SYMPOSIUM V

Interfacial Issues for Oxide-Based Electronics
December 2–4, 2002

Chairs
David S. Ginley
Sue Anne Carter
David C. Paine
Hideo Hosono
Janet Tate

Symposium Support
National Renewable Energy Laboratory

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*Invited paper
Also in conjunction with Symposium NN

SESSION VI: TRANSPARENT CONDUCTING OXIDES
Chairs: David S. Ginley and Hideo Hosono
Monday Morning, December 2, 2002
Fairfax A (Sheraton)

8:30 AM *VI.1

9:00 AM VI.2

9:15 AM VI.3
CATHODO-STRUCTURAL AND FILM GROWTH PROPERTIES OF ROOM-TEMPERATURE DEPOSITED INDIUM-TIN-OXIDE ON POLYMER SUBSTRATES. Sung Kye Park, Jeong Il Hae, Dae Gyu Moon, Won Keun Kim, Min Gi Kwak, Korea Electronics Technology, Institute Information Display Research Center, Kyunggi, KOREA.

9:30 AM VI.4
THIN-FILM INDIUM OXIDE DOPED WITH REFRACTORY METALS. Yuki Yoshida, Chihaya Wasing, Colorado School of Mines, Golden, CO; Timothy Grosser, Timothy Courts, National Renewable Energy Laboratory, Golden, CO.

9:45 AM VI.5

10:00 AM BREAK

10:30 AM *VI.6
SURFACE CRISTALLINE AND MICROSTRUCTURE OF POLYCRYSTALLINE ITO AND AMORPHOUS ZIO TRANSPARENT CONDUCTIVE FILMS. Yaze Shigeno, Pun-Kun Song, Ayashim Gakuen University, Tokyo, JAPAN.

11:00 AM VI.7
AN ANGULAR-DEPENDENT X-RAY PHOTOEMISSION STUDY OF INDIUM-TIN-OXIDE SURFACES. H.H. Feng, W. J. Song, and S.K. So, Department of Physics and Centre for Surface Analysis and Research, Hong Kong Baptist University, Kowloon Tong, HONG KONG.

11:15 AM VI.8
SYNTHESIS AND PERFORMANCE OF TRANSPARENT CONDUCTING OXIDE STACKS. Josh A. Jochim, James B. Estes, Cassandra M. Fry, Colin A. Wolden, Colorado School of Mines, Dept. of Chemical Engineering, Golden, CO.

11:30 AM *VI.9
RECENT PROGRESS OF VISIBLE-LIGHT INDUCED TiO2-xNx PHOTOCATALYSIS. Yasunori Tama, Toyota Central R&D Labs., Inc., Aichi, JAPAN.

SESSION V: II AND OXIDES GROWTH AND PROPERTIES
Chairs: Janet Tate and Dave H. A. Blank
Monday Afternoon, December 2, 2002
Fairfax A (Sheraton)

1:30 PM *V.2
WIDE-GAP P-TYPE CONDUCTIVE PROPERTIES IN LAYERED OXYCHALCOGENIDES. Kazumasa Ueda*, Hidemori Hiramatsu**, Hirofumi Ohta, Manaburo Hirano*, Hideo Hosono***, and Hiroshi Kawanoe", "Materials and Structures Laboratory, Tokyo Institute of Technology, JAPAN, **Hoson Transparent Electro-Active Materials, ERATO, JST, JAPAN, ***HOYA Corporation, R&D Center, Akishima, JAPAN.

2:00 PM V.2
X-RAY AMORPHOUS P-TYPE CONDUCTIVE OXIDE; ZnRh2O4. Satoru Narashima**, Hiroshi Mizuguchi**, Hirofumi Ohta, Manaburo Hirano*, Kenichi Shiman**, Hideo Hosono***, "TIT, Yokohama, JAPAN, **ERATO, JST, Kawasaki, JAPAN, ***Keio Univ., Yokohama, JAPAN.

2:15 PM V.3
CO-DOPING DEPOSITION OF P-TYPE ZnO THINS USING RF EXCIMER LASER ABLATION. Kenji Ebihara, Tsukito Otsuki, Tomioka Ieggami, Graduate School of Science and Technology, and Department of Electrical and Computer Engineering, Kumamoto University, Kumamoto, JAPAN; J. Asamunen, Department of Electrical Engineering, Michigan State University, East Lansing, MI; Raj K. Thareja, Department of Physics and Centre of Laser Technology, Indian Institute of Technology Kanpur, Kanpur(U.P.), INDIA.

