

Table of Contents

Committees and Acknowledgement

Chapter 1: Ferroelectrics, Piezoelectrics and Pyroelectrics

Ferroelectric Properties of $\text{Bi}_{0.5}(\text{Na}_{0.8}\text{K}_{0.2})_{0.5}\text{TiO}_3$ Ceramics	3
J. Camargo, L. Ramajo, F. Rubio-Marcos and M. Castro	
Physical Properties of Self-Polarized PZT Thin Films at Compositions around the Morphotropic Phase Boundary	9
E.B. Araujo, E.C. Lima, I.K. Bdikin and A.L. Kholkin	
Structure, Dielectric Relaxor Behavior and Ferroelectric Properties of $\text{Sr}_{1-x}\text{La}_x\text{Bi}_2\text{Nb}_{2-x/5}\text{O}_9$ Ferroelectric Ceramics	16
P.Y. Fang, Z.Z. Xi, W. Long and X.J. Li	
PZT Dielectric Ceramic Characterization for Application in Nonlinear Transmission Lines	23
L.P. Silva Neto and J.O. Rossi	
Titanium K-Edge XAS Study on Local Structure of $\text{Pb}_{1-x}\text{Ca}_x\text{TiO}_3$ Ferroelectric Ceramics	29
A. Mesquita, F.R. Estrada, V.R. Mastelaro, J.A. Eiras and D. Garcia	
Effects of La Doping on the Structural and Dielectric Properties of Barium Titanate Ceramics	36
M.S. Silva and N.S. Ferreira	
Cr-Doping-Induced Ferromagnetism in $\text{CeO}_{2-\delta}$ Nanopowders	42
N.S. Ferreira and M.A. Macedo	
Electrodeposition of Zinc Oxide NanoSheets on Exfoliated Tips of Carbon Nanotube Films	50
E.F. Antunes, E. Saito, M. Pianassola, F.H. Christovam, V.J. Trava-Airoldi and E.J. Corat	
Ultrasonic Synthesis of SrTiO_3	56
O. Andrade Raponi, A.S. Chaves, M.V. Gelfuso and D. Thomazini	
Characterization of Multilayer Ferroelectric Ceramic Capacitors in a Wide Frequency Range for RF Applications	61
L.P. Silva Neto, J.O. Rossi and J.J. Barroso	

Chapter 2: Thermoelectrics

Structural and Thermal Properties of $\text{YMn}_{1-x}\text{Ru}_x\text{O}_3$	69
R.K. Thakur, R. Thakur, N. Kaurav, G.S. Okram and N.K. Gaur	

Chapter 3: Ionic and Electronic Conductors and Applications to Solid Oxide Fuel Cells and Membrane Technology

Influence of the Zn Dopant in Structural and Electrical Properties of the $\text{La}_2\text{Ni}_{1-x}\text{Zn}_x\text{O}_4$	75
C.A. Silva, J.B. Silva, M.C. Silva-Santana, P.B. Silva and N.O. Moreno	
Ionic Conductivity of Chemically Synthesized $\text{La}_{0.9}\text{Sr}_{0.1}\text{Ga}_{0.8}\text{Mg}_{0.2}\text{O}_{3-\delta}$ Solid Electrolyte	81
S.L. Reis and E.N.S. Muccillo	
Effect of Manganese Dioxide Addition on the Cubic Phase Stability, Densification and Electrical Conductivity of Scandia-Stabilized Zirconia	86
E.Z. Santos and R. Muccillo	

Chapter 4: Magnetic and Superconducting Ceramics

Effects of Oxygen Doping on the Transport Properties of $\text{Hg}_{0.82}\text{Re}_{0.18}\text{Ba}_2\text{Ca}_2\text{Cu}_3\text{O}_{8+d}$ Superconducting Polycrystals	95
C.A.C. Passos, J.R. Rocha and M. de Sousa Bolzan	
Magnetic Properties of YBCO/LCMO Superlattices with and without STO Interlayers	101
A.H. Yonamine, S.A. Fedoseev, D.I. dos Santos and A.V. Pan	

Characterization of Superconducting BSCCO/CaSiO₃ and BSCCO/CaZrO₃ Ag PIT Wires	106
N.A. Nogueira, A.H. Yonamine, D.I. dos Santos, J.H. Kim and S.X. Dou	
Magnetocrystalline Properties of Sr_{1.4}Ba_{1.6}Co₂Fe₂₄O₄₁	111
Y.P. dos Santos, B. da Costa Andrade and M.A. Macedo	
Effects of Ca²⁺-Doping on the Crystal Lattice of α-Fe₂O₃	116
B. da Costa Andrade, J.C. da Conceição Passos and M.A. Macedo	
Ferromagnetic Cluster on La₂FeMnO₆	122
P. Barrozo, N.O. Moreno and J.A. Aguiar	
Characterization of Bi2212 Superconductor Bulk Samples by Digital Image Processing	128
A.R. Bigansolli, T.G. da Cruz, F.R. de Souza Machado and D. Rodrigues Jr.	

