

Table of Contents

Committees

Preface

CHAPTER 1 - FERROELECTRICS, PIEZOELECTRICS, ELECTROSTRRICTIVE AND MAGNETOSTRICTIVE MATERIALS

Piezoelectric Composites Based on Hydroxyapatite / Barium Titanate C.R. Bowen, K.V.S. Raman and V.Y. Topolov	1
High-Performance Lead-Free Barium Titanate Piezoelectric Ceramics T. Karaki, M. Adachi and K. Yan	7
Constitutive Modeling for Design and Control of Magnetostrictive Galfenol Devices M.J. Dapino and P.G. Evans	13
Novel Magnetostrictive Microcantilever and Magnetostrictive Nanobars for High Performance Biological Detection Z.Y. Cheng, S.Q. Li, K.W. Zhang, L.L. Fu and B.A. Chin	19
Multilayered Magnetic Wires and Films for Electromagnetic Sensor Technology L.V. Panina, D.P. Makhnovskiy, A. Zhukov and J. Gonzalez	29
Piezoelectric Properties of Sputtered AlN Thin Films and their Applications U. Schmid and J.L. Sánchez-Rojas	41
Production of 3Y-PSZ Powders by Co-Precipitation and Milling E. Furlani, E. Aneggi and S. Maschio	50
Study of Langasite Crystal Micro-Resonators Using Length-Extension Mode: Temperature-Compensated Cuts and Applications to Atomic Force Microscopy G. Douchet, F. Sthal, T. Leblois, E. Bigler, C. Tellier and R. Bourquin	56
Magnetic Temperature Transducers Made from Copper Based Soft Ferrite C. Miclea, C. Tanasoiu, C.F. Miclea, I. Spanulescu, M. Cioangher and C.T. Miclea	62

CHAPTER 2 - STIMULI RESPONSIVE POLYMERS AND GELS

Ionic Polymeric Conductor Nano Composites (IPCNCs) as Distributed Nanosensors and Nanoactuators M. Shahinpoor	70
Design and Optimization of IPMC for Biomedical Applications C.H. Jo, H.E. Naguib and R.H. Kwon	82
Static and Dynamic Electro-Response of a Triblock Polymer Gel T. Leitão, S.J. Picken and E. Mendes	90
Shape-Memory Polymers for Biomedical Applications A. Lendlein and M. Behl	96
Rapid Shrinking of Porous Hydrogel Prepared by Ice Templating E. Umebayashi, W. Murai, K. Suguro, T. Morohoshi, T. Ikeda and N. Kato	103
Preparation of Microporous, Thermosensitive Organic-Inorganic Hybrid Hydrogel with Simultaneous Control of Phase Separation and Sol-Gel Process I. Sakuhara, E. Umebayashi, K. Suguro, W. Murai, T. Morohoshi, T. Ikeda and N. Kato	109
Dielectrophoresis Force and the Electromechanical Responses of Elastomers R. Kunanuruksapong and A. Sirivat	114
Thiophene Containing Polyaromatic Hydrocarbons C.J. Martin, S.D. Perera and S.M. Draper	120
Composite Polymeric Foams Produced by Using Magnetic Field L. Sorrentino, M. Aurilia, G. Forte and S. Iannace	123

CHAPTER 3 - SHAPE MEMORY POLYMERS & MAGNETORHEOLOGICAL FLUIDS

Ferrofluids and Magnetorheological Fluids L. Vékás	127
--	-----

CHAPTER 4 - SMART MULTIFUNCTIONAL MATERIALS AND COMPOSITES**Synthesis and Characterization of Thermal Actuators Based on Composite Coatings with Phase Change Materials**

A. Malfliet, L. Stappers and J. Fransaer 143

Self Healing of Mechanical Damage in Metallic Materials

N. Shinya 152

A New Designing Concept for Multifunctional Structural Material Systems Based on Composites

H. Asanuma 158

Multistable Textured Shell Structures

A.D. Norman, M.R. Golabchi, K.A. Seffen and S.D. Guest 168

Friction Coefficients and Wear Rates of MoS₂/Cu, BN/Cu Composites

T. Hashimoto, H. Kohri, A. Yumoto and I. Shiota 174

Development of Stress and Temperature Sensitive Microwires for the Sensor Applications and Tuneable Composite Materials

A. Zhukov, V. Zhukova, J. Gonzalez, L.V. Panina and J.M. Blanco 180

Development of Multi-Ferroic Actuator/Sensor Material and Device for Intelligent/Smart Technology - Basic Design and Experimental Verification

Y. Furuya and T. Okazaki 187

Fabrication of Electrode for Thermoelectric Oxide Materials

H. Kohri, I. Shiota, M. Kato and I.J. Ohsugi 195

Tunable and Self-Sensing Microwave Composite Materials Incorporating Ferromagnetic Microwires

