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978-1-107-41229-3 - Materials Science of Microelectromechanical Systems (MEMS) Devices III

Edited by Harold Kahn, Maarten de Boer, Michael Judy and S. Mark Spearing

Table of Contents

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Table of Contents

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Table of Contents

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CONTENTS

Preface xi
Materials Research Society Symposium Proceedings..... xii

METROLOGY

**Temperature-Dependent Internal Friction in Silicon
Nanoelectromechanical Systems..... EE1.3**
Stephane Evoy, Anatoli Olkhovets, Dustin W. Carr,
Jeevak M. Parpia, and Harold G. Craighead
Resonating Microelectromechanical Structures for Metrology..... EE1.4
A.M. Allen and G.C. Johnson

MECHANICAL PROPERTIES

*** On the Fracture Toughness of Polysilicon MEMS Structures..... EE2.1**
H. Kahn, R. Ballarini, and A.H. Heuer
**The Influence of Fabrication Governed Surface Conditions on the
Mechanical Strength of Thin Film Materials EE2.2**
Ioannis Chasiotis and Wolfgang G. Knauss
**On the Evolution of Surface Morphology of Polysilicon MEMS
Structures During Fatigue EE2.3**
S.M. Allameh, B. Gally, S. Brown, and W.O. Soboyejo
**Anelastic Creep Phenomena in Thin Metal Plated Cantilevers for
MEMS..... EE2.5**
Deborah J. Vickers-Kirby, Randall L. Kubena,
Frederic P. Stratton, Richard J. Joyce, David T. Chang,
and Jinsoo Kim

TRIBOLOGY

Novel Chemistry for Surface Engineering in MEMS EE3.3
X.-Y. Zhu, Y. Jun, V. Boiadjev, R. Major, H.I. Kim,
and J.E. Houston

*Invited Paper

***ELECTRO-DEPOSITED
METALS AND PZT***

Elastic and Inelastic Properties of Electroplated Nickel Used in LIGA Techniques	EE4.1
Skandar Basrour and Patrick Delobelle	
Structural and Micromechanical Assessment of Electrochemically Grown Metal Layers for Si Magnetic Microactuators	EE4.2
Susanna Martinez, Nourdin Yaakoubi, Christophe Serre, Alejandro Pérez-Rodríguez, Joan Ramon Morante, Ismael Díez-Pérez, Pau Gorostiza, and Jaume Esteve	
Defects and Failure Modes in PZT Films for a MEMS Microengine.....	EE4.4
D.F. Bahr, B.T. Crozier, C.D. Richards, and R.F. Richards	
Dielectric and Pulsed Spectroscopy of Shear Mode PZT Microactuator	EE4.6
Jürgen Brünahl, Alex Grishin, and Sergey Khartsev	

POSTER SESSION

Multilayer Materials for Electrostatic Switches.....	EE5.1
Mark A. Phillips, Brennan L. Peterson, Christine M. Esber, Jesse Hwang, and Bruce M. Clemens	
Optical Manipulation of Inorganic and Organic Objects in Soft Microfluidic Devices	EE5.2
Cengiz S. Ozkan, Erhan Ata, Mihrimah Ozkan, and Sadik C. Esener	
Adjustment of Membrane Stress Using Aluminum Oxide and Silicon Dioxide Multi Layer Structure.....	EE5.3
Ryuichi Kubo, Yukio Yoshino, Kazuhiro Inoue, Takahiro Makino, and Seiichi Arai	
Young's Modulus and Fracture Strength of Three Polysilicons	EE5.5
W.N. Sharpe, Jr., K. Jackson, G. Coles, and D.A. LaVan	
High-Cycle Fatigue of Polycrystalline Silicon Thin Films in Laboratory Air.....	EE5.8
C.L. Muhlstein, S.B. Brown, and R.O. Ritchie	
Finite Element Analysis of the Precracked Line Scratch Test	EE5.9
A.A. Volinsky, L. Mercado, V. Sarihan, and W.W. Gerberich	

