

Table of Contents

Preface

Chapter 1: Materials and Technologies in the Scale of Micro and Nano

Study of PSG Thickness Uniformity Influencing Factors in LPCVD W.L. Lü, Z. Zhan, X.H. Du, R.H. Zhou, H.E. Zhang, L.Y. Wang and D.H. Sun	3
Anisotropic Elastic Properties of Chiral Sculptured Thin Films at Micro-Scale Evaluated by Resonance Frequency Spectra H. Fang, K. Matsumoto, T. Sumigawa and T. Kitamura	9
The Dilute Magnetic Properties of Monolayer MoS₂ Doped with Transition Metal Fe and VA Atoms L. Lan, J.M. Cao, Y.J. Cao, D.S. Xu and J. Zhou	15
Strategies for Defect-Free and Deep Wet Etching of Pyrex 7740 Z. Zhan, L.K. Yu, C. Zheng, J.F. Cai, D.H. Sun and L.Y. Wang	21
Effect of Hydrophilic and Hydrophobic SiO₂ Particles on Performances of PI/Al₂O₃ Composite Films Y.Y. Li, L.Z. Liu, H. Shi, L. Weng and W.W. Cui	26
Synthesis and Characterization of Topological Insulator Bi₂Te₃ Nanowires Z. Guo, L. Lu, J.Y. Wang and Y.J. Xing	32
Electronic and Magnetic Properties of Rare-Earth Atoms Absorbed on Graphene Sheet: A Theoretical Study Q.X. Zhou, Z.B. Fu, C.Y. Wang, X. Yang, L. Yuan and Y.J. Tang	40
Melt Electrohydrodynamic Direct-Writing Micro/Nano Fiber with Restriction of Heated Sheath Gas Z.J. Yu, L.J. Wang, L.L. Sun, Y.H. Lin, W. Wang, G.F. Zheng and D.H. Sun	45
Experimental Study on WEDM Machining of PCD and PCBN Compacts M.C. Song, J.L. Zhang, C. Yu, M.J. Wang, C. Liu and Y. Liu	52
Wet Anisotropic Etching Characteristics of Si{100} in TMAH+Triton at near the Boiling Point M.Q. Yao, B. Tang, W. Su and G. Tan	58
Hierarchically Ordered Porous Carbon as a Host Material for Energetic Composites J. Chen, S.M. He, H.Q. Cai, Q.L. Hao and H. Huang	64
TCAD Study of the Raised SiGe Source/Drain in 40nm PMOS M. Zhong, Y.H. Zhao, S.M. Chen, M. Li, S.H. Zeng and W. Zhang	70
Adsorption of Silver Nanoparticles on Modified Surfaces C. Gao, T. Guo, X.S. Ye, H.F. Zhang, H.N. Liu and Z.J. Wu	75
W-Band Quadrupler Based on Multi-Chip Module and Schottky Barrier Diodes Y. He, X.J. Deng, C. Wang and B. Lu	80
Intermediate Layer Bonding for Silicon and Piezoelectric on UV Adhesive X.Y. Wang, H. Liu, R. Lei and W.G. Liu	86
Quantitative Production of Charges with a Carbon Nanotubes Coated Electrode Based on Trichel Pulses F.C. Deng, L.Y. Ye and K.C. Song	92
Band Engineering of Graphene Nanomesh Field Effect Transistor under Multiscale Simulation Framework Y.W. Lv, H. Wang, S. Chang, Z.H. Yu, J. He and Q.J. Huang	98
Growth and Magnetic Properties of Three-Dimensional Fir-tree-Like Cobalt Microcrystals with Hierarchical Dendritic Superstructures X. Yang, Z.B. Fu, L. Yuan, C.Y. Wang and Q.W. Chen	104
The Thermal Decomposition Behavior of Graphene Oxide/HMX Composites G.Y. Zeng, J.H. Zhou and C.M. Lin	110
Facile Fabrication of Super-Hydrophobic Surfaces by Spray PTFE Y. Wang, H.F. Zhang and X.W. Liu	115

