Micro- and Nanosystems—Materials and Devices
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CONTENTS

Preface .............................................................................................................................................. xv

Materials Research Society Symposium Proceedings .............................................................................. xvi

METROLOGY AND MATERIALS CHARACTERIZATION

Modification of Deposition Process of Piezoelectric Polycrystalline Film by Hydrothermal Method—Improvement of the Deposition Process by Pre-Treatment Using Hydrogen Peroxide ................................................................................................................................. 3

Akito Endo, Norimichi Kawashima, Shinichi Takeuchi, Mutsuo Ishikawa, and Minoru Kurosawa

Micromirror Arrays for High Temperature Operation ........................................................................ 9

Mahmoud F. Almasri and Bruno A. Frazier

SURFACES AND INTERFACES

Anchoring of Organic Molecules on Cu(001) Surface Through S-Headgroup ................................................... 17

P. Monachesi, L. Chiodo, F. Bussolotti, M.G. Betti, and C. Mariani

In Situ Pretreatment Approach for Surface Deterioration Alleviation Amidst Thermal Desorption of Si(100) ............................................................................................................................................. 23

A.F. Pun, X. Wang, J.B. Meeks, S.M. Durbin, and J.P. Zheng

Significance of Surface Topography on Performance and Lifetime of MEMS Switches and Relays .............................................................. 29

Lior Kogut and Kyriakos Komvopoulos

RELIABILITY AND PACKAGING

Effects of Hydrogen Annealing Process Conditions on Nano Scale Silicon (011) Fins ......................................... 37

Rownak J. Zaman, Weize Xiong, Rudy Quintanilla, Thomas Schulz, C. Rinn Cleavelin, Rick Wise, Mike Pas, Paul Patruno, Klaus Schruefer, and Sanjay K. Banerjee
Detection of Residual Stress in Silicon Carbide MEMS by μ-Raman Spectroscopy

John C. Zingarelli, Michael A. Marciniak, and Jason R. Foley

Strain Transduction in Conductor-Modified Polymers

Eerik T. Hantsoo, Vanessa B. Chial, Yanan Zhao, Kevin C. Chan, Klint A. Rose, Kenneth S. Wu, and Beth L. Pruitt

TRIBOLOGY

Characterization of Ti/TiN and TiN Conductive Layer for High Temperature MEMS Devices

Peter Lange, Birger Ohlsen, Sebastian Puls, and Joerg Syre

Exchange Spring Type Magnet Realized in FePt/Fe Multilayers Deposited by Magnetron Sputtering

Yousong Gu, Dayong Zhang, Xiaoyuan Zhan, Zhen Ji, Xiaolan Zhen, and Yue Zhang

MATERIALS AND MECHANICS

Fabrication of Electrical Nanocontacts to Nanometer-Sized Materials and Structures Using a Focused Ion Beam


Through-Wafer Polysilicon Interconnect Fabrication With In Situ Boron Doping

Ismo Luusua, Kimmo Hetitinen, Panu Pekko, Tapani Vehmas, and Hannu Luoto

NEW MATERIALS AND FABRICATION METHODOLOGIES

Low Temperature MEMS Manufacturing Processes: Plasma Activated Wafer Bonding

Viorel Dragoi, Sharon Farrens, and Paul Lindner
Spontaneous Growth of Nickel Silicide Nanowires and Formation of Self-Assembled Nanobridges by the Metal Induced Growth Method ......................................................... 91
Joondong Kim, Wayne A. Anderson, and Young-Joo Song

Self Assembled Monolayer Methods in the Fabrication of High-Tc Superconductor SNS Junction Nano-Devices ........................................ 97
Sungwook Kim, In Soon Chang, Fannyben Patel, and John T. McDevitt

Electrical and Optical Properties of Self-Assembled, Ordered Gold Nanocrystal/Silica Thin Films Prepared by Sol-Gel Processing ................................................................. 103
Kai Yang, Hongyou Fan, Michael J. O’Brien, Sima La Fontaine, Gabriel P. Lopez, Kevin J. Malloy, C. Jeffrey Brinker, and Thomas W. Sigmon

RF AND OPTICAL APPLICATIONS

Micro-Molded High Q Polymer Resonators for Optical Loss Determination ................................................................. 111
Andrea L. Martin, Akil Srinivasan, Deniz K. Armani, Bumki Min, and Kerry J. Vahala