Deformation Mechanisms of a Micro-Sized Austenitic Stainless Steel With Fine Grains	EE5.10
G.P. Zhang, K. Takashima, M. Shimojo, and Y. Higo	
Corrosion Fatigue Tests of Micro-Sized Specimens	EE5.11
Y. Mizutani, Y. Higo, Y. Ichikawa, A. Morita, K. Takashima, and M.V. Swain	
Anisotropic Fracture Behavior of Electroless Deposited Ni-P Amorphous Alloy Thin Films	EE5.12
Kazuki Takashima, Akio Ogura, Yusuke Ichikawa, and Yakichi Higo	
Temperature and Doping Dependency of Piezoresistivity in P-Type Silicon	EE5.13
Eivind Lund and Terje G. Finstad	
Curvature Model for an Ion-Machined Free-Standing Thin Film MEMS Device	EE5.14
H.T. Johnson, P. Bierden, and T.G. Bifano	
Nanoindentation of Microspring Thin Films.....	EE5.15
Mary W. Seto, Brian Dick, and Michael J. Brett	
Effect of La on the Growth of Cu₆Sn₅ Intermetallic Compound for Improved Sn-Pb Solder Joints.....	EE5.18
Xin Ma, Hongyuan Fang, Yiyu Qian, and Fusahito Yoshida	
Measurements of Residual Stress in the Layers of Thin Film Micro-Gas Sensors.....	EE5.19
Youngman Kim and Sung-Ho Choo	
Control of Stress With Growth Conditions and Mechanical Parameters Determination of 3C-SiC Heteroepitaxial Thin Films	EE5.20
C. Gourbeyre, T Chassagne, M. Le Berre, G. Ferro, C. Malhaire, Y. Monteil, and D. Barbier	
Double Sided Porous Silicon on Patterned Substrates for Thermal Effect Microsystems.....	EE5.21
S. Périchon, V. Lysenko, B. Remaki, and D. Barbier	
On the Role of the Underlying Microstructure on the Mechanical Properties of Microelectromechanical Systems (MEMS) Materials	EE5.22
G.F. Dirras, G. Coles, A.J Wagner, S. Carlo, C. Newman, K.J. Hemker, and W.N. Sharpe, Jr.	
Annealing Effects on the Microstructure and Mechanical Properties of LIGA Nickel for MEMS.....	EE5.23
H.S. Cho, W.G. Babcock, H. Last, and K.J. Hemker	

Unstable Etching of Si(110) With Potassium Hydroxide..... EE5.27
Z. Moktadir, K. Sato, T. Shimizu, and M. Shikida

**Simple and Low Cost Patterning Process for Sputtered
Pb(Zr,Ti)O₃ Thin Films and Electrodes for Membrane-Based
Microsystems Applications EE5.29**
Cyril Millon, Christophe Malhaire, Emmanuel Defaÿ,
and Daniel Barbier

Microfabrication of Crevice Corrosion Samples EE5.31
Xiaoyan Wang, Robert G. Kelly, Jason S. Lee,
and Michael L. Reed

**Etch Rate and Surface Morphology of Plasma Etched Glass
Substrates EE5.32**
Junting Liu, Nikolay I. Nemchuk, Dieter G. Ast,
and J. Gregory Couillard

**Fabrication of MEMS Components Based on Ultrananocrystalline
Diamond Thin Films and Characterization of Mechanical
Properties EE5.33**
A.V. Sumant, O. Auciello, A.R. Krauss, D.M. Gruen,
D. Ersoy, J. Tucek, A. Jayatissa, E. Stach, N. Moldovan,
D. Mancini, H.G. Busmann, and E.M. Meyer

**Asymmetrical Polysilicon Electrothermal Microactuators for
Achieving Large In-Plane Mechanical Forces and Deflections..... EE5.34**
Edward S. Kolesar, Peter B. Allen, Noah C. Boydston,
Jeffery T. Howard, Simon Y. Ko, Matthew D. Ruff,
Josh M. Wilken, and Richard J. Wilks

**Issues in the Flexible Integration of Sputter-Deposited PZT Thin
Films With Polysilicon and Ti/Pt Electrode Layers for Use as
Sensors and Actuators in Microelectromechanical Systems
(MEMS) EE5.35**
C.F. Knollenberg, T.D. Sands, A.S. Nickles, and R.M. White

**Measurement of Electrical Charge During Nanoindentation of
Ferroelectric Thin Films EE5.37**
M. Algueró, A.J. Bushby, and M.J. Reece

**Wet-Etch Patterning of Lead Zirconate Titanate (PZT) Thick
Films for Microelectromechanical Systems (MEMS) Applications..... EE5.39**
L.-P. Wang, R. Wolf, Q. Zhou, S. Trolhier-McKinstry,
and R.J. Davis

PACKAGING

*** Challenges in DMD™ Assembly and Test.....EE6.1**
S. Joshua Jacobs, Joshua J. Malone, Seth A. Miller,
Armando Gonzalez, Roger Robbins, Vincent C. Lopes,
and Dennis Doane

**Characterization of Silicon Fusion Bonds Using a Four-Point
Bend Specimen.....EE6.3**
Kevin T. Turner, Arturo A. Ayon, Dongwon Choi, Bruno Miller,
and S. Mark Spearing

**Phenomenological Model of Non-Evaporated Getter for Micro-
electromechanical Systems (MEMS) ApplicationsEE6.4**
Caroline A. Kondoleon and Thomas F. Marinis