Frequency Characteristics Research for the Negative Resistance Oscillations Phenomenon of a Silicon Magnetic Sensitivity Transistor X.F. Zhao, Y.F. Li, M.W. Lv, D.Z. Wen and H.Q. Zhang	120
Large-Scale Synthesis and Microwave Absorption Properties of $\text{CoFe}_2\text{O}_4/\text{Co}_{0.4}\text{Zn}_{0.6}\text{Fe}_2\text{O}_4$ Hollow Nanospheres Q.G. Ren, X.J. Qiao, Y. Li, Z.G. Sun, X.D. Guo and S.Z. Zhang	126
Research of Magnetic Characteristics of the Split-Drain MAGFET Based on Nano-Polysilicon TFTs X.F. Zhao, H.Y. Guan, M.W. Lv, Y.N. Bai and D.Z. Wen	132
Graphene Field Effect Transistor's Circuit Modeling and Radio Frequency Application Study R. Zhu, Y. Zhang, J. Luo, S. Chang, H. Wang, Q. Huang and J. He	139
Synthesis and Dispersity of YBCO Powder Produced by Oxalic Acid Precipitation Method A.Q. Wang, H.H. Han, M. Li, J.P. Xie, Q.J. Wu and D.Q. Ma	145
Influence of Defects on the Young's Modulus of [110] Silicon Nanowires with Different Cross Sections F. Gu, J.H. Zhang, M. Li, L.Y. Liu and J. Su	151
Sintering Behavior and Electrical Property of Surface Treated Silver Nanoparticle for Electronic Application H. Xie, N.N. Xiong, Y.Z. Zhao and Y.H. Wang	157
Study on the Etching Technique of Non-Photosensitive Polyimide R. Lei, W.G. Liu, C.L. Cai, S. Zhou, J. Nie and X.Y. Wang	163
An Investigation on Resistive Switching Characteristics Induced by HfO_x and Electrode Interfaces X.R. Chen and J. Feng	169
Study on Internal Stress in Micro-Electroformed Layer L.Q. Du, Z.C. Tan, C. Song, Z. Zhao, Q.F. Li and P.H. Yin	178
Low Temperature Eutectic Alloy Bonding Used in MEMS-Based Solid Propellant Microthrusters Array C.B. Ru, Y.H. Ye, J.B. Xu, Z.Y. Zou, J. Dai, P. Zhu and R.Q. Shen	184
Simulation and Test of through Silicon Vias Impacted by Large Current Pulse X.R. Ding, Y.B. Wang, W.Z. Lou and F.Y. Liu	190
Preparation of Strongly Hydrophobic Film with Large Area and Flexibility Based on Micro Fabrication Y.B. Zeng, T.T. Wang, J.Y. Wang and H. Guo	195
Preparation of TiO_2 Nano-Film by Anodic Oxidation Method and its Hydrophobic Modification F.B. Liu and B. Jing	201
Fabrication and Thermal Performance of Copper Pillars Modified Micro Heat Pipe (MHP) L.L. Zou, Y. Luo, J.G. Liu, B.K. Yu, Q. Shan and X.D. Wang	208
Research on TSV Dry Etching Technology G.Q. Jiang, L. Kuang and J. Zhu	216
Research on Microstructure and Wear Resistance of Cast-Penetrated Layer Strengthened by Nano-Sized TiN Intermediate Alloy J.P. Xie, X.H. Shao, S. Liu, F.M. Wang, A.Q. Wang and D.Q. Ma	221
Research on Delamination of Plastic Packaging Device during Reflow Soldering P.S. Liu, Y. Lu, J.X. Huang and L.L. Yang	226
Preparation of Nano $\alpha\text{-Fe}_2\text{O}_3$ Powders and Characterization of their Photo-Catalysis Capacities N.Y.S. Zhang, Y.A. Zen, S.B. Wang and B. Zhu	232
Research on the Preparation of Nanoporous Copper Using Taguchi Method K.C. Li, X.G. Liu, Y. Chen and M.X. Chen	238
Preparation of Mn-Zn Ferrite Flake Absorbent by Self-Reactive Spray Forming Technology H.T. Gao, J.J. Wang, H.F. Lou, X.D. Cai and Y.S. Hou	246
Intermolecular-Interaction and Mechanical Properties of MNs-Plasticizer Modified 2,4,6-Trinitrotoluene/1,3,5-Trinitrohexahydro-1,3,5-Triazine Molten-Energetic-Composite(MEC) Q. Ma, M.P. Wen, B.H. Zheng, H.J. Huang, D.B. Liu and J.S. Li	252
Research Survey of Electroformed Nickel Material Properties Used in MEMS G.Z. Li, G.C. Shi, L. Sui, F.T. Yi and B. Wang	259

The Effect of Thermal Accumulation to the Field Emission Properties of the Carbon Nanotubes	265
F. Yan, N.N. Li, L. Chen, D.Z. Jin and W. Xiang	
Effect of Ammonia as an Inert Solvent on Structure and Separation Performance for Oil/Water Mixtures of PVDF Porous Membranes	269
W.W. Cui, J.Q. Liu, L.Z. Liu, W.H. Xu, Y.Y. Li and Z.Q. Gao	
Size Effect of Piezoelectricity in ZnO Nanowires: A First-Principles Study	275
C.Q. Qin, Y.S. Gu, X. Sun, C. Li and Y. Zhang	
Ejection and Motion Behaviors Simulation for Multi-Jet Electrospinning	281
W.W. Li, Z.W. Luo, X. Wang, J.Y. Zheng, G.F. Zheng and D.H. Sun	
Measurement on the Mechanical Properties of SiC Thin Films Based on Square Thin Films Theory	287
Y.M. Chen, P.T. Dong, X.Z. Wu and Y.L. Wu	
Optimization of Chemical Mechanical Planarization Process of High Enrichment Slurry Under Low Pressure	291
Y. Li, Y.L. Liu, H.B. Li, A.C. Wang, W.J. Liu and J. Hong	
Effect of Reaction Inhibitors on Synthesized Silver Nanostructures via Solvothermal Method	297
H. Xie, N.N. Xiong, J.Z. Liu, Y.Z. Zhao and Y.H. Wang	
Effects of NaOH Concentration on Section Structures of Oxide Films Based on TC4 by Anodic Oxidation Process	303
J.K. Yan, G. Yang, Z. Shi, W.X. Tang and Y.F. Wu	
A Novel High Precision Analytic Potential Function for Diatomic Molecules	313
C.F. Yu	
The Simulation and Analysis of Current Crowding and Joule Heat in Flip Chip Solder Bumps	319
P.S. Liu, L.L. Yang, J.X. Hang and Y. Lu	
Effects of n-Type Dopants on Electronic Properties in 4H-SiC	325
J.L. Tang, J.N. Zhong and C. Wen	
Fabrication of UltrasMOOTH Polymer Films by Concentration Control and Spin Speed Adjustment	330
Y. Guo, W.G. Liu, H. Liu, S. Zhou, L. Wu and F. Li	
Nanopore in C-S-H Gel Stability Analysis of Hardened Cement Pastes	335
L. Wu, N. Xiong and F.Y. Yu	
Simulation and Typical Application of Multi-Step Diffusion Method for MEMS Device Layers	341
L.Y. Wang, R.H. Zhou, Y.F. Liu, C. Zheng, J.F. Cai and Y. He	
Synthesis of Nano-Al with Fe₂O₃ Nanowires to Realize Core-Shell Composite Materials Arrays Based on Colloidal Templates	347
S.M. He, J. Chen, K. Fang, Z.Q. Qiao and J.S. Li	
Evaluation of the Stability on the New Alkaline Copper Bulk Slurry	352
J. Wang, R. Wang and G.D. Chen	
Research on Low Temperature Anodic Bonding Based on Interface Pretreatment of Dielectric Barrier Discharge Plasma	356
M.Q. Pan, L.N. Sun, Y.J. Wang, J.Z. Liu, T. Chen, H.C. Liu and L.G. Chen	
The Study on the Selectivity Ratio of SiC/Epoxy Resin Based on ICP Etching	362
J. Hu, S. Zhou, C.L. Cai, Y.F. Zhu, S. Hu and W.G. Liu	
High-Efficiency Preparation of N-Doped Titania with High Visible Light Photocatalytic Activity Using Composite N Precursor	368
Y.L. Hu, X.D. Zhang, H.F. Liu and X.P. Guo	
UV Photocatalytic Digestion Utilizing TiO₂ Nano-Fiber for the Determination of Total Phosphorus	375
Q. Zhang, J.H. Tong, C. Bian and S.H. Xia	
Research of Thin Film for Laser Polarization Beam Splitter	381
X.H. Fu, Y.G. Pan, D.M. Liu, J. Zhang and X.J. Wang	
Micro Laser Joining between Dissimilar Materials of 200μm Thick TiNi Alloy and Stainless Steel and the Joint's Electrochemical Behavior	388
Y.H. Chen, J.L. Xie and W.H. Gong	

