

Table of Contents

Preface

I. Dielectric, Piezoelectric and Ferroelectric Ceramics

Ferroelectric Domain Structures and Piezoelectric Properties of Pb(Zr,Ti)O₃ Ceramics N. Iwaji, C. Sakaki, N. Wada, H. Takagi and S. Mori	3
Ferroelectric Polarization Properties in High-Performance Bismuth Sodium Titanate Single Crystals M. Suzuki, Y. Kitanaka, Y. Noguchi, J. Akedo and M. Miyayama	7
Ferroelectricity of SrTiO₃ Thin Films Prepared by Dynamic-Aurora Pulsed Laser Deposition K. Yamashita, Y. Sakamaki, N. Sakamoto, K. Shinozaki, H. Suzuki and N. Wakiya	11
The Effect of Oxygen Vacancies on the Dielectric Responses of BaTiO₃ Based Ceramics in the Ultra-Wide Frequency Range Y.K. Choi, T. Hoshina, H. Takeda, J.M. Oh and T. Tsurumi	15
First-Principles Calculations of Structural Changes Induced by Oxygen Vacancies in Tetragonal Phase BaTiO₃ Y. Iwazaki, T. Sakashita, T. Suzuki, Y. Mizuno and S. Tsuneyuki	19
Alkaline-Earth and Rare-Earth Elements and Oxygen Vacancy in BaTiO₃: Analyses by First-Principles Calculations and EXAFS A. Honda, S. Higai, T. Okamoto, N. Inoue, Y. Motoyoshi, N. Wada and H. Takagi	23
Molten Salt Synthesis of the Barium Strontium Titanate Ba_{1-x}Sr_xTiO₃ with KOH-KNO₃ T. Kuze, M. Higuchi and K. Katayama	27
Relaxor Characteristics of BaTiO₃-Bi(Mg_{1/2}Ti_{1/2})O₃ Ceramics I. Fujii, K. Yamato, M. Shimada, J. Hayashi, H. Yabuta, M. Kubota, T. Fukui, K. Nakashima, N. Kumada and S. Wada	31
Preparation and Dielectric Properties of Dense Barium Titanate Nanoparticle Accumulations by Electrophoresis Deposition Method S. Wada, S. Kondo, T. Kita, R. Nakata, I. Fujii, K. Nakashima, N. Miyajima, T. Suzuki, T. Uchikoshi, Y. Sakka, T. Takei and N. Kumada	35
Preparation of Potassium Niobate-Barium Titanate Ceramics Using Well-Dispersed Nanoparticles and their Dielectric Properties K. Yamashita, S. Shimizu, I. Fujii, K. Nakashima, N. Kumada, T. Tsukada and S. Wada	39
Kinetics of Oxygen Diffusion into Multilayer Ceramic Capacitors during the Re-Oxidation Process and its Implications on Dielectric Properties K. Kaneda, Y. Mizuno, N.J. Donnelly, S. Lee, W.G. Qu and C.A. Randall	43
The Kelvin Probe Force Microscopy Measurement of Degraded Multilayer Ceramic Capacitors with Ni Inner Electrode T. Okamoto, N. Inoue, S. Kitagawa, H. Niimi, A. Ando and H. Takagi	47

II. Lead Free Piezoelectric Ceramics

High-Temperature Depolarization of Alkali Niobate Lead-Free Piezoceramics H. Matsudo, K. Kakimoto and I. Kagomiya	53
Piezoelectric Properties of (Li, Na, K)NbO₃ Ceramics with Monoclinic System K. Hatano, K. Kobayashi, T. Hagiwara, H. Shimizu, Y. Doshida and Y. Mizuno	57
Piezoelectric Properties of Porous Potassium Niobate System Ceramics S. Wada, Y. Mase, S. Shimizu, K. Maeda, I. Fujii, K. Nakashima, P. Pulpan and N. Miyajima	61
Piezoelectric Properties and Enhancement of Moisture-Resistance of K_{0.5}Na_{0.5}NbO₃ by Adding ZnO-Based Glass Y. Oba, R. Kobayashi and Y. Matsuo	65
Electrical Properties and Polarization Reversal in (Li,Na)NbO₃ Lead-Free Piezoelectric Ceramics T. Ohashi, R. Aoyagi, M. Maeda and M. Iwata	69