D. Makhnovskiy, A. Zhukov, V. Zhukova and J. Gonzalez 201

Thermoelectric Properties of High Density Sintered Ca₃Co₂O₆

T. Uesugi, H. Kohri, I. Shiota, M. Kato and I.J. Ohsugi 211

Room Temperature Magnetic-Semiconductors in Modified Iron Titanates: Their Properties and Potential Microelectronic Devices

R.K. Pandey, H. Stern, W.J. Geerts, P. Padmini, P. Kale, J. Dou and R. Schad 216

Formation of Highly Transparent SiCN Films Prepared by HWCVD

A. Izumi and T. Nakayamada 223

Smart Properties of an Irradiated High-T_c Superconductor

A. Balogh, I. Kirschner, G. Kovács and C. Mészáros 227

Synthesis of Carbon Nanofibers as Support Layer for Metal Catalyst in a Microreactor for Three-Phase Reactions

D.B. Thakur, R.M. Tiggelaar, K. Seshan, J.G.E. Gardeniers and L. Lefferts 231

Multifunctional Wear and Corrosion Resistant Decorative Nanostructured Carbon-Base Coatings

F. Černý, J. Gurović, V. Jech and S. Konvicková 237

Miscibility, Isothermal Crystallization/Melting Behavior and Morphology of Poly(Trimethylene Terephthalate)/Poly(Butylene Terephthalate) Blends

P. Krutphun and P. Supaphol 243

Non-Isothermal Crystallization Kinetics and Melting Behaviors of Thermoplastic/Liquid Crystalline Polymer Blends of Poly(Trimethylene Terephthalate)/Vectra A950

P. Pisitsak and R. Magaraphan 249

Sulfonated Poly(Ether Ether Ketone)(S-PEEK) as Derived from Bisphenol-S for a Proton Exchange Membrane (PEM) in Direct Methanol Fuel Cells (DMFC)

S. Changkhamchom and A. Sirivat 255

Preparation and Characterisation of Dense TiO₂ Ceramics

A. Pavlova, L. Berzina-Cimdina, J. Locs, D. Loca and J. Bossert 261

CHAPTER 5 - HYBRID ACTIVE MATERIALS SYSTEMS

Multiscale Molecular Modeling of Hybrid Organic-Inorganic Nanocomposites of Type I and II

M. Fermeglia, M. Maly, P. Posocco and S. Prchl 265

Ultrathin Film Formation by Gamma-Ray Induced Polymerization in Surfactant Template on Solid Surface

S. Nummeechai, P. Suwanmala, K. Hemvichian and T. Pongprayoon 270

Bistable Buckled Beam: Modelling and Piezoelectric Actuation

C. Maurini, J. Pouget and S. Vidoli 281

Design of Actuation for Bistable Structures Using Smart Materials

P. Cazottes, A. Fernandes, J. Pouget and M. Hafez 287

CHAPTER 6 - SMART NANOCOMPOSITES AND NANOMATERIALS

High Internal Phase Emulsion Foams (HIPE) Filled with Organo-Bentonite: Hybrid Organic-Inorganic Porous Clay Heterostructures (HPCH) versus Organo-Modified Bentonite (MÖD)

P. Pakeyangkoon, R. Magaraphan, P. Malakul and M. Nithitanakul 293

Synthesis and Characterization of Nanoparticulate Strengthened Nickel Microcomponents

X.Y. Wei and K. Jiang 299

Low Temperature Growth of ZnO Nanorods by Chemical Bath Method

P. Hari and D. Spencer 305

Inorganic Mesoporous Membrane for Potentially Used in Proton Exchange Membrane

T. Kuanchaitrakul, S. Chirachanchai and H. Manuspiya 311

Characteristics of the TiO₂/SnO₂ Thick Film Semiconductor Gas Sensor to Determine Fish Freshness

J.M. Jun, J.Y. Jung and C.S. Lee 317

A New Synthesis Route to Prepare Polyaniline (PANI) Nanotubes Containing Magnetic Nanoparticles

A.C.V. De Araújo, S. Alves and W.M. Azevedo 325

New Electroconducting Radical Cation Salts Based on BEDT-TTF with 8,8'-Dibromo Cobalt Bis(Dicarbollide) Anion

O. Kazheva, G. Alexandrov, A. Kravchenko, V. Starodub, I. Lobanova, I. Sivaev, V. Bregadze, L. Titov and O. Dyachenko 331

Modulation of the Metallic Oxide Properties through of Soft Chemistry Techniques for Several Applications