2:30 PM V.4
PHOTO-INDUCED INSULATOR-SEMICONDUCTOR TRANSITION IN 12CAO7 TSIO2 (C12A7). K. Hiyama**, S. Matushita, T. Komiyama, M. Hirono, H. Hosono, ERATO, Japan Science and Technology Corporation, Kawasaki, JAPAN; Materials and Structure Laboratory, Tokyo Institute of Technology, Yokohama, JAPAN.

3:00 PM BREAK

3:30 PM V.5
REACTIVE SOLID-PHASE EPITAXY – A MAGICAL WAY TO FABRICATE SINGLE-CRYSTALLINE THIN FILMS OF COMPLEX OXIDES WITH SUPERLATTICE STRUCTURE. Hirofumi Ohta, Hidemori Hiramatsu, Hiyama Kazuo, Matsuhiro Orita, Matsuhiro Hirano, JST, Hoson Transparent Electro-Active Materials, Kanazawa, JAPAN; Kenji Nomura, Kazumasa Ueda, Hideo Hosono, Tokyo Institute of Technology, Materials and Structures Laboratory, Yokohama, JAPAN; Toshiya Suzuki, JFCC, Nagoya, JAPAN; Yuchii Ishihara, Univ of Tokyo, Tokyo, JAPAN.

4:00 PM V.6
FABRICATION OF TRANSPARENT MISFET USING InGa2O3/ZnO2 SINGLE CRYSTALLINE THIN FILM WITH NORMALLY INSULATING NATURE. Kenji Nomura**, Hirofumi Oht**, Kazumasa Ueda**, Toshiya Kumiya**, Matsuhiro Hirono**, and Hideo Hosono***, "Tokyo Institute of Technology, Materials and Structures Laboratory, Yokohama, JAPAN, **JST, Hosono Transparent Electro-Active Materials, Kanazawa, JAPAN.

4:15 PM V.7
IN-PLANE CRYSTALLINITY CONTROL OF FUNCTIONAL OXIDE FILMS ON SAPPHIRE USING ROOM-TEMPERATURE
SELECTIVE EPITAXY INDUCED BY ELECTRON BEAM IRRADIATION. A. Suzuki, J. Liu, H. Is, M. Yoshimuno, Tokyo Institute of Tech. Materials and Structures Laboratory, Yokohama, JAPAN.

4:30 PM #V2.8
CONTROLLING THE GROWTH AND INTERFACES OF COMPLEX OXIDE HETEROSTRUCTURES. Dave H.A. Blank and Guus Rijnders, MESA Research Institute and Low Temperature Division, Applied Physics, University of Twente, NETHERLANDS.

SESSION V3: FIELD EFFECT DEVICES AND GATE DIELECTRICS
Chairs: David C. Paine and David Paul Norton

Tuesday Morning, December 3, 2002
Fairfax A (Sheraton)

8:30 AM #V3.1
GATE DIELECTRICS FOR FET STRUCTURES. David Norton, Young S. Heo, Madhavi, B.S. Jeong, H. Bae, S. Park, Y. Li, K.H. Kim, M. Jones, Y.W. Kwon, Univ. of Florida, Dept. of Materials Science and Engnr, Gainesville, FL.

9:00 AM V3.2
MATERIAL SELECTION FOR SrTiO$_3$ BASED EPITAXIAL OXIDE FIELD-EFFECT DEVICES. Keisuke Shibuya, Department of Innovative and Engineered Materials, Tokyo Institute of Technology, Yokohama, JAPAN; Tsuyoshi Ohtani, Mick Lipkon, Institute for Solid State Physics, University of Tokyo, Kawasaki, JAPAN; Masaharu Kawakami, Institute for Materials Research, Tohoku University, Sendai, JAPAN; Hideomi Koinuma, Materials and Structures Laboratory, Tokyo Institute of Technology, Yokohama, JAPAN.

9:15 AM V3.3
FERROELECTRIC FIELD EFFECT INDUCED MODULATION OF MAGNETISM IN THE COLOSMAGNETORESISTIVE OXIDE La$_2$Sr$_{2-x}$MnO$_x$. Andrew Liu, Charles H. Ahn, Yale Univ, Dept of Applied Physics, New Haven, CT.

9:30 AM #V3.4
CASE STUDIES ON THE EFFECTS OF INTERFACES ON FERROELECTRIC THIN FILMS. S.K. Sreedhar, G.B. Stephenson, J.A. Eastman, D.D. Feng, S. Saha, O. Auciello, and P.H. Fack, Materials Science Division, Argonne National Laboratory, Argonne, IL; D.Y. Kang, Technology Division, Argonne National Laboratory, Argonne, IL; M.M. Ansard, Carol Thompson, Northern Illinois University, DeKalb, IL.

