

2010 Symposium on Design Test Integration and Packaging of MEMS/MOEMS

(DTIP 2010)

**Seville, Spain
5 – 7 May 2010**



**IEEE Catalog Number: CFP10DTI-PRT
ISBN: 978-1-4244-6636-8**

TABLE OF CONTENTS

SESSION C1: NUMERICAL SIMULATION AND MODELLING

Molecular Dynamics Simulation of Mechanical Properties of Gold Nanowire	1
<i>P. Nayebe, M. Shamsheersaz, E