

Program

Nonstoichiometric Compounds

**March 8-13, 2009
Jeju Island, Korea**

Conference Chairs

Professor Han-Il Yoo
Seoul National University, Korea

Professor Shu Yamaguchi
The University of Tokyo, Japan

Professor Juergen Janek
Justus-Liebig-University, Germany

Professor Sossina M. Haile
California Institute of Technology, U.S.A.



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Sunday, March 8, 2009

- 16:00 - 18:00 Registration
- 18:00 - 20:00 Welcome Party/Dinner

Monday, March 9, 2009

- 07:30 - 08:20 Breakfast
- 08:20 - 08:30 **Opening Remarks**
- Session I: Basics/Defects/ Defect driven phenomena**
Session Chairs: S. Yamaguchi & X. Guo
- 08:30 - 09:00 DEFECT INTERACTIONS IN SrTiO₃ IN THE TEMPERATURE RANGE OF 25 TO 250 °C
Xin Guo, Institute of Solid State Research, Germany
- 09:00 - 09:20 THE OXYGEN RELEASE BEHAVIOR OF CAF₂-TYPE (PR_{0.75}ZR_{0.25})O_{2-γ} PHASE WITH WIDE OXYGEN NONSTOICHIOMETRY
Shinya Otsuka-Yao-Matsuo, Osaka University, Japan
- 09:20 - 09:40 MICROSTRUCTURAL EVOLUTION IN PEROVSKITES BY OXYGEN PARTIAL PRESSURE CHANGE AND DONOR DOPING
Suk-Joong L. Kang, KAIST, Korea
- 09:40 - 10:00 DISORDER, LATTICE DYNAMICS AND IONIC CONDUCTION IN SUPERIONIC COPPER CHALCOGENIDES
S.A. Danilkin, ANSTO, Australia
- 10:00 - 10:30 Coffee break
- 10:30 - 11:00 ON THE ORIGIN OF ANOMALOUS V_{TH} SHIFT IN HIGH-K MOSFETS
Akira Toriumi, The University of Tokyo, Japan
- 11:00 - 11:20 DIRECT OBSERVATION OF REVERSIBLE OXIDATION AND REDUCTION AT BURIED OXIDE/METAL INTERFACES
Andreas Klein, Technische Universität Darmstadt, Germany
- 11:20 - 11:40 STRUCTURAL FEATURES OF BATIO₃ NANO-POWDERS AND NANO-GRAINED CERAMICS
N.-H. Cho, Inha University, Korea
- 11:40 - 12:00 DEFECT COMPLEX AND DIELECTRIC PROPERTIES OF ACCEPTOR AND MNO-DOPED BATIO₃
Young Ho Han, Sungkyunkwan University, Korea

12:00 - 14:00	Lunch
	Session II: Ferroelectrics
	Session Chairs: H-I. Yoo & P. McIntyre
14:00 - 14:30	Effect of Acceptor (Mg) Concentration on the Resistance Degradation Behavior in BaTiO ₃ Model Dielectrics: Impedance Spectroscopy and TSDC (Thermally Stimulated Depolarization Current) Analysis Seok-Hyun Yoon, Samsung Electro-Mechanics Co., Korea
14:30 - 14:50	DIFFUSION PROCESSES IN MULTI-LAYER CERAMIC CAPACITORS Markus Kessel, Institute of Physical Chemistry, RWTH Aachen University, Germany
14:50 - 15:10	ROLE OF ELECTRON EMISSION FROM THE RARE-EARTH METAL OXIDES IN DISPLAY DEVICE Ki-Woong Whang, Seoul National University, Korea
15:10 - 15:40	Coffee break
15:40 - 16:10	BULK AND INTERFACIAL OXYGEN DEFECTS IN HAFNIA DIELECTRIC STACKS: A CRITICAL ASSESSMENT Paul C. McIntyre, Stanford University, USA
16:10 - 16:30	ATOMIC-RESOLUTION STRUCTURAL ANALYSIS OF LA _{2/3-x} LI _{3x} TiO ₃ BY HIGH RESOLUTION ELECTRON MICROSCOPY Takao Tsurui, Tohoku University, Japan
16:30 - 16:50	TRANSMISSION ELECTRON MICROSCOPY STUDY OF AN ELECTRON-BEAM-INDUCED ORDER TO DISORDER TRANSFORMATION OF NONSTOICHIOMETRIC NIOBIUM NITRIDE Jonghan Won, Los Alamos National Laboratory, USA
16:50 - 17:40	Short Presentation for Poster Session I (Odd number)
18:00 - 19:30	Dinner
19:30 - 20:30	Poster Session I and Social Hour