10:00 AM BREAK

10:15 AM #V3.5
OXIDE CHANNEL FIELD EFFECT DEVICES: FABRICATION, LIMITATIONS, AND OPPORTUNITIES. J.A. Mawhinney, A.G. Schrott, IBM Research Division, Thomas J Watson Research Center, Yorktown Heights, NY.

10:45 AM V3.6
INTERFACE CONTROLLED GROWTH OF THIN HfO$_2$ FOR FUTURE GATE OXIDE APPLICATIONS. Frank Schueler, Stefano Miedel, Peer Lehmann, Marcus Schumacher, ANTRON AG, Aachen, GERMANY; Cho-Hun Chien, Nano Device Lab. Hsinchu, TAIWAN.

11:00 AM V3.7
PHOTOELECTRODE STUDY OF INTERFACIAL OXIDATION IN ZrO$_2$/SUB-NANOMETER SION_/_Si(100) STACKED STRUCTURES. Shinichi Imaizumi, Hiroki Yamashita, Hiroshi Nakagawa and Manoton Yamada, Graduate School of Advanced Sciences of Matter, Hiroshima University, Higashi-Hiroshima, JAPAN.

11:15 AM V3.8
FERROELECTRIC FIELD EFFECT DEVICE. Alejandro G. Schrott, James A. Mawhinney, IBM Research Division, Thomas J Watson Research Center, Yorktown Heights, NY; V. Nagarajan, R. Ramesh, Department of Materials Science, University of Maryland, College Park, MD.

11:30 AM V3.9
BAND OFFSET AT A'O/ABo$_3$ INTERFACES. Magali Zimmer, Javier Junquera, and Philippe Ghosez, Institut de Physique, Université de Liège, Sart-Tilman, BELGIUM.

11:45 AM V3.10
THE ELECTRONIC STRUCTURE OF INTERFACE SBT/ELECTRODE PD STUDIED BY QUANTUM THEORY. Hongsing Liu, Yale University, Department of Electrical Engineering, Wuhan University of Technology, State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, Wuhan, P.R. CHINA; Xiaomin Min, Wuhan University of Technology, State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, Wuhan, P.R. CHINA.

SESSION V4: FERROELECTRICS, CAPACITORS AND SENSORS
Chairs: David C. Paine and Hiromichi Ohta
Tuesday Afternoon, December 3, 2002
Fairfax A (Sheraton)

1:30 PM #V4.1

2:00 PM V4.2
TRANSMISSION ELECTRON MICROSCOPY STUDY OF DISLOCATION ARRAYS IN B$_2$O$_3$ THIN FILMS GROWN ON S, T-O$_3$, H$_2$O$_2$, X:Q: Pn, W: Tin, Department of Materials Science & Engineering, University of Michigan, Ann Arbor, MI; H.H. Hoen, D.G. Schom, Department of Material Science & Engineering, Penn State University, University Park, PA.

2:15 PM V4.3
FAILURE MECHANISMS OF MULTILAYER CERAMIC CAPACITORS WITH Ni ELECTRODES. G.Y. Yang, J.E. Clayton, E.C. Dickie and C.A. Randall, Department of Materials Science and Engineering and Materials Research Institute, The Pennsylvania State University, University Park, PA.

2:30 PM #V4.4
INFLUENCE OF OXIDATION ON THE ELECTRICAL PROPERTIES OF Sr$_{1-x}$La$_x$TiO$_3$ SEMICONDUCTING CERAMICS. Seung Hyung Sun, Joo-Hwan Park, Joo-Gwon Park, and Yoo-Soo Kim, Material Science and Technology Division, Korea Institute of Science and Technology, Seoul, KOREA.

2:45 PM V4.5
INTERFACE ATOMIC STRUCTURE AND CHEMISTRY OF FERROELECTRIC La$_6$Sr$_{5}$CoO$_{12}$/Pt/ZrO$_{2}$/Ta$_2$O$_{5}$/Si/Si(100) TEMPLATE. W. Tian, X.C. Pan, Department of Materials Science & Engineering, The University of Michigan, Ann Arbor, MI; B.T. Liu, K. Maki, Y. So, V. Nagarajan, and R. Ramesh, Department of Materials and Nuclear Engineering, University of Maryland, College Park, MD; J. Lottieri, J.H. Hoen, and D.G. Schom, Department of Material Science & Engineering, Penn State University, University Park, PA.