Ferroelectric and Piezoelectric Properties of $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ Single Crystals Grown by Top-Seeded Solution Growth Method at High Oxygen Pressure	
Y. Kitanaka, Y. Noguchi and M. Miyayama	73
Microstructure Control of Barium Titanate Grain-Oriented Ceramics and their Piezoelectric Properties	
R. Mori, I. Fujii, H. Hayashi, Y. Nagamori, Y. Yamamoto and S. Wada	77
Single Phase Formation and Electric Properties of Bismuth Niobium Based Perovskite-Type Oxides	
A. Shimamura, I. Fujii, N. Kumada, K. Nakashima, M. Azuma, Y. Kuroiwa, S. Kawada, M. Kimura and S. Wada	81
Piezoelectric Properties of Perovskite-Type Lead-Free Piezoelectric Ceramics under Large Amplitude Continuous Driving	
S. Sato, Y. Noumura, Y. Hiruma, H. Nagata and T. Takenaka	85
Microstructure Control of Barium Titanate – Potassium Niobate Solid Solution System Ceramics by MPB Engineering and their Piezoelectric Properties	
S. Shimizu, N. Kumada, K. Nakashima, I. Fujii, D. Tanaka, M. Furukawa, Y. Kuroiwa, T.S. Suzuki, T. Uchikoshi, Y. Sakka and S. Wada	89
High-Power Piezoelectric Characteristics of $\text{Sr}_2\text{Bi}_4\text{Ti}_5\text{O}_{18}$-$\text{Ca}_2\text{Bi}_4\text{Ti}_5\text{O}_{18}$-Based Ferroelectric Ceramics	
Y. Noumura, S. Sato, Y. Hiruma, H. Nagata and T. Takenaka	93

III. Li-Ion Battery Related Materials

Single Crystal Synthesis of Cubic Garnet Related-Type $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$ by a Self-Flux Method	
J. Awaka, A. Takashima, H. Hayakawa, N. Kijima, Y. Idemoto and J. Akimoto	99
Lithium Intercalation Properties of Lithium Tetratitanate Obtained by Nanosheets Process	
S. Suzuki and M. Miyayama	103
The Effect of Carbon Doping on Electrochemical Properties of LiFePO_4/C Powders Prepared by Spray Pyrolysis	
T. Kodera, D.Y. Bi, D. Ogawa and T. Ogihara	107
Synthesis and Electrochemical Properties of Al Doped Lithium Manganate Powders by Spray Pyrolysis Using Carbonate Aqueous Solution	
S. Hirose, T. Kodera and T. Ogihara	111
Synthesis and Electrochemical Properties of C/LiMnPO_4 Cathode Materials by Complex Polymerized Method	
A. Fujita, F. Isobe, T. Kodera and T. Ogihara	115
Synthesis and Electrochemical Properties of Lithium Titanate Anode Materials Powders by Solid State Reaction of Li and Spherical TiO_2 Powders	
M. Yamada, H. Kawaguchi, T. Kodera and T. Ogihara	119
Synthesis and Electrochemical Properties of Hollandite-Type K_xTiO_2	
M. Sakao, N. Kijima, K. Kataoka, J. Akimoto and T. Okutani	123
Microwave Synthesis of Nano-Sized SnO_2 for Lithium-Ion Batteries	
M. Yoshinaga, N. Kijima, S. Wakahara and J. Akimoto	127

IV. Other Batteries and Energy Related Materials

Characterization of Low Temperature Chemical Vapor Deposited Gd_2O_3 Doped CeO_2 Films	
R. Saotome, N. Wakiya, T. Kiguchi, J.S. Cross, O. Sakurai and K. Shinozaki	133
Characterization of Samarium Doped Ceria Powders Having High Specific Surface Area Synthesized by Carbon-Assisted Spray Pyrolysis	
K. Myoujin, H. Ichiboshi, T. Kodera and T. Ogihara	137
Effect of Annealing Atmosphere on Oxygen Diffusion through Ba-Fe-Based Perovskite Oxide	
K. Watanabe, T. Kida, I. Sakaguchi, N. Ohashi, K. Shimanoe and H. Haneda	141
Performance of Intermediate Temperature Fuel Cells with Proton Conducting Electrolytes Synthesized with Diammonium Hydrogen Phosphate (I)	
M. Yonekawa, S. Kano, H. Shiroishi, H. Tateishi, Y. Ayato, M. Saito and J. Kuwano	145

