPOSITED BY RF MAGNETRON SPUTTERING. Jiwei Lu, Susanne Stemmer, Materials Department, University of California, Santa Barbara, CA.