3:00 PM BREAK

3:15 PM V4.6
COMPARISON OF TUNNELING THROUGH THIN OXIDE LAYERS ON STEP-FREE AND NORMAL Si SURFACES. Antonio Olivar, Jack Blakely, Cornell University, Materials Science & Engineering, Ithaca, NY. Now at Sandia National Laboratories, Albuquerque, NM.

3:30 PM #V4.7
LARGE DIELECTRIC CONSTANT IN CaCu$_3$Ti$_4$O$_{12}$. A.P. Ramirez, G. Lowes, LANL, Los Alamos, NM; C.M. Varma, Bell Laboratories, Murray Hill, NJ.

4:00 PM V4.8
Abstract Withdrawn

4:15 PM #V4.9
K-BAND REFLECTARRAY ANTENNA BASED ON FERROELECTRIC THIN FILMS: WHAT WE HAVE LEARNED SO FAR. Felix A. Miranda, Robert Romano, NASA Glenn Research Center, Cleveland, OH; Carl H. Mueller, Haltron, Inc., Cleveland, OH; Fred W. Van Keuls, The Ohio Aerospace Institute, Cleveland, OH.

4:45 PM V4.10
RECENT DEVELOPMENTS OF Al$_2$O$_3$-BASED GAS SENSING CERAMICS. Ping Yu, Dingguan Xiao, Jinchao Zhu, Sichuan Univ, Dept of Materials Science, Chengdu, PR. CHINA.
SESSION V5: ORGANIC DEVICES

8:30 AM #V5.1
INTERFACES BETWEEN TRANSPARENT CONDUCTING OXIDES AND ORGANIC CHARGE TRANSPORTING ASSEMBLIES. DRAMATIC CONSEQUENCES FOR OLED CHARGE INJECTION, LUMINANCE, AND DURABILITY.
Tobin J. Marks, Dept. of Chemistry and the Materials Research Center, Northwestern University, Evanston, IL.

9:00 AM #V5.2
INDIUM TIN OXIDE AND ORGANIC FILM INTERFACES MODIFIED AND EVALUATED BY CHEMICAL PROBE MOLECULES AS AN INDICATION OF THE RATE OF ELECTRON TRANSFER. C. Carter, N. R. Armstrong, University of Arizona, Dept. of Chemistry, Tucson, AZ.

9:15 AM #V5.3
DIODE INTERFACE FORMATION IN ORGANIC SEMICONDUCTOR-BASED ELECTRONICS. Neil Watkins, Li Yan, Serkev Zorba, Yangli Gao, Department of Physics and Astronomy, University of Rochester, Rochester, NY.

9:30 AM #V5.4
EFFECTS OF ITO/ORGANIC INTERFACE ROUGHNESS ON THE INSTABILITY OF ORGANIC LIGHT EMITTING DIODES. Ki-Beom Kim, Kwang-Heum Bak, Myung-Ho Youn and You-Young Tae, MesoTechnology Gr., LG Electronics, OLED Division, Kami, Korea.

9:45 AM BREAK

10:15 AM #V5.5
PHOTOELECTRON SPECTROSCOPY INVESTIGATION OF THE ORGANIC-METAL AND ORGANIC-METAL OXIDE INTERFACES. Xavier Giripitx, Dept. of Physics, Linköping, Sweden.

10:45 AM #V5.6
SURFACE SENSITIZED SCHOTTKY BARRIER SOLAR CELLS. Jing Tseng, University of California-Santa Barbara, Materials Dept., Santa Barbara, CA; Eric W. McFarland, University of California-Santa Barbara, Dept. of Chemical Engineering, Santa Barbara, CA; Galen D. Stucky, University of California-Santa Barbara, Dept. of Chemistry and Biochemistry and Materials Dept., Santa Barbara, CA.

11:00 AM #V5.7
INTERFACE ENGINEERING FOR NANO-THICK ORGANIC-BASED PHOTONIC AND PHOTOVOLTAIC DEVICES. Changho E. Jhong, Optical Sciences Center, The University of Arizona, Tucson, AZ.