Fabrication of Dye-Sensitized Solar Cells with Hydrothermally-Synthesized TiO₂ Nanopowder Films	
T. Nakamura, K. Hayashi and T. Ogihara	149
Preparation and Characterization of Dye-Sensitized Solar Cells Containing TiO₂ Nanotube Clusters/Nanoparticle Hybrid Films	
K. Hayashi, T. Nakamura and T. Ogihara	153
Development of a Dye-Sensitized Solar Cell with a Carbon Counter Electrode Formed by Screen-Printing	
T. Kakuda, T. Terasawa and T. Futakuchi	157
Quasi-Solid-State Dye-Sensitized Solar Cells Using ZnO Photoelectrodes Fabricated by a Liquid Process	
M. Hosokawa and S. Fujihara	161
Evaluation of TiO₂ Nanoparticle Thin Films Prepared by Electrophoresis Deposition	
R. Kawakami, K. Ito, Y. Sato, Y. Mori, M. Adachi and S. Yoshikado	165
Preparation and Thermoelectric Properties of TE Module by a Spark Plasma Sintering Method	
K. Arai, H. Akimoto, T. Kineri, T. Iida and K. Nishio	169
Development of Electric Power Measurement for Energy Harvesting Using Unimorph-Type Piezoceramics	
Y. Shimura, P. Pulpan, I. Fujii, K. Nakashima and S. Wada	173

V. Thin Film Process and Properties

TEM Observation on Ferroelectric Domain Structures of PbTiO₃ Epitaxial Films	
K. Aoyagi, T. Kiguchi, Y. Ehara, H. Funakubo and T.J. Konno	179
Dielectric Properties of Nanograined BaTiO₃ Ceramics Fabricated by Aerosol Deposition Method	
T. Furuta, S. Hatta, Y. Kigoshi, T. Hoshina, H. Takeda and T. Tsurumi	183
Fabrication of BaTiO₃ Films on Si Substrate by Inkjet Printing	
A. Komatsu, T. Hoshina, S. Kunej, H. Takeda and T. Tsurumi	187
Dielectric Properties of Bismuth Layer-Structured Oxide Thin Films with Preferential Crystal Orientation at High-Temperature	
Y. Mizutani, J. Kimura, I. Takuwa, T. Yamada, H. Funakubo and H. Uchida	191
Growth of (111)-Oriented Epitaxial Bi(Mg_{0.5}Ti_{0.5})O₃ Films and their Characterization	
H. Tanaka, T. Yamada, S. Yasui, K. Yamato, S. WADA and H. Funakubo	195
Growth of Orientation-Controlled Epitaxial KNbO₃ Thin Film by Hydrothermal Method	
H. Einishi, M. Ishikawa, M. Nakajima, S. Yasui, T. Yamada, M. Kurosawa and H. Funakubo	199
Influence of Schottky Interfaces on Dielectric Properties in Perovskite-Type Oxide Thin-Film Capacitors	
N. Horiuchi, T. Hoshina, H. Takeda and T. Tsurumi	203
Low-Loss Transmission Characteristics of Transparent Conductive Thin Films in GHz Range	
T. Ogino, N. Ohashi, S. Hishita, I. Sakaguchi, Y. Adachi, K. Nakajima and H. Haneda	207
Fabrication and Evaluation of Al₂O₃ Films Using the Aerosol Deposition Method	
Y. Uemichi, K. Nishikawa, Y. Sato and S. Yoshikado	211
Planarization of Zinc Oxide Surface and Evaluation of Processing Damage	
H. Miyazaki, Y. Adachi, I. Sakaguchi, T. Ishigaki and N. Ohashi	215

VI. Magnetic and Semiconductor Ceramics

Magnetic Properties of Epitaxial NiFe₂O₄ Thin Films Prepared Using Dynamic Aurora PLD in a Magnetic Field	
T. Kubo, N. Sakamoto, K. Shinozaki, H. Suzuki and N. Wakiya	221
Influence of Al₂O₃ Addition on the Temperature Dependence of Initial Permeability of NiCuZn Ferrites	
S. Takane, H. Umeda, T. Aoki and T. Murase	225