Electrokinetic Research on the Dispersion Behavior of Nano-Ceria Particles in Concentrated Suspensions	
W. Gao, Q.L. Wei, L. Ding, X.Y. Li, C. Wang, G.P. Tang and J.G. He	394
Study of SiC's Mechanical Property Variance Caused by Film Thickness	
Z.L. Jiao and J. Zhu	400
Experimental Study on the Relationship between Dislocation Density and Internal Stress in Micro Electroforming Layer	
C. Song, L.Q. Du, T. Yang, L. Luo, Y.S. Tao and X. Zhang	405
Influence of Hybrid Fibers on Flexural Properties of Ultra High Toughness Cementitious Composites with Nano-SiO₂	
X. Gao, Q.H. Li and S.L. Xu	411
The Influence of Polyhedral Oligomeric Silsesquioxane on Heat Resistance and Curing Kinetics of Potting Materials	
J.H. Fan, H. Jing and J.Y. Wu	416
Study on Mechanism of Phase Forming in Ni⁺ Implantation into Ti6Al4V at Elevated Temperature	
Y. Wang, X.H. Yu and H.L. Yang	421
Preparation and Mechanical Properties of Ultra-Fine Grain Medium-Carbon Steel Based on Equal-Channel Angular Pressing	
J.M. Wang, W.T. Hou and L. Lu	427

Chapter 2: Micro/Nanofluids Research and Technologies

Tribological Properties of Oil-Based ZnO Nanofluids	
X. Ran, X.Y. Yu, Y. Wang and Z. Xiao	437
Performance Investigation of TiO₂ Nanofluid Coolant for Automobile Cooling Applications	
J.M. Chen, X.Y. Sun, G.J. Leng and J.H. Feng	444
The Simulation and Experimental Analysis of Hydrodynamic Focusing Effect inside a Rectangular Microchannel	
S.J. Feng, X.Q. Shi, J. Zeng, Y. Peng and M. Liu	449
Threshold Model of Micro-Fluidic Inertial Switch Based on Orthogonal Regression Design	
T.T. Liu, W. Su, C. Wang and T. Yang	455
Effect of Flow Rate of Slurry in Micro-Channels on the Consistency of Polishing Rate	
Y. Li, M. Sun, Y.L. Liu, A.C. Wang, J.Y. Tang and S.Y. Fan	462
Discrimination of Low-Grade Oil from Edible Oil by a Microfluidic Device	
M. Liu, S.J. Feng, X.Q. Shi, Y. Peng and Z.Z. Wu	469
Effect of Elliptical Dimples on Hydrodynamic Lubrication	
J.H. Ji, H. Wang and Y.H. Fu	474

Chapter 3: Measurements, Sensors and MEMS

Study of Bandwidth Expansion Based on Electrochemical Vibration Sensor	
Z.Y. Zhang, J.B. Wang, D.Y. Chen and Y.A. Li	483
A Novel Micro-Machined Out-of-Plane Resonant Accelerometer with Differential Structure of Different-Height Resonant Beams	
S.M. Zhao, Y.F. Liu and J.X. Dong	488
The Research of Turn-On Time for Silicon Micromechanical Gyroscope on a Chip	
Y. Bian, Q. Shi and G.M. Xia	492
3D Indoor Positioning System Based on MEMS Sensors	
J.L. Zhu, B. Mo, C.D. Ling and W.Y. Fu	498
Analysis Temperature Characteristics of Atmosphere Pressure Sensor Caused by Residual Gas	
L.D. Du, Z. Zhao, S.H. Wu and Z. Fang	504
Q-Factor Improving of Film Bulk Acoustic Wave Resonator for Chip-Scale Atomic Clocks	
Z.S. Zhang, L. Tang and L. Ji	509