Tuesday, March 10, 2009

- 07:30 – 08:30 Breakfast
- Session III: Thermoelectric, Energy conv/storage**
Session Chairs: K. Koumoto & M. Schroeder
- 08:30 - 09:00 NANOSTRUCTURED STRONTIUM TITANATE-BASED OXIDES FOR THERMOELECTRICS
Kunihito Koumoto, Nagoya University, Japan
- 09:00 - 09:20 THERMOELECTRIC PROPERTIES OF NONSTOICHIOMETRIC CHALCOGENIDE COMPOUNDS: THEORETICAL AND EXPERIMENTAL STUDIES
Min Wook Oh, Korea Electrotechnology Research Institute, Korea
- 09:20 - 09:40 COPPER INDIUM DISELENIDE AND DISULFIDE SEMICONDUCTOR NANOCRYSTALS; SYNTHESSES AND THEIR DEFECT RELATED OPTICAL PROPERTIES
Takahisa Omata, Osaka University, Japan
- 09:40- 10:00 AVERAGE AND LOCAL STRUCTURE INVESTIGATION OF ION CONDUCTORS BY MEANS OF TOTAL NEUTRON SCATTERING
Lorenzo Malavasi, University of Pavia, Italy
- 10:00 - 10:20 WORK FUNCTIONS OF TRANSPARENT CONDUCTING OXIDES
Andreas Klein, Technical University of Darmstadt, Germany
- 10:20 - 10:50 Coffee break
- 10:50 - 11:20 KEY PROPERTIES OF INORGANIC MEMBRANES FOR PARTIAL OXIDATION AND ENERGY CONVERSION PROCESSES
Michael Schroeder, RWTH Aachen University, Germany
- 11:20 - 11:40 DISORDER AND DIFFUSION IN VARIOUSLY DOPED MAYENITES
Hans Boysen, LMU, Germany
- 11:40 - 12:00 DEFECT MODEL OF LIQUID APPLIED TO IONIC CONDUCTIVITY OF GLASS
Junichi Kawamura, IMRAM, Tohoku University, Japan
- 12:00 - 12:20 DEFECT STRUCTURE AND TRANSPORT PROPERTIES OF MG-Y-BASED HYDRIDES PREPARED UNDER HIGH PRESSURE
Hitoshi Takamura, Tohoku University, Japan
- 12:20 - 14:00 Lunch

Session IV: Wuensch Symposium

Session Chairs: Sossina Haile & Tom Mason

- 14:00 - 14:30 A CHEMICALLY DRIVEN INSULATOR-METAL TRANSITION IN AMORPHOUS AND NON-STOICHIOMETRIC GALLIUM OXIDE
Manfred Martin, RWTH Aachen University, Germany
- 14:30 - 15:00 DISCOVERY AND PROGRESS OF IRON-BASED SUPERCONDUCTORS
Hideo Hosono, Tokyo Institute of Technology, Japan
- 15:00 - 15:30 LOW-TEMPERATURE PROTONIC CONDUCTION IN NANOCRYSTALLINE FLUORITE-STRUCTURED OXIDES: CONDUCTION MECHANISM
Sangtae Kim, University of California, Davis, USA
- 15:30 - 16:00 Coffee break
- 16:00 - 16:30 THE NANO-GRAIN COMPOSITE MODEL (N-GCM): AN ALTERNATIVE TO THE BRICK LAYER MODEL FOR ANALYZING NANOCERAMICS
Thomas O. Mason, Northwestern University, USA
- 16:30 - 17:10 CRYSTAL CHEMISTRY AND STRUCTURE FOR ANION-DEFICIENT FLUORITE PHASES
Bernhardt J. Wuensch, Massachusetts Institute of Technology, USA
- 17:10 - 18:00 **Short Presentation for Poster Session II (Even numbers)**
- 18:00 - 19:30 Dinner
- 19:30 - 20:30 **Poster Session II** and Social Hour

Wednesday, March 11, 2009

07:30 - 08:30 Breakfast

Session V: Magnetic Materials

Session Chairs: Manfred Martin & Klaus Becker

08:30 - 09:00 THE DEVELOPMENT OF A-SITE ORDERED MANGANITES UTILIZING OXYGEN NONSTOICHIOMETRY
Yutaka Ueda, University of Tokyo, Japan