Composite Electromagnetic Wave Absorber Made of Ni-Zn Ferrite Particles Dispersed and Isolated in an SiO₂ Medium K. Sakai, Y. Guan, Y. Sato and S. Yoshikado	229
Relationship between the Crystallinity and Magnetic Properties of Cr₂O₃/LiNbO₃/Cr₂O₃ Multi-Layer Materials T. Yokota, Y. Tsuboi, S. Kito, R. Imura and M. Gomi	233
Electrical Properties of La(Cr,Mn)O₃ NTC Materials T. Fujita, K. Fujiwara and T. Yamaguchi	237
Characterization of Grain Boundaries of Lead-Free Semiconducting Ceramics Using BaTiO₃-(Bi_{1/2}K_{1/2})TiO₃ System H. Takeda, H. Joong Sang, T. Tateishi, S. Kunej, C. Leach, R. Freer, T. Hoshina and T. Tsurumi	241
Fabrication of Lead-Free Semiconducting Ceramics Using BaTiO₃-(Bi_{1/2}Na_{1/2})TiO₃ System by Sintering in Air Atmosphere T. Tateishi, H. Joong Sang, H. Takeda, T. Hoshina, S. Kunej and T. Tsurumi	245
Multilayer Varistor with Low-Voltage Characteristics from ZnO + ACoO₃ Ceramics (A = Ca, Sr and Ba) E. Koga, N. Sawada and M. Amisawa	249
Effect of Sb Addition on ZnO Grain Growth and Electrical Characteristics of Bi-Co-Mn-Ba-Added ZnO Varistors A. Fukumori, T. Watanabe, Y. Sato and S. Yoshikado	253
Effect of Simultaneous Addition of Zr and Y on Electrical Characteristics of ZnO Varistors T. Watanabe, A. Fukumori, Y. Akiyama, Y. Sato and S. Yoshikado	257
Cathodoluminescence of ZnO Crystals Prepared via Electric Current Heating Method Using Zn Wire T. Hagizawa, Y. Kuroki, T. Okamoto and M. Takata	261
Resistivity of Thin Films of MoSi₂-Si Composites S. Hikita, T. Hayashi, Y. Sato and S. Yoshikado	265

VII. Sensors and Ceramic Science

Investigation of Electrical Hydrogen Detection Properties of Pt/WO₃ Thin Films Prepared by Sol-Gel Method Y. Yamaguchi, T. Kineri, M. Fujimoto, H. Mae, A. Yasumori and K. Nishio	271
Low Temperature Preparation and Optical Hydrogen Response of Pd/Titania Composite Film J. Hamagami, R. Araki, S. Onimaru, H. Oda, G. Kawamura and A. Matsuda	275
Synthesis of AnataseTiO₂ Having High Specific Surface Area from a Gel Precursor K. Fukushi, S. Nakajima, K. Uematsu, T. Ishigaki, K. Toda and M. Sato	279
Solvothermal Synthesis of WO₃ Photocatalysts and their Enhanced Activity Y. Kondo and S. Fujihara	283
Molecular Dynamics Study on Dielectric Properties of Silicon Oxynitride: Composition and Microstructure Dependence M. Tomita and K. Tsuruta	287
The Effect of Citric Ion on the Spin-Sprayed ZnO Films: IR and XPS Study for the Organic Impurities H. Wagata, N. Ohashi, K.I. Katsumata, K. Okada and N. Matsushita	291
Evaluation of Compact X-Ray Source Using Multiple LiTaO₃ Single Crystals H. Honda, S. Fukao, K. Ito, Y. Guan, Y. Nakanishi, Y. Sato, Y. Ito and S. Yoshikado	295

VIII. Processing of Ceramics

Crystallization and Morphology of Glassy Sanbornite Y. Takahashi, R. Ihara, T. Fujiwara and M. Osada	301
Preparation of Barium Titanate/Strontium Titanate Multilayered Nanoparticles T. Goto, K. Nakashima, I. Fujii, Y. Kuroiwa, Y. Makita and S. Wada	305
Preparation of Strontium Titanate Nanocubes Using Titanium Alkoxide and their Accumulations by Capillary Force S. Iwatsuki, M. Kera, K. Nakashima, I. Fujii, T. Takei, N. Kumada and S. Wada	309

Preparation and Characterization of Grain-Oriented Barium Titanate Ceramics Using Electrophoresis Deposition Method under a High Magnetic Field	
T. Kita, S. Kondo, T. Takei, N. Kumada, K. Nakashima, I. Fujii, S. Wada, T. Suzuki, T. Uchikoshi, Y. Sakka, Y. Miwa, S. Kawada and M. Kimura	313
Chemical Compositions and Crystallization Behavior of BaO-TiO₂-GeO₂ Glass	
Y. Yamazaki, Y. Takahashi, R. Ihara and T. Fujiwara	317
Fabrication of Artificial Superlattices Using Perovskite Nanosheets	
M. Osada, B.W. Li and T. Sasaki	321
Development of Gas-Solid Phase Hybrid Synthesis Method of Single Crystal Ba₂SiO₄:Eu²⁺	
T. Sakamoto, K. Uematsu, T. Ishigaki, K. Toda and M. Sato	325