D.C. Altamirano-Juárez 337

CHAPTER 7 - MEMS / NEMS

CNT Based Sensors

C. Hierold, T. Helbling, C. Roman, L. Durrer, A. Jungen and C. Stampfer 343

Design and Fabrication of a MEMS AC Electric Current Sensor

E.S. Leland, R.M. White and P.K. Wright 350

A Review of Test Structures for Characterising Microelectronic and MEMS Technology

A.J. Walton and S. Smith 356

Friction Drive Simulation of a SAW Motor with Slider Surface Texture Variation

M. Kurosawa and T. Shigematsu 366

MEMS Rotational Actuator for High Force and Large Displacement

L.J. Currano, D. Gee, W.A. Churaman, M. Dubey, P. Amirtharaj, M. Yu and B. Balachandran 372

Design and Fabrication of a Horizontal Thermal Micro-Actuator with Integrated Micro Tweezers

A.B. Alamin Dow, K. Ivanova, T. Ivanov and I.W. Rangelow 378

Three-Axis MEMS Threshold Accelerometer Switch for Enhanced Power Conservation of MEMS Sensors

W.A. Churaman, L.J. Currano, D. Gee and E. Zakar 384

Electromechanical Behavior of Single and Multiwall Carbon Nanotubes

A. Pantano 390

The Promise of Nano and Micro Systems for Meeting the Emerging Demands of the US Army	
J.M. Pellegrino	396
Fully Integrated Bridge-Type Anemometer in LTCC-Based Microfluidic Systems	
H. Bartsch de Torres, C. Rensch, T. Thelemann, J. Müller and M. Hoffmann	401
Strain Enhancement within Cantilevered, Piezoelectric MEMS Energy Scavenging Devices	
L.M. Miller, N.C. Emley, P. Shafer and P.K. Wright	405
3C-SiC Hetero-Epitaxial Films for Sensors Fabrication	
R. Anzalone, A. Severino, C. Locke, D. Rodilosso, C. Tringali, S.E. Saddow, F. La Via and G. D'Arrigo	411
Porous Metal Frameworks on Silicon Substrates	
J.G. Alves Brito-Neto, T. Matsuzaka, Y. Saito and M. Hayase	416
The Mechanical Behaviour of Silicon Diaphragms for Micromachined Capacitive Pressure Sensor	
J. Ren, D. Cheneler, M. Ward and P. Kinnell	422
GaAs Non Resonant Micro-Sensors: Design and Simulations	
C.R. Tellier and S. Durand	428
Thin Film YBCO Pixels for MMW Detector	
E. Zakar, D. Wikner, M. Dubey and P. Amirtharaj	434
Micromask Generation for Polymer Morphology Control: Nanohair Fabrication for Synthetic Dry Adhesives	
D. Sameoto, Y.S. Li and C. Menon	439
Wet Etching of Si Micro-Arrays: Experimental and Theoretical Shapes	
T.G. Leblois and C.R. Tellier	445

CHAPTER 8 - RECENT DEVELOPMENT IN ELECTRICAL WRITABLE ORGANIC MEMORY DEVICES

Nanoparticles for Charge Storage Using Hybrid Organic Inorganic Devices	
D. Tsoukalas, S. Kolliopoulos, P. Dimitrakos, P. Normand and M.C. Petty	451
Non-Volatile Memory Devices Based on Diphenyl Bithiophenes	
E.V. Canesi, C. Bertarelli, A. Bianco, M. Caironi, G. Dassa, D. Natali, A. Rottigni, M. Sampietro and G. Zerbi	458
Resistive Electrical Switching of Nonvolatile Memories from Electrodeposited Copper Tetracyanoquinodimethane (CuTCNQ)	
R. Müller, A. Katzenmeyer, O. Rouault, L. Goux, D.J. Wouters, J. Genoe and P. Heremans	464
Effect of Various Electrode Materials in Non-Volatile Memory Device Using Poly(3,4-Ethylenedioxythiophene):Poly(Styrenesulfonate) (PEDOT:PSS) Thin Films	
H.J. Ha, J.M. Lee, M. Kim and O.H. Kim	470
Fabrication and Characterisation of MIS Organic Memory Devices	
M.F. Mabrook, D. Kolb, C. Pearson, D.A. Zeze and M.C. Petty	474
Gold Nanoparticle Based Electrically Rewritable Polymer Memory Devices	
D. Prime and S. Paul	480
Electrically Re-Writable Non-Volatile Memory Device - Using a Blend of Sea Salt and Polymer	
I. Salaoru and S. Paul	486
Effect of Varying Memory Device Architectures on the Electrical Properties of P(VDF/TrFE)(72/28) Copolymer Thin Film	
C.W. Choi, A.A. Prabu, S. Yoon, Y.M. Kim and K.J. Kim	491