Study on a Planar Interdigitated MEMS Supercapacitor Using Modeling and Simulation Method	
K.R. Dai, X.F. Wang, W.S. Lv and Z. You	513
Passive Acoustic Localization Based on MEMS Microphone Arrays	
X.M. Dai, W.Z. Lou, M.R. Guo, F.F. Wang and X. Jin	517
An Electromagnetic Vibrating Ring Gyroscope Using SOI-MEMS Technology	
Y.X. Li, D.Y. Chen, G. Huang and Q. Li	522
The Research on MEMS Micro Capacitance Sensor Detection Based on MS3110	
H.J. Yu, Z.Q. Ding, X.P. He, L.M. Du, H. Qu, W. Zhou and B. Peng	528
The Influence of Die-Attach Adhesives on the Packaging of MEMS Accelerometer	
P. Peng, X.P. He, L.M. Du, W. Zhou, H.J. Yu and B. Peng	533
High Resolution Micro-Displacement Sensing Circuit for Rotor Micro-Gyroscope	
M.Y. Ren, X.W. Liu, H.F. Zhang and Z.G. Mao	538
Simulation and Experimental Verification of Silicon Microgyroscope's Closed-Loop Driving Circuits Based on Cadence	
W.F. Tang, G.M. Xia, A.P. Qiu and Y. Su	543
Design of 16 bit 200kHz Feedforward Sigma-Delta ADC Applied in Silicon Gyroscope	
F.X. Huang, Z.Q. Gao and X.W. Liu	548
Advancements in Micro-Structure with Multiple Stress Concentration Region for Bionic Vector Hydrophone	
G.J. Zhang, P. Zhao and W.D. Zhang	555
High-Precision Quadrature Signal Generator for Digital Demodulation of MEMS Gyroscope	
D.H. Chen, L. Chen, H. Zhou and Y. Tian	561
Study of Thin Film Pressure Sensor by Magnetron Sputtering	
D.P. Hu and X.L. Wang	566
FPGA-Based Test Equipment for System-Level MEMS Switch Series	
P. Liu, W.Z. Lou, Y.F. Lu and X.Y. Feng	572
Design and Analysis of Capacitive Micromachined Ultrasonic Transducers Based on SU-8	
Y.P. Li, C.D. He, J.T. Zhang, J.L. Song, W.D. Zhang and C.Y. Xue	577
Passive Wireless Multi-Parameter Sensor System for Hermetic Environment Monitoring	
D. Tang, L.F. Wang and Q.A. Huang	583
Statistical Analysis and Yield Enhancement of MEMS Devices by Considering Multi-Process Variations	
L.L. Gao, W.H. Li and Q.A. Huang	589
Effects of Hall Output Probes Shape on Magnetic Characterization of Hall Magnetic Field Sensor Based on MOSFET	
X.F. Zhao, Q.R. Lin, A.L. Mu, D.Z. Wen and H.Q. Zhang	595
Chip-Level Active Temperature Control for Improving Temperature Robust of a Micro-Gyroscope	
Z.H. Chen, L.L. Liu, D.B. Xiao, H.J. Cui and X.H. Wang	600
A 16 Bits 500 kHz Sigma-Delta DAC for Silicon Micro Gyroscope	
Y.K. Zhao, L. Yin, Z.T. Liu, W.P. Chen and X.W. Liu	605
An Integrated Pressure and Magnetic Field Sensor Based on Piezoresistance Effect	
T. Wu, X.F. Zhao, X.H. Yang, D.Z. Wen and G. Li	610
The SOI Micro-Accelerometer Fabricated by Sacrificial Process	
Z.Y. Zhang, W. Su, Z.G. Shi, B. Tang, Z. Xiong, Y.H. Chen and B. Peng	616
Noise Analysis of Silicon Microgyroscope's Transimpedance Amplifier Interface Circuit	
W.F. Tang, A.P. Qiu, G.M. Xia and Y. Su	624
Micromachined Tri-Axis Capacitive Accelerometer Based on the Single Mass	
F. Yuan, L.G. Chen, T. Chen and L.N. Sun	630
Multi-Chip Module Design of a MEMS Air Pressure Sensor	
G.X. Yao, H.Y. Du, Q.A. Huang and M. Nie	636
A Modulated Feedback Approach to Improve Closed Loop MEMS Accelerometer Bias Instability	
M.J. Ma, Z.H. Jin and Y.D. Liu	640
A Second Differential Bandpass Filter with Tuning Center Frequency and Constant Q	
Y.X. Zhao, W.R. Zhang, H.Y. Xie, X. Huang and L.H. Zhang	646