Fine-Tuning of the Spectral Collection Efficiency in a Multilayer Junction Through the LSP Technique ........................................ 117
M. Fernandes, A. Fantoni, M. Niehus, P. Louro, G. Lavareda, C.N. Carvalho, and M. Vieira

Mechanically Tunable Nanophotonic Devices ........................................ 123
W. Park, E. Schonbrun, M. Tinker, Q. Wu, and J.-B. Lee

MICRO- AND NANOFLUIDICS

Micrometer Scale Silicon Dioxide Tunnels for On-Chip Fluidic Sample Delivery to Nanometer-Scale Chemical Sensors ........................................ 131
Ali Gokirmak and Sandip Tiwari

A Fabrication of a Novel Microfluidic Reactor Microsynthesis of MIP’s Particles ........................................ 137
Kyung M. Choi, John A. Rogers, and Kenneth J. Shea
DRUG AND PROTEIN DELIVERY

Oligonucleotide Metallization for Conductive Bio-Inorganic Interfaces in Self Assembled Nanoelectronics and Nanosystems ........................................ 145
Xu Wang, Krishna Singh, Chris Tsai, Roger Lake, Alexander Balandin, Mihri Ozkan, and Cengiz Ozkan

Efficient Atomization Using MHz MEMS-Based Ultrasonic Nozzles .......................................................... 149
Shirley C. Tsai, Yu L. Song, Yuan F. Chou, J.H. Cheng, and Chen S. Tsai

ACTUATORS FOR BioMEMS

Thin Film Silicon Microbridges for DNA Detection .................................................. 157
T. Adrega, J. Gaspar, F. Fixe, V. Chu, D.M.F. Prazeres, and J.P. Conde

Fabrication and Electromechanical Properties of Conductive Polymer Microbridge Actuators .................................................. 163
Guandong Zhang, Joao Gaspar, Virginia Chu, and Joao Pedro Conde

Low-Cost and Chemical Resistant Microfluidic Devices Based on Thermoplastic Elastomers for a Novel Biosensor System .......................... 169
I. Stoyanov, M. Tewes, S. Glass, M. Koch, and M. Löhndorf

Multi-Layer Photopolymer Micromachining ............................................................. 175
J.R. Huang, B. Bai, J. Shaw, T.N. Jackson, C.Y. Wei, V. Manivannan, and K. Durocher

A Novel Latching Relay Fabricated Using an Oxide Molded Tungsten Process ........................................ 189
J.G. Fleming, Michael Baker, and David Luck

PROCESS AND DEVICE MODELING

Hot Embossing Lithography: Release Layer Characterization by Chemical Force Microscopy ........................................ 197
Neil S. Cameron, Arnaud Ott, Hélène Roberge, and Teodor Veres
Carbohydrate-Carbohydrate Recognition Promotes Cell Adhesion

Christine Gourier, Eric Perez, Yongmin Zhang, and Pierre Sinay

POSTER SESSION

Fabrication and Evaluation of Conducting Polymer Nanowire Heterostructures

Yevgeny Berdichevsky and Y.-H. Lo

Composition Influence on the Properties of Titanium-Doped Gamma Iron Oxide Nanoparticles Prepared by Laser Pyrolysis Method

Ion Morjan, Rodica Alexandrescu, Florian Dumitrache, Ion Sandu, Monica Scarisoreanu, Lavinia Albu, Iuliana Soare, Ion Voicu, Bohumil David, Oldrich Schneeweiss, Claudiu Fleaca, Ernest Popovici, and Victor Ciupina

A Systematic Study of the Formation of Nano-Tips on Silicon Thin Films by Excimer Laser Irradiation

D.G. Georgiev, R.J. Baird, I. Avrutsky, G. Auner, G. Newaz, and N. Tokranova

Functionally Engineered Carbon Nanotubes-Peptide Nucleic Acid Nanocomponents

Krishna V. Singh, Xu Wang, Rajeev R. Pandey, Roger Lake, Cengiz S. Ozkan, and Mihrimah Ozkan

Investigation of Electric Characteristics of Nanoscale Composite A$^4$B$^5$C$^6$ Semiconductors: Experiment and Numerical Simulation

H. Khlyap, V. Bilozerzueva, L. Panchenko, P. Shikumbatiuk, and M. Andrukhiv

Etching Silicon Through an Effective Nanomask: An Electrochemical Way to Nanomachining