09:00 - 09:20 NONSTOICHIOMETRY AND PHYSICAL PROPERTIES OF β -PHASE $\text{Ag}_x\text{V}_2\text{O}_5$ ($0.65 < X < 0.90$)
Masahiko Isobe, University of Tokyo, Japan

09:20 - 09:40 STRUCTURE ANALYSIS OF COBALT OXIDE SUPERCONDUCTORS BASED ON COMPOSITE CRYSTAL MODELS
Kazunori Takada, National Institute for Materials Science, Japan

09:40 - 10:00 DEFECT-CHEMICAL PROPERTIES AND ELECTRONIC STRUCTURE OF DOPED BaPrO_3
Shogo Miyoshi, The University of Tokyo, Japan

10:00 - 10:30 Coffee break

10:30 - 11:00 A HIGH-TEMPERATURE MÖSSBAUER STUDY INTO THE STRUCTURE, DISORDER, AND FORMATION KINETICS OF IRON NITRIDES
K.-D. Becker, Technical University of Braunschweig, Germany

11:00 - 11:20 SURFACE MODIFICATION OF $(\text{La,Sr})\text{CoO}_3$ FOR HIGH PERFORMANCE SOFC CATHODE
Koji Amezawa, Tohoku University, Japan

11:20 - 11:40 CHEMICAL ROUTE FROM A SOLID ELECTROLYTE TO AN ELECTRIDE - DEFECT CHEMISTRY OF MAYENITE (C_{12}A_7)
Juergen Janek, Justus-Liebig-University Giessen, Germany

12:00 - 13:00 Lunch

13:00 Optional excursions

Dinner on your own

Thursday, March 12, 2009

07:30 – 08:30 Breakfast

Session VI: Mixed Conductors

Session Chairs: H. Tuller & J. Mizusaki

08:30 - 09:00 INVESTIGATION OF CATHODE BEHAVIOR OF MODEL THIN FILM $\text{SrTi}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$ MIXED IONIC-ELECTRONIC CONDUCTING ELECTRODES AND CORRELATION WITH DEFECT PROPERTIES
Harry Tuller, Massachusetts Institute of Technology, USA

09:00 - 09:20 OXIDATION STATES OF THE TRANSITION METAL CATIONS IN THE HIGHLY NONSTOICHIOMETRIC PEROVSKITE -TYPE OXIDE $\text{Ba}_{0.1}\text{Sr}_{0.9}\text{CO}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$
David N. Mueller, RWTH Aachen, Germany

09:20 - 09:40 OXYGEN NONSTOICHIOMETRY IN MIXED CONDUCTORS FROM ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY IN A THIN FILM GEOMETRY
Sossina M. Haile, California Institute of Technology, USA

09:40 - 10:00 ANALYSIS OF STRUCTURAL PHASE TRANSITION OF $\text{BaCe}_{1-x}\text{Y}_x\text{O}_{3-f}$ BY THERMAL ANALYSES AND X-RAY DIFFRACTION AT HIGH TEMPERATURES
Takuya Hashimoto, Nihon University, Japan

10:00 - 10:30 Coffee break

10:30 - 11:00 B-SITE CATION MIXING EFFECTS ON CHEMICAL STABILITY AND DEFECT EQUILIBRIUM OF LaCrO_3 BASED PEROVSKITE -TYPE OXIDE ELECTRONIC CONDUCTORS
Junichiro Mizusaki, Tohoku University, Japan

11:00 - 11:20 PHASE STABILITY AND PROTON CONDUCTIVITY OF BARIUM CERATES DOPED BY TRIVALENT CATIONS HAVING DIFFERENT IONIC RADII
Byung-Kook Kim, Korea Institute of Science and Technology, Korea

11:20 - 11:40 OXYGEN TRANSPORT KINETICS IN PBCF DOUBLE PEROVSKITE MEMBRANE
Ji Haeng Yu, Korea Institute of Energy Research, Korea

11:40 - 12:00 MONITORING OF CHEMICAL POTENTIAL OF OXYGEN ON THE SURFACE OF GROWING OXIDE SCALES IN HIGH TEMPERATURE OXIDATION OF METALS AND ALLOYS
Toshio MARUYAMA, Tokyo Institute of Technology, Japan