Trajectory Guidance Law for MAV Based on MEMS Sensor/GPS Y. Cai, W. Xiong, X.T. Cao and Z.Y. Zhou	653
A Feed-Forward Sigma-Delta Modulator Applied in Silicon Gyroscope Q. Shao, Q.Y. Lv, H. Meng, Q. Fu and X.W. Liu	657
A Novel Capacitive Temperature Sensor for Real-Time Monitoring of Temperature in the Silicone Oil Fan Clutch Q.Y. Ren, L.F. Wang, J.Q. Huang and Q.A. Huang	662
Active Disturbance Rejection Control Design for Fast AFM D.X. Chen, B.H. Yin, J.B. Liu, W.P. Li, L.Q. Wu and H. Li	670
Plastic Strain Effect in Progressive Multi-Cycle Nano-Indentation Measurement Q.L. Wei, X.Y. Li, X.B. Yue and D.J. Lei	675
Micro-Fabricated Pre-Concentrator Filled with Single-Walled Carbon Nanotubes as Adsorbent Material X.F. Zhu, Z.W. Ning, J.H. Sun, T.J. Ma, Y.N. Zhang and J.H. Liu	681
Research on Rapid Detection and Accounting of Small Particles in Marine Hydraulic Oil L. Zeng, H.P. Zhang, E.C. Liu, H.Q. Chen and F.Y. Cui	687
Dissemination of Micro-Gram Weights from 500 μg to 50μg Based on Automatic Mass Measuring System X.P. Ren, J. Wang, L. Dong and O. Wilson	693
Design and Fabrication of High Vacuum Gauge Based on Micro Hotplate F.T. Zhang, Y.B. Zheng, B. Tang, W. Su and Z. Tang	698
Analysis of Impact of Bottom Electrode Position on Dynamic Pull-In Parameters of Microcantilevers S.K. Chang, G.F. Zhang and Z. You	706
Fabrication and Formaldehyde-Sensing Property of Quartz Crystal Microbalance (QCM) Coated with PVP-MWCNTs Composites Y.F. He, Y.D. Jiang, H.L. Tai and G.Z. Xie	719
A Micro Direct Formic Acid Fuel Cell with PDMS Fluid Flow Plates T.T. Wang, Y.B. Zeng, Z.G. Zhao and H. Guo	724
A Novel Microfluidic Time Gate for Controlling Flow of Liquids L. Gan, C. Liu, J.M. Li, Y.H. Ma, L.J. Zhou, H. Zhang, T. Li and L. Wang	730
Microfluidic Amperometric Detection Sensor with Integrated Ag/AgCl Reference Electrode H. Zhang, X.W. Liu, L. Tian, X.W. Han and T. Dai	736
Optimization of Microfluidic Chip Bonding Technology Based on Polydimethylsiloxane J. Mao, W. Chen, L. Zhao, L.X. Yang and B.Z. Zhang	741
Applied Research on Self-Sensing Micro-Flow Injection Device Based on Piezoelectric Ceramics J. Huang, L.P. Shi, H.M. Zhou, X.W. Wei and Y.B. Wei	746
Iron Wear Particle Content Measurements in Process Liquids Using Micro Channel – Inductive Method Z. Bo, X.M. Zhang, H.P. Zhang, E.C. Liu and H.Q. Chen	756
Fluid Dynamic Analysis on Solar Heating Error of Radiosonde MEMS Humidity Measurement X.L. Mao, J.H. Zhang, M. Li, S.R. Xiao and Q.Q. Liu	761
Experimental Study on Velocity of Flyer Based on Silicon Q.B. Fu, Y. Wang, M. Wang, W.Z. Qin and F. Guo	766
A New Method of Design and Verification of Digital Silicon Gyroscopes Closed-Loop Driving System Based on MicroBlaze P. Sun, Q. Shao, Y.Y. Liu and W.P. Chen	771
Design and Fabrication of a SOI Optical Waveguide Sensing Platform for Biochemical Sensor Application Y.J. Liu, Y. Dong, D.P. Yuan and T.J. Li	777
The Research on Electroplating Technology Used for RF Micro Inductor Coil R.K. Bi, X.Y. Wei, J.L. Wu and H. Guo	783
Study on Magnetization and Detection the Metal Particle in Harmonic Magnetic Field X.M. Zhang, H.P. Zhang, Z. Bo, H.Q. Chen and Y.Q. Sun	790
The Buckling Simulation of Planar W-Form Micro-Spring in MEMS Safety and Arming Device F.F. Wang, W.Z. Lou, F.Y. Liu, D.K. Wang, J. Lu, J. Wu, X.H. Guo and Z. Zhang	796