Chapter 5: Materials for Fuel Cells

Preparation of (BaSr)_{0.5}Sm_{0.5}C_{0.8}Fe_{0.2}O_{3-δ} and (BaSr)_{0.5}Nd_{0.5}C_{0.8}Fe_{0.2}O_{3-δ} Cathodes for IT-SOFCs	137
F.M. Aquino, F.M.B. Marques, D.M.A. Melo, D.A. de Macedo, A.A. Yaremchenko and F.M. Figueiredo	
Low Temperature Synthesis of Lanthanum Silicate Apatite Type by Modified Sol Gel Process	143
A.M. Misso, D.R. Elias, F. dos Santos and C. Yamagata	
Particle-Filled Polysilazane Coatings for Steel Protection	149
L. Neckel Jr., A.G. Weiss, G. Motz, D. Hotza and M.C. Fredel	
Effects of Microwave Processing on the Properties of Nickel Oxide/Zirconia/Ceria Composites	154
L.B. Pinheiro, A.E. Martinelli and F.C. Fonseca	

Chapter 6: Electroceramic Devices. Sensors and Actuators

Effect of Cd Doping on Mechanical Properties of SrCoO₃	163
N.K. Gaur, R. Thakur, R.K. Thakur and A.K. Nigam	
Electrical Properties of a TiO₂-SrO Varistor System	168
T. Delbrücke, I. Schmidt, S. Cava and V.C. Sousa	
Development and Test of a Small Resistive Fault Current Limiting Device Based on a SmBaCuO Ceramic	173
C.A.C. Passos, M.T.D. Orlando, J.N.O. Pinto, V.T. Abilio, J.B. Depianti, A. Cavichini and L.C. Machado	
Electrodeposition of Zinc Oxide on Graphene Tips Electrochemically Exfoliated and O₂-Plasma Treated	179
E. Saito, E.F. Antunes, M. Pianassola, F.H. Christovan, J.P.B. Machado, E.J. Corat and V.J. Trava-Airoldi	
Dielectric Properties of CaCu₃Ti₄O₁₂ Synthesized by Different Routes	184
T.C. Porfirio and E.N.S. Muccillo	
Gas Sensor Properties of ZnO Nanorods Grown by Chemical Bath Deposition	189
G. Gasparotto, T. Mazon, G. Gasparotto, M.A. Zaghete, L.A. Perazolli and J.A. Varela	
A Capacitive-Type Humidity Sensor Using Porous Ceramics for Environmental Monitoring	194
R.d.M. Oliveira, M.d.C.d.A. Nono and G. de Souza Oliveira	

Chapter 7: Solar Photovoltaic and Photoelectrochemical Cells

Investigation of Photoinduced Electrical Properties in the Heterojunction TiO₂/SnO₂	201
D.H. de Oliveira Machado, E.A. Floriano, L.V. de Andrade Scalvi and M.J. Saeki	
Nanostructured TiO₂-Based Composites for Light Absorption	207
D.I. dos Santos, O. Modesto Jr., L.V.A. Scalvi and A.S. Tabata	
Photocatalytic Decomposition of Rhodamine-B Using Scandium and Silver-Modified TiO₂ Powders	213
D.W. da Silva, D.C. Manfroi, G.F. Teixeira, L.A. Perazolli, M.A. Zaghete and A.A. Cavalheiro	

Flexible Linear Array with Curvature Sensor T.F. Oliveira, M.Y. Matuda, C.N. Pai, F. Buiochi and J.C. Adamowski	219
Development of Novel Photoelectrode Materials with Improved Charge Separation Properties L.R. Sheppard, M.B. Lamo, T. Dittrich and R. Wuhrer	224

Chapter 8: Photonic and Electro-Optical Ceramics

Synthesis and Characterization of Nanostructured TiO₂-SnO₂ Composite J.C. S. Breve and D.I. dos Santos	233
Structural, Optical, and Electrical Properties of ZnO/Nb/ZnO Multilayer Thin Films A.H.N. Melo, P.B. Silva and M.A. Macedo	238
Synthesis and Optical Property of MgMoO₄ Crystals C.S. Xavier, A.P. de Moura, E. Longo, J.A. Varela and M.A. Zaghete	243
Al₂O₃ Obtained through Resistive Evaporation for Use as Insulating Layer in Transparent Field Effect Transistor M.H. Boratto, L.V. de Andrade Scalvi and D.H. de Oliveira Machado	248

Chapter 9: Magneto-Electric Coupling and Multiferroics

Multiferroic Properties and Piezoelectric Characterizations of Bismuth Ferrite Based Compounds Produced by Spark Plasma Sintering R.A.M. Gotardo, D. Montanher, O.A. Protzek, L.F. Cótica, I.A. Santos, D.S.F. Viana, W.J. Nascimento, D. Garcia and J.A. Eiras	257
Structural and Magnetoelectric Properties of a New W-Type Hexaferrite (Sr_{0.85}Ce_{0.15}Co₂Fe₁₆O_{27-δ}) B. da Costa Andrade and M.A. Macedo	263
Effect of Substituting Sr²⁺ for Gd³⁺ on Structural and Magnetoelectric Properties of W-Type Hexaferrite B. da Costa Andrade and M.A. Macedo	268
Controlled Atmosphere Thermal Treatment for Pyrochlore Phase Elimination of PMN-PT/CFO Prepared by Spark Plasma Sintering D.S.F. Viana, J.A. Eiras, W.J. Nascimento, F.L. Zabotto and D. Garcia	274

Chapter 10: Modeling and Simulation

Elastic and Thermal Properties of SrCo_{1-x}Sc_xO_{3-δ} R. Thakur, R.K. Thakur and N.K. Gaur	283
Sensitivity Analysis and Identification of Damping Parameters in the Finite Element Modeling of Piezoelectric Ceramic Disks N.P. Alvarez, R.C. Carbonari, M.A.B. Andrade, F. Buiochi and J.C. Adamowski	288