12:00 - 14:00 Lunch

Session VII: Interface/composite/nanosize effects

Session Chairs: S-T. Kim & R. A. De Souza

- 14:00 - 14:30 STRUCTURE –PROPERTY RELATIONSHIPS FOR TILT GRAIN BOUNDARIES IN STRONTIUM TITANATE
Roger A. De Souza, RWTH Aachen University, Germany
- 14:30 - 14:50 ELASTIC STRAIN IN INTERFACES AND ITS INFLUENCE ON THE INTERFACIAL IONIC TRANSPORT – EXPERIMENTAL STUDIES AND FORMAL CONSIDERATIONS
N. Schichtel, Justus-Liebig-University Giessen, Germany
- 14:50 - 15:10 NANOSCALE CONTROL OF ELECTRODE MATERIALS FOR LI-ION BATTERY AND FUEL CELL
Byungwoo Park, Seoul National University, Korea
- 15:10 - 15:30 OXYGEN PERMEATION PROPERTIES OF $\text{GdBaC}_{0.2}\text{O}_{5+d}\text{-Ce}_{0.8}\text{Gd}_{0.2}\text{O}_2$ COMPOSITE MEMBRANE
Sun-Ju Song, Chonnam National University, Korea
- 15:30 – 16:00 Coffee break
- 16:00 – 16:30 STOICHIOMETRY AND PROPERTIES OF COMPLEX OXIDE THIN FILMS
Jun Woo Son, University of California, Santa Barbara, USA
- 16:30 – 16:50 RELATIONSHIP BETWEEN STRUCTURAL AND ELECTRICAL PROPERTIES ON PROTON CONDUCTING BaZrO_3 THIN FILM
Hiroo Yugami, Tohoku University, Japan
- 16:50 - 17:10 A COMPREHENSIVE ELECTRICAL CHARACTERIZATION OF ACCEPTOR DOPED BaTiO_3 IN QUENCHED STATE
Jong-Sook Lee, Chonnam National University, Korea
- 17:10 – 17:50 **Poster Discussion**
- 18:30 – 20:30 Conference Banquet with entertainment

Friday, March 13, 2009

- 07:30 – 08:30 Breakfast
- Session VIII: Solid State Devices**
 Session Chairs: T. Hasegawa & J. Janek
- 08:30 - 09:00 THREE-TERMINAL ATOMIC SWITCH USING Ta₂O₅
 Tsuyoshi Hasegawa, National Institute for Materials Science, Japan
- 09:00 - 09:20 NONSTOICHIOMETRIC OXIDES AND THEIR APPLICATION TO RESISTIVE
 SWITCHING MEMORY DEVICES
 Jinha Hwang, Hongik University, Korea
- 09:20 - 09:40 CONTROL OF LOCAL ION TRANSPORT TO DEVELOP UNIQUE FUNCTIONAL
 NANOIONICS DEVICES
 Kazuya Terabe, National Institute for Materials Science, Japan
- 09:40- 10:00 MIXED CONDUCTING SILVER(I) POLYCHALCOGENIDE HALIDES, COMPOUNDS
 WITH UNEXPECTED SWITCHING PROPERTIES
 Tom Nilges, University of Muenster, Germany
- 10:00 - 10:20 AB INITIO STUDY ON THE ELECTRONIC CONDUCTION PATHS IN SOLID
 ELECTROLYTE ATOMIC SWITCHES
 Satoshi Watanabe, The University of Tokyo, Japan
- 10:20 - 10:50 Coffee break
- 10:50 - 11:20 DEFECT CHEMISTRY AND TRANSPORT PROPERTIES OF NITROGEN-DOPED
 YSZ
 Juergen Janek, Justus-Liebig-University Giessen, Germany
- 11:20 – 11:40 FABRICATION AND CHARACTERIZATION OF THE NANO-STRUCTURED THIN
 FILM ELECTROLYTE
 Jong-Ho Lee, Korea Institute of Science and Technology, Korea
- 11:40 - 12:00 THERMAL ATOMIC OXYGEN EMISSION FROM ZIRCONIA
 Katsuro Hayashi, Tokyo Institute of Technology, Japan
- 12:00 – 12:10 **Closing Remarks**
- 12:10 Lunch and Departures

List of Posters

Poster Session 1 (Monday)