Design, Optimization and Simulation of an Electric Field Microsensor Based on PZT Piezoelectric Interdigitated Cantilevers	
K. Feng, J.H. Tong, Y. Wang and S.H. Xia	800
Design and Application of Digitally-Programmable Delay-Time Microchip in Detonating System	
Y.F. Lu, W.Z. Lou, X.R. Ding and Y.B. Wang	806
A Traceable Metrological Method with Nanometer Scale Resolution for Micro-Structure	
B.H. Yin, D.X. Chen, H. Xue, Y.S. Lin, S.T. Gao, W. Li and L. Han	810
Accurate and Traceable Calibration of the Stiffness of Various AFM Cantilevers	
Y.W. Zhao, Y.P. Song, S. Wu and X. Fu	817
Design of Minimal Capacitance Detect Circuit for MEMS Capacitive Sensor	
H. Qu, H.J. Yu, W. Zhou, X.P. He, L.M. Du and B. Peng	824
Micro-Spring's Variable Stiffness Design and Characteristics Analysis	
G.H. Liu, L. Sui, G.C. Shi and X.H. Guo	830
Fabrication Process and Electro-Thermal Modeling for the Cathode of the CMOS-Compatible Hot-Filament Vacuum Gauge	
J.Q. Wang and J. Yu	836
A New Design of a Piezoelectric Triaxial Micro-Accelerometer	
J.Y. Wang, T.T. Wang and H. Guo	841
UVC-Thermal Coupled Digestion without Oxidant for the Detection of Total Phosphorus	
L. Li, C. Bian, J.H. Tong, H. Li and S.H. Xia	847
Fabrication of SU-8 Microneedle Based on Backside Exposure Technology	
L.Q. Du, Z.Z. Wang, X.P. Ruan, S.L. Chen and Q. Shan	853
Analysis on the Effect of Machining Error on the Vibration of MEMS Device	
H. Wang, W.H. Li and L.L. Gao	859
A Variable Resistor Micro System Based on Electro-Explosion	
X.R. Ding, Y.B. Wang, W.Z. Lou and Y.L. Guo	865
Design and Experimental Study of a Composite Materials Micro-Deformation Measurement Device	
Y. Yuan, H. Bao, H. Xu and Z.L. Li	869
A Low-Frequency Filter in Inertial Applications	
Q. Li, X.W. Liu, L. Yin and J.J. Zhou	875
Experimental Investigations on New Characterization Method for Giant Piezoresistance Effect and Silicon Nanowire Piezoresistive Detection	
J.H. Zhang, M. Yang, Q.Q. Liu, F. Gu, M. Li and Y.X. Ge	881
Application of Magnetic Filter Technology in Improving the Precision of a Micro Attitude Reference System	
G.M. Yuan, X.R. Cao, Y.M. Zhao, P. Wang, J.B. Xie and H.L. Chang	888
Intelligent Logistics Monitoring Microsystem Based on STM32	
F. Wang, W.Z. Lou, M.R. Guo and Y.F. Lu	896
Nondestructive Microscopy Test on Damage of Waterproof Material in Underground Engineering	
Q.G. Wang, Q.X. Yang, Y.J. Jiang and J. Yang	900
A Robust Adaptive Angle Algorithm for Imaging Bionic Polarization Navigation Sensor	
B. Li, L. Guan, S.Y. Li, J.K. Chu and Y. Cui	906
A Nano-Cantilever Bending Method for Interface Cracking in Nanoscale Materials	
X.Y. Wang and Y.B. Yan	912
The Displacement Characteristics of Piezoelectric Ceramic Micro Actuators Evaluated by Laser Interferometer	
H. Wu, L.B. He, J.L. Zhou and P. Yang	920
On the Temperature-Related Mechanical Properties of UV-LIGA Nickel Material	
S.S. Yuan, G. He, M. Zhang and G.Z. Li	926
Design and Experiment Research on MEMS Vector Hydrophone Vibration Damping Structure	
N. Guo, G.J. Zhang and W.D. Zhang	931
The Test and Simulation Modeling of Micro Scale Solid Particles Fuel Cloud Dispersal under High Dynamic	
X. Jin, W.Z. Lou, M.R. Guo and X.M. Dai	942

Chapter 4: Micro Actuators and Devices

Performance-Enhanced Heat Converter Used in FPA Utilizing a SiO_x/Al Corrugated Micro-Cantilever Actuator	
Y.M. Kong, R.W. Liu, B.B. Jiao, D.K. Lu, E.C. Zhu, Q.S. Fu and D.P. Chen	951
Modeling of Hysteresis in Piezoelectric Actuator Using Linear Play Operator Adaptive Filter	
R. Xiong, X.D. Liu and F.M. Shan	957
The Dynamic Characteristics Research of MEMS V-Shaped SiO₂/Al Electrothermal Actuator	
Y.Y. Shen, R.C. Song, H.M. Tang, Q.S. Chen and P. Guan	963
The Parametric Analysis of the Threshold Value Judging Mechanism in MEMS Safety and Arming Device	
F.F. Wang, W.Z. Lou, F.Y. Liu, D.K. Wang, M.R. Zhang and C.G. Xu	968
The Error Analysis of Micro-Flow Self-Sensing Actuator	
Y.B. Wei, L.P. Shi and H. Zhou	972
Analysis of Harmonic Distortion of Sigma-Delta Modulator	
D. Yan, W.N. Jiang, S.Q. Tao, J. Yang, L. Yin and X.W. Liu	980
The Parametric Analysis of the Lock-Releasing Mechanism in MEMS Safety and Arming Device	
F.F. Wang, W.Z. Lou, F.Y. Liu, D.K. Wang, J. Lu, J. Wu, X.H. Guo and Z. Zhang	986
Theoretical Investigation of the Electronic Properties in BN Nanowires	
C.C. Zhuang, L. Li, S.D. Fan, C.C. Ban and X.W. Liu	990
Dynamic Modeling and Output Characteristic Analysis of a Micro Bistable Piezoelectric Generator	
X.H. Mao, Q. He and T.T. Huang	995
Impact of Cross-Section and Size on Vibration of Silicon Nanowires	
P. Zhang, H.B. Chen and H. Yu	1004
Controlled Encapsulation of Micron-Sized Beads in a Droplet Based on Pulse Inertia Force Driving of Micro-Fluids	
H.C. Wang, L.J. Yang, J. Liu and Z.D. Dai	1009
Interference Fit Assembly of Micro-Parts Based on Microscopic Vision and Force	
J. Zhang, W.R. Wu, F. Shen and Y.J. Deng	1016
Scalable Electrical Model and Performance Analysis of a Novel Bar TSV Structure	
Z.S. Li, M. Miao, S.C. Yang and D.C. Yang	1024
Experimental Investigation of Thermal Conduction Performance on Silicon-Based Micro Flat Heat Pipe	
C.M. Li, Y. Luo, C.P. Zhou, L.L. Zou, X.D. Wang and Q. Shan	1032
Analysis of Effective Field Emitting Angle for Spindt Cathode	
N.N. Li, S.C. Pang, F. Yan, D.Z. Jin, W. Xiang, D. Zhang, J.Y. Dai and B.Q. Zeng	1038
Fabrication of Convex Plate-Shaped Micro Tool Electrode and its Application in Micro Hole Machining by ECM	
Z.W. He, M.H. Wang, L. Zhang and W. Peng	1043
Design of Micromachining System Based on Nanosecond Pulsed Laser	
D. Xu, Y. Yao, X. Fu and C. Wang	1049
Experimental Research on Nanostructure Fabricated by AFM Probe Combining with a CW Laser	
L.J. Yang, B. Cheng and Y. Wang	1054
Constructing Dual Band Metamaterial Absorbers at Mid-Infrared by Employing Multi-Resonant Structures	
W. Ma, Y.Z. Wen, R. Zhao and X.M. Yu	1059
Structure Design of Large Travel One-Arm Bridge Type Z-Axis Nano-Positioning Stage	
W. Fan, Z.S. Li and S.Y. Jiang	1064
Effect of Undercut on the Characterization of the Mechanical Properties of Silicon Nanocantilevers with Dynamic and Static Test	
J.H. Zhang, F. Gu, X.L. Zhang, M. Li, Y.X. Ge and X.L. Mao	1072