Stefano Borini, Andrea M. Rossi, Luca Boarino, and Giampiero Amato

An Optical Diffraction Microphone With Active Grating Diaphragm

Kazuhiro Suzuki, Hideyuki Funaki, and Yujiro Naruse
Fabrication of a Bimodal Ferromagnetic Nanosystem in an Etched Silicon Structure and Its Magnetic and Magneto-Optic Characterization

P. Granitzer, K. Rumpf, P. Pölt, A. Reichmann, S. Surnev, and H. Krenn

Nanocomposite Thin Film Coatings for Protection of Materials Surfaces

R. Asmatulu, R.O. Claus, J.B. Mecham, S.G. Corcoran, and Y.X. Wang

Embedded Piezoresistive Microcantilever Sensors: Materials for Sensing Chemical and Biological Analytes

Timothy L. Porter, William Delinger, and Robert L. Gunter

Interpretation of the Phonon Frequency Shifts in ZnO Quantum Dots

Khan A. Alim, Vladimir A. Fonoberov, and Alexander A. Balandin

MATERIALS AND DEVICES

In Vivo Biostability of CVD Silicon Oxide and Silicon Nitride Films

John M. Maloney, Sara A. Lipka, and Samuel P. Baldwin

In Situ Pretreatment Approach for Surface Deterioration Alleviation Amidst Thermal Desorption of GaAs(100)

A.F. Pun, X. Wang, J.B. Meeks, S.M Durbin, and J.P. Zheng

Effect of Dopants on the Band Structure of Barium Strontium Titanate Thin Films

Yuebing Zheng, Shijie Wang, and Cheng Hon A. Huan

MEMS AND PHOTONICS

Multi-Band Terahertz Imaging System Design

Liviu Popa-Simil

A Wide Band Gap Boron-Doped Microcrystalline Silicon Film Obtained With VHF Glow Discharge Method

Feng Zhu, Ying Zhao, Changcun Wei, Xiaodan Zhang, Yantao Gao, Jian Sun, and Xinhua Geng
Diode Laser Bonding of Planar MEMS, MOEMS, and Microfluidic Devices ................................................................. 309
Jie-Wei Chen, Jerry Zybko, and James Clements

SENSORS AND MATERIALS

Investigating Narrow Plasmons in Nanoparticle Arrays Fabricated Using Electron Beam Lithography ..................................................... 317
Erin M. Hicks, Linda Gunnarrsson, Tomas Rindevicius, Shengli Zou, Bengt Kasemo, Mikael Käll, Goerge C. Schatz, Kenneth G. Spears, and Richard P. Van Duyne

Microchannel Arrays in Borophosphosilicate Glass for Photonic Device and Optical Sensor Applications ................................................... 323
Claire L. Callender, Patrick Dumais, Chantal Blanchetière, Christopher J. Ledderhof, and Julian P. Noad

Development of Humidity Sensors Using Layer-by-Layer NanoAssembly of Polypyrrole ............................................................. 329

Stabilized Pd-Alloy/AlN/Si Hydrogen Sensors ......................................................................................................................... 337

NANOSYSTEMS AND DEVICES

Multi-Technology Measurements of Amorphous Carbon Films ........................................................................................................ 345
Jingmin Leng, Jon Opsal, Heath Pois, Osman Sorkhabi, Xiaoping Liu, and Stephen J. Morris

POSTER SESSION

Towards Novel Light-Activated Shape Memory Polymer: Thermomechanical Properties of Photo-responsive Polymers ..................................... 353
Emily A. Snyder and Tat H. Tong
Thermally Stimulated Electron Emission From Scratched Metal Surfaces
Keiji Nakayama and Hitoshi Matamura

Fabrication Methods for Improved Electromechanical Behavior in Piezoelectric Membranes

Quantum Sizing of Power Electronics: A Trend Towards Miniaturization of Power Electronic Systems and Equipments
Arindam Chakraborty and Ali Emadi

In Search of Metallic Nanowires on Si(001)
Inder P. Batra, Bikash C. Gupta, and Aakanksha A. Panjwani

Space Charge Limited Current in Porous Silicon With Traces of Nitrogen Dioxide
Stefano Borini, Andrea M. Rossi, Luca Boarino, and Giampiero Amato

Functional Carbon Nanotube Substrates for Tissue Engineering Applications
X. Zhang, C. Ozkan, S. Prasad, M. Ozkan, and S. Niyogi