**High Temperature, High-Pressure Fluid Connections for Power
Micro-Systems.....EE6.5**
Todd S. Harrison, Adam P. London, and S. Mark Spearing

NEW MATERIALS

*** Developing a New Material for MEMS: Amorphous DiamondEE7.1**
J.P. Sullivan, T.A. Friedmann, M.P. de Boer, D.A. LaVan,
R.J. Hohlfelder, C.I.H. Ashby, M.T. Dugger, M. Mitchell,
R.G. Dunn, and A.J. Magerkurth

Preparation of Mesoporous Oxides for MEMS Structures.....EE7.3
Jong-Ah Paik, Nobuaki Kitazawa, Shih-Kang Fan,
Chang-Jin Kim, Ming C. Wu, and Bruce Dunn

Silicon Germanium Epitaxy: A New Material for MEMS.....EE7.4
J.T. Borenstein, N.D. Gerrish, R. White, M.T. Currie,
and E.A. Fitzgerald

*OPTICAL MICROSYSTEMS AND
PROCESSING TECHNIQUES I*

**The Characterization of TiNi Shape-Memory Actuated
MicrovalvesEE8.3**
B.-K. Lai, G. Hahm, L. You, C.-L. Shih, H. Kahn, S.M. Phillips,
and A.H. Heuer

*Invited Paper

Processing of Thick Dielectric Films for Power MEMS: Stress and Fracture EE8.4
Kuo-Shen Chen, Xin Zhang, and S. Mark Spearing

Microbridge Testing of Silicon Oxide/Silicon Nitride Bilayer Films EE8.5
C.-F. Qian, Y.-J. Su, M.-H. Zhao, and T.-Y. Zhang

PROCESSING TECHNIQUES II

Low Temperature Si Direct Bonding by Plasma Activation EE9.2
Yonah Cho and Nathan W. Cheung

MEMS Materials and Fabrication Technology on Large Areas: The Example of an X-ray Imager EE9.3
J.H. Daniel, B. Krusor, R. Lau, J.P. Lu, Y. Wang, M. Mulato, R.B. Apte, R.A. Street, A. Goredema, D.C. Boils-Boissier, S.E. Silver, and P.M. Kazmaier

Micropatterning of Ceramics on Substrates Towards Gas Sensing Applications EE9.4
Martin Heule, Lorenz Meier, and Ludwig J. Gauckler

The Mechanical Properties of Polycrystalline Silicon Carbide Films Determined Using Bulk Micromachined Diaphragms EE9.5
Shuvo Roy, Christian Zorman, and Mehran Mehregany

Author Index

Subject Index

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Table of Contents

[More information](#)

PREFACE

Microelectromechanical systems (MEMS) is a rapidly growing field with numerous current and potential commercial applications, including pressure and inertial sensing, optical and electrical switching, power conversion, fluidic flow control, and chemical analysis. MEMS combine mechanical and electrical (and sometimes optical, chemical, or biological) function at small scales, typically microns to millimeters, using many of the batch fabrication techniques developed for the microelectronics industry. Much of the recent progress in MEMS has been enabled by materials science developments, and this will invariably continue in the future. New materials have been developed or adapted for MEMS applications for use as structures, actuators, and sensors. New processing techniques also have been established for integrating these materials with existing MEMS, as well as expanding the range of possible structures that can be fabricated from current materials. In addition, MEMS technology has proven ideal for allowing the mechanical and tribological characterization of materials at small scales. The 52 papers included in this volume address these issues. A variety of MEMS materials are discussed, including Si, porous Si, SiC, SiGe, diamond, electroplated Ni and Cu, as well as piezoelectric, ferroelectric, and shape memory materials, and self-assembled organic monolayers. Fabrication processes considered include plasma and chemical etching, Si bonding, high-aspect-ratio lithography, and micromolding, as well as several packaging techniques. In addition, the stress, fracture strength, fatigue, and friction of MEMS materials and structures are discussed.

This volume contains papers presented at Symposium EE, "Materials Science of Microelectromechanical Systems (MEMS) Devices III," held November 27–28 at the 2000 MRS Fall Meeting in Boston, Massachusetts, and is the third in a series of proceedings held by MRS on this topic. The proceedings of the first two were published as Volumes 546 and 605, and a fourth symposium in this series is scheduled for the 2001 MRS Fall Meeting. Prior to this series, MRS has published two volumes on closely related topics, namely *Microelectromechanical Structures for Materials Research* (Volume 518) and *Materials for Mechanical and Optical Microsystems* (Volume 444).

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Table of Contents

[More information](#)**MATERIALS RESEARCH SOCIETY SYMPOSIUM PROCEEDINGS**

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Table of Contents

[More information](#)**MATERIALS RESEARCH SOCIETY SYMPOSIUM PROCEEDINGS**

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