Implementation of Convolutional Encoder in Quantum-Dot Cellular Automata M.L. Zhang, L. Cai, X.K. Yang, H.Q. Cui and Z.C. Wang	1078
--	------

Chapter 5: Optics in the Scale of Micro and Nano

Theoretical and Experimental Studies on Microcavity Organic Light-Emitting Diodes with Different Emitters C.Y. Peng, M.J. Wei, R.J. Huang, K.P. Guo, Y.L. Jing, T. Xu and B. Wei	1087
A Method to Fabricate Thin Micro Silicon Cantilever Based on Optical Lithography with AZ 1518 C.Z. Tang	1093
Design and Experiment of Phase Laser Ranging System Based on MEMS Mirror for Scanning Detection C. Zhang and H. Huang	1099
High-Frequency InP-InGaAsP Heterojunction Phototransistor Employing a UTC Structure Z.Y. Jiang, H.Y. Xie, W.R. Zhang and L.H. Zhang	1105
A Compact Infrared Gas Sensor Based on an Asymmetry Gas Cavity A.J. Ming, Y.H. Ren, Y. Zhang, L. Zhang, W.B. Zhang, Z.X. Tan, W. Ou, Q.L. Tan, H.Y. Mao, J.J. Xiong and D.P. Chen	1111
Surface Micromachined Mirror Based on Pre-Stress Comb-Drive Actuator W.M. Wang, S.M. Yan, Q. Wang, C.K. Qiu, Z.X. Chen and B. Fan	1115
Design and Simulation of MEMS Mirror Based 3D Shape Measurement System C. Zhang	1120

Chapter 6: Energy Harvesting, Power Supply and Technologies for Fuel Cells

The Design of an Interface Circuit for Micro-Electrostatic Vibration Energy Harvesters and Super-Capacitor S. Chen, Y.X. Lu and X.H. Wang	1127
Fabrication of Aluminum Nitride Films by Reactive Pulse DC Magnetron Sputtering for Vibration Energy Harvester Z.G. Shang, D.L. Li and S.Q. Wang	1133
Novel Wind Energy Harvesting Device for City Building Based on ZnO Films Array S.H. Wu, L.D. Du, Z. Zhao, D.Y. Kong and Z. Fang	1139
VCu_xO_y Thin Film by Magnetron Sputtering as Cathode Material for Thin Film Lithium-Ion Microbatteries J. Lin, J.L. Guo, C. Liu and H. Guo	1145
High Performance Supercapacitor Electrode Materials Based on Activated Carbon and Conducting Polypyrrole W.T. Yuan, Y.J. Yang, Y.L. Qiu, J.H. Xu, W.Y. Yang and S. Xia	1150
Electrohydrodynamic Atomization Deposition of Fuel Cell Catalyst-Coated Membrane with Structure and Material Gradient Variation D.Z. Wang, W. Zha, X.H. Zhu, Y. Li, J.S. Liang, T.Q. Ren, Y. Luo, X.D. Wang and C. Liu	1156
Secondary Synthesis of Microporous Heteroatoms Y Zeolite and their Hydrodesulfurization Properties for Model Fuel X. Hong and K. Tang	1163
A 3D All-Solid-State Thin Film Microbattery with Inverted Pyramid Arrays J. Lin, J.L. Guo, C. Liu and H. Guo	1170
Formation of Membrane Electrode Assembly for High Temperature Methanol Fuel Cells D.Z. Wang, X.H. Zhu, W. Zha, T.Q. Ren, M.Q. Li, J.S. Liang and C. Liu	1175
Asymmetric Design of Anode and Cathode Current Collectors for Micro Direct Methanol Fuel Cells Y.F. Zhang, S.B. Zhang, Z.Z. Ma, H.L. Chen and X.W. Liu	1181
Study on the Energy Harvesting Performance of PE Cantilever Beam H.P. Liu, S.Q. Gao and L. Jin	1189