Influence of Growth Parameters and Annealing on Properties of MBE Grown GaAsSbN SQWs
Liangjin Wu, Shanthi Iyer, Kalyan Nunna, Sudhakar Bharatan, Jia Li, and Ward J. Collis

Critical Process Issues in the Fabrication of a Lateral, Self-Cleaning, MEMS Switch
Yong Shi and Sang-Gook Kim

Self Organized InAs Quantum Dots on Patterned GaAs Substrates
SELF-ASSEMBLED STRUCTURES

Colloidal Crystal Wires From Directed Assembly
Feng Li, Xavier Bade, Jan Linnros, and John B. Wiley
477

The Performance of the Gate Electrode Using Co Thin Films
Selectively Deposited on SAMs Patterns for a-Si TFT
K.H. Chung
483

NANOMATERIALS SYNTHESIS AND APPLICATIONS

Surface Electronic States and Electrostatic Attractive Forces Between Metals or Semiconductor and Tribocharged Polymers
Yoshihiro Momose, Masahiro Umeki, Daisuke Suzuki,
and Keiji Nakayama
491

Chirality Characterization of Dispersed Single Wall Carbon Nanotubes
Min Namkung, Phillip A. Williams, Candis D. Mayweather,
Buzz Wincheski, Cheol Park, and Juock S. Namkung
497

Energetic Neutral Atom Beam Lithography/Epitaxy for Nanoscale Device Fabrication
Elshan A. Akhadov, Alexander H. Mueller, and
Mark A. Hoffbauer
503

TiN/GaN Metal/Semiconductor Multilayer Nanocomposites Grown by Reactive Pulsed Laser Deposition
Vijay Rawat and Timothy D. Sands
507

Zinc Powder Evaporation: An Efficient Way of Synthesizing a Wide Range of High-Quality ZnO Nanostructures at Lower Temperature
Yue Zhang, Jian He, Yunhua Huang, Yousong Gu,
Zhen Ji, and Cheng Zhou
513

Author Index
519

Subject Index
523
PREFACE

Symposium J, "Micro- and Nanosystems—Materials and Devices," held March 28–April 1 at the 2005 MRS Spring Meeting in San Francisco, California, provided an active forum in the areas of (a) microsystems, including micromachines and micro-electro-mechanical systems (MEMS) as well as micro-optical-electro-mechanical systems (MOEMS), and (b) nanosystems, also referred to as nano-electro-mechanical systems (NEMS) or molecular machines, including devices that incorporate nanotubes, nanocantilevers, and molecular or atomic manipulators. A wide range of physical and chemical sensor applications have been addressed with these technologies, such as inertial, magnetic, environmental, chemical, and biological detection. In addition, the symposium gave an overall perspective about the technology requirements for taking a leap from conventional micro- and nano-systems towards bio-nano systems for realizing functional materials and systems for applications such as drug delivery.

The symposium was initiated with a tutorial titled BioMEMS—Materials, Fabrication and Devices, and taught by Rashid Bashir (Purdue University), Kevin Turner (MIT) and David A. LaVan (Yale University). Besides overviewing surface and bulk microfabrication techniques, they placed a special emphasis on methods of fabricating polymer micro- and nano-systems and applications in drug delivery and single molecule detection. The symposium provided an exciting environment to discuss some of the latest progress in fabrication and characterization of related technologies. We would like to list the following highlights from our symposium:

Joseph Michael from Sandia National Laboratories discussed the application of focused ion beam milling in characterizing MEMS devices, which is becoming a conventional tool for this purpose.

James Kelly from Sandia National Laboratories discussed the electrodeposition of structures through high aspect ratio features in thick resists, which is a new and powerful trend in MEMS fabrication.

Xuan Zhang from UCR discussed the use of nanostructured substrates and demonstrated neurite guidance and growth using vertical carbon nanotube arrays.

Roya Maboudian from UCB talked about surface and materials issues for reliability of MEMS devices and provided an insight into how characterization schemes for evaluating MEMS reliability can be developed.

AH Gokirmak from Cornell University demonstrated a CMOS compatible integrated fluidic channel system for the analysis of oligonucleotides.

Cedric Meier from UCSB discussed the fabrication of GaN photonic crystal membrane cavities.

The organizers express their gratitude to all the invited and contributed speakers and poster presenters for their participation. It is expected that further developments in the field will provide additional stimulating symposia in the future.

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