- <01> REDOX REACTION AND ELECTROCHEMICAL CHARACTERISTIC OF PT-(CE,GD)O₂ MIXED SYSTEM
Kenji Yoshimura, Department of Materials Engineering, University of Tokyo, Japan
- <03> IONIC/ELECTRONIC TRANSPORT PROPERTIES AND DEFECT/ELECTRONIC STRUCTURE OF
Ba(Zr_xPr)_{1-x}O₃
Mao Tamaru, Department of Materials Engineering, University of Tokyo, Japan
- <05> CONCENTRATION-DEPENDENT DIFFUSION OF DONORS IN ZINC OXIDE
Tsubasa Nakagawa, National Institute for Materials Science, Japan
- <07> ELECTROCHEMICAL PROPERTIES OF ELECTRODE-SUPPORTED LA_{0.75}SR_{0.25}GA_{0.8}MG_{0.16}FE_{0.04}O_{3-δ}
SOLID OXIDE FUEL CELLS
Ji Haeng Yu, Korea Institute of Energy Research, Korea
- <09> QUANTITATIVE ESTIMATION OF VOLUME FRACTION OF VOID AT METAL/SCALE INTERFACE AND
AT THE INTERFACE OF DUPLEX SCALE FORMED DURING HIGH TEMPERATURE OXIDATION
OF METALS AND ALLOY
Mitsutoshi Ueda, Tokyo Institute of Technology, Japan
- <11> TRANSPORT PROPERTIES OF La_{0.1}Sr_{0.9}Co_{0.8}Fe_{0.2}O_{3-δ} MEMBRANE
Moon-Bong Choi, Alternative Energy Materials Research Laboratory, School of Materials Science and
Engineering, Chonnam National University, Korea
- <13> ELECTRICAL PROPERTY OF BaCe_{0.85-x}Zr_xY_{0.15}O_{3-δ} (0 ≤ x ≤ 0.85) PROTON-CONDUCTORS
Cheol-Jae Park, Alternative Energy Materials Research Laboratory, School of Materials Science and
Engineering, Chonnam National University, Korea
- <15> FIRST PRINCIPLES SIMULATION OF STOICHIOMETRY AND INTERFACE/SURFACE EFFECTS ON
IONIC CONDUCTIVITY OF YTRIA-STABILIZED ZIRCONIA
Shusuke Kasamatsu, Department of Materials Engineering, University of Tokyo, Japan
- <17> PREPARATION AND CHARACTERIZATION OF COMPLEX OXIDES FOR WATER PHOTOLYSIS
Eui-Chol Shin, Chonnam National University, Korea
- <19> SYNTHESIS AND STRUCTURE OF NONSTOICHIOMETRIC COMPOUND V₄O₉ AS A MISSING LINK
OF WADSWORTH PHASES
Satoshi Yamazaki, Institute for Solid State Physics, University of Tokyo, Japan

Poster Session 2 (Tuesday)

- <02> EFFECT OF OXYGEN NON-STOICHIOMETRY ON THE MAGNETIC PROPERTIES OF TiO₂ THIN FILMS
Lorenzo Malavasi, University of Pavia, Italy
- <04> THE MAGNETORESISTANCE OF METAL-RICH Ag_{2+x}Se - A PROTOTYPE NANOSCALE METAL/SEMICONDUCTOR DISPERSION
Juergen Janek, Justus-Liebig-University Giessen, Institute of Physical Chemistry, Germany
- <06> MOCVD GROWTH OF DOPED CERIA THIN FILMS
Tae-Sik Oh, California Institute of Technology, USA
- <08> SYNTHESIS AND PHYSICAL CHARACTERIZATION OF NANO-GRAINED BaTiO₃ CERAMICS
S.-M. Moon, Inha University, Korea
- <10> STRUCTURE OF Ti₄O₇ PREPARED BY MECHANOCHEMICAL SYNTHESIS
Kosuke O. Hara, Graduate School of Energy Science, Kyoto University, Japan
- <12> EFFECT OF SM AND W CO-DOPING ON PROPERTIES OF FAST OXYGEN ION
Moon-Bong Choi, Alternative Energy Materials Research Laboratory, School of Materials Science and Engineering, Chonnam National University, Korea
- <14> FIRST PRINCIPLES STUDY ON THE ELECTRONIC STRUCTURE AND REACTIVITY OF Ni/H/ZrO₂ TRIPLE PHASE BOUNDARY IN SOLID OXIDE FUEL CELL
Tomofumi Tada, Department of Materials Engineering, University of Tokyo, Japan
- <16> ROLES OF OXYGEN VACANCY AND INTERSTITIAL CU IN ATOMIC SWITCH OF Ta₂O₅: AN AB INITIO STUDY
Tingkun Gu, Department of Materials Engineering, University of Tokyo, Japan
- <18> ACCEPTOR CENTERS IN Ga₂O₃
Detlev M. Hofmann, Physics Institute, University of Giessen, Germany