To Improve Micro-Planar-Magnetic Generator Performance Based on Addition of Magnetic Material	
L. Du, G.C. Shi and J.J. Zhao	1195
Electrospun PVDF/PMMA/SiO₂ Membrane Separators for Rechargeable Lithium-Ion Batteries	
X.L. Wu, J. Lin, J.Y. Wang and H. Guo	1201
Electrospun SnO₂-Graphene Composite Nanofibers as High Performance Anode for Lithium Ion Batteries	
Y.L. Wu, J. Lin, J.Y. Wang and H. Guo	1207
Numerical Optimization Approach of the Gap between the Magnet and Coil for Electromagnetic Vibration Energy Harvesters Design	
Y.M. Lei and Z.Y. Wen	1214
Design and Comparison of Micro Electromagnetic Vibration Energy Harvesters	
Y.M. Lei, Z.Y. Wen and L. Chen	1223
Corrosion Behavior of SAMs Modified Silver-Coated 316LSS as PEMFC Bipolar Plates	
X.J. Yan, J.B. Zhuang, N.B. Huang, C.H. Liang, H.T. Wang and L.S. Xu	1233

Chapter 7: Bioresearch and Biomedical Engineering

Stabilization of Pickering Emulsions by Bacterial Cellulose Nanofibrils	
W. Fu, Y. Liu, C. Yang, W.H. Wang, M. Wang and Y.Y. Jia	1247
Enrichment Efficiency Optimization of Dielectrophoresis Cell Chip Based on Interdigitated Microelectrodes Array	
W.W. Gu and J. Huang	1255
Functionalization of Mesoporous SBA-15 with APTES by Co-Condensation and its Effect on Immobilization of <i>Candida rugosa</i> Lipase	
X.Y. Li, Y.Q. Xu and G.W. Zhou	1261
Fabrication of a Pendulous Resonant Micro-Machined Biosensor for Direct Liquid Detection	
G. Huang, Y.X. Li, L. Qian and Q. Li	1267
<i>In Situ</i> Synthesis of the Hollow Silica Microspheres with Porous Surface by Using Chemical Modified Pollen Grains as Biotemplate	
F. Cao, D.X. Li and Z.Y. Wu	1273
CMOS Amplifier for Neural Signal Recording Applications	
Z. Zhang, Z.X. Cheng and Y.W. Zhuang	1279
Analysis and Simulation of a Planar Microelectrode Structure for Dielectrophoretic Manipulation of a Single Cell and Cell Cluster	
P. Chen, X.L. Ma, H. Zhang, M.J. Han, Y.C. Wang, B.B. Li and H.X. Zhu	1285
A Biological 3D Printer for the Preparation of Tissue Engineering Micro-Channel Scaffold	
Y.N. Zhang, Y.Y. Liu, Y. Li, S. Li and Q.X. Hu	1290
Specific Detection of Staphylococcus Enterotoxin B in Milk Using Piezoresistive Cantilever Aptasensor	
R. Zhao, Y.Z. Wen, W. Ma, J.C. Yang and X.M. Yu	1298
Biological CAD/CAM/3D Printing Integrated Molding Platform and System Building	
Y.M. Ma, Y.Y. Liu, H.P. Chen and Q.X. Hu	1303
A CMOS Automatic Gain Control Circuit for Biomedical Applications	
Z.Q. Gao, F.X. Huang, J. Li, L. Yin and X.W. Liu	1308
Facile Preparation of Cu/TiO₂ Nanocomposite via Photocatalysis and their Antibacterial Performance	
B.X. She, J.B. Long, Y.M. Deng, X.J. Wan, K.J. Zhu and J.N. Tang	1314
Design of a Microfluidic Chip for Enrichment of Circulating Tumor Cells	
X.X. Ling, D.H. Ren and Z. You	1320
Biological Effect of Single Wall Carbon Nanotubes on <i>Skeletonema costatum</i> and <i>Prorocentrum donghaiense</i> in Seawaters	
F.F. Li, J.T. Wang and L.J. Tan	1326
Expansion Performance of Novel Balloon-Expandable Stent for Tapered Vessel	
X. Shen, Y.Y. Sun and B.B. Wu	1333

Synthesis of Silica Modified Large-Sized Hydroxyapatite Whiskers by a Hydrothermal Co-Precipitation Method	
Y.T. Yin, Q.H. Chen, T.T. Yan and Q.H. Chen	1339
Flow Field Analysis for Plant Vessel and Bionic Structural Microfluidic Chip	
C. Zheng, C.Y. Guo, J.W. Xue, S.B. Liu and T. Chen	1345
The Application of Micro-Flow Extrusion Forming Technology in the Denture Preparation	
J. Zhou, G.L. Duan, D.B. Zhu and J. Cai	1351
Yeast Cells Immobilization in Microfluidic Channels Based on a Self-Polymerized Nano-Film of Poly(Dopamine)	
X. Chen, L.L. Zhang, J.H. Sun, H. Li and D.F. Cui	1357
An Ultrasonic Micro Knife Based on Triangular Silicon Horn Chip	
T.T. Wang, J. Wu, K.M. Ying, W.G. Li and H. Guo	1363
Preparation and Characterization of Tissue Engineering Scaffolds by Composite Molding of 3D Printing and Electrospinning	
Y.M. Ma, Y.Y. Liu, H.P. Chen and Q.X. Hu	1368
Pretreatment with Huperzine A-Loaded Poly(lactide-co-glycolide) Nanoparticles Protects against Lethal Effects of Soman-Induced in Mice	
R.H. Zhang, L.Q. Li, C. Wang, X.J. Lu, T. Shi, J.F. Xu, L.C. Song and H.F. Wang	1374