11:30 AM #V5.8
CHARACTERIZATION OF THE ENERGY AND CHARGE TRANSFER PROCESSES IN CONJUGATED SEMICONDUCTING OLGOMERS AND POLYMERS. Jean-Luc Bedel, University of Arizona, Department of Chemistry, Tucson, AZ; David Beljohn, Jerome Cornell, University of Mons-Hainaut, Laboratory for Chemistry of Novel Materials, Center for Molecular Electronics and Photonics, Mons, Belgium; Vencesla Coropceanu, Demetrio da Silva Filho, Massimo Malagoli, University of Arizona, Department of Chemistry, Tucson, AZ; Geoffrey Pourtois, University of Mons-Hainaut, Laboratory for Chemistry of Novel Materials, Center for Molecular Electronics and Photonics, Mons, Belgium; Egbert Zejger, University of Arizona, Department of Chemistry, Tucson, AZ.

SESSION V6: INTERFACIAL GROWTH ISSUES

13:30 PM #V6.1

2:00 PM #V6.2
EXPERIMENTAL AND THEORETICAL STUDIES OF THE Si/SiO2 INTERFACES IN DRY AND WET OXIDATION.
Dong-Un Jin, Abhijit Roychowdhury, Christos G. Takoudis, Univ. of Illinois at Chicago, Dept. of Chemical Engineering, Chicago, IL.

2:15 PM #V6.3
STUDY OF THE CRYSTALLIZATION CONDITION OF Bi SUBSTITUTED V'TRIUM IRON GARNET MAGNETO-OPTIC THIN FILMS BY AEROSOL ATMOSPHERIC CVD PROCESS. Jean-Luc Deschamps, Amine Hassan, Laboratoire des matériaux et du génie physique, CINRS-ENSPG, St. Martin D’Heres, FRANCE.

2:30 PM #V6.4
SiO2 FORMATION AT THE ALUMINUM OXIDE-Si(100) INTERFACE. A. Roy Chowdhury, C.G. Takoudis, Univ of Illinois at Chicago, Dept of Chemical Engineering, Chicago, IL; R.P. Kie, N.D. Brooming, Univ of Illinois at Chicago, Dept of Physics, Chicago, IL.

2:45 PM #V6.5
CHARGE CARRIER TRAPPING IN ULTRATHIN ANODIC TiOx LAYERS INVESTIGATED BY PHOTOVOLTAGE TECHNIQUE. V. Duško, New Jersey Institute of Technology, ECE Department, Newark, NJ; J. Roppich, Hahn-Meitner-Institut, Abt. Silizium Photoelektrik, Berlin, GERMANY; Th. Dietrich, Technische Universität München, Physik Department E10, Garching, GERMANY.

3:00 PM #V6.6
A STUDY OF THE EFFECT OF TiN ON THE TRANSPORT PROPERTIES AND STRUCTURE OF AMORPHOUS AND CRYSTALLINE TiO DEPOSITED BY DC MAGNETRON SPUTTERING. Barry Yaglou, Elliott Denderick, Hye-Young Yeo, Eric Chason, and David C. Plane, Brown University, Division of Engineering, Providence RI.

3:15 PM BREAK

3:30 PM #V6.7
ENGINEERING ZnO/GaN INTERFACES FOR OHMIC CONTACTS TO GaN. E. Kazmerska, A. Pietrowska, R. Golszewski, B. Kruska, A. Kuchak, Institute of Electron Technology, Warsaw, Poland; J. Szade, A. Winiarski, Institute of Physics, University of Silesia, Katowice, Poland; A. Barcz, Institute of Physics PAS, Warsaw, Poland; J. Jaminski, Z. Liliental-Weber, Lawrence Berkeley National Laboratory, Berkeley, CA.

3:45 PM #V6.8
ELECTRONIC PROPERTIES OF VALENCE-MISMATCHED PEROVSKITE HETEROINTERFACES. Akira Ohno, David A. Muller, Harold Y. Hwang, Don R. Hamann, Bell Labs, Lucent Technologies, NJ.

4:00 PM #V6.9
HETEROEPITAXIAL GROWTH OF A WIDE GAP P-TYPE OXYSULFIDE, La,Ca,SnO: Holonori Hirama1,2, Kenmichi Ueda1,2, Hisashi Ohita1,2, Masahiro Hirano1,2, and Hiroshi Hosono1,2, Materials and Structures Laboratory, Tokyo Institute of Technology, Japan; 1Hosono Transparent Electro-Active Materials, ERATO, JST, Japan.

4:15 PM #V6.10
PHASE EQUILIBRIA IN THE SYSTEM Ag2Bi2O5-Nb2O5-O: A MODEL SYSTEM FOR INTERFACE REACTIONS IN LTCC MATERIALS. Lawrence P. Cook, Winnie Wong-Ng, Igor Levin, Peter Scheneck, Mark D. Varden, and Julia Sh, National Institute of Standards and Technology, Gaithersburg, MD.

4:30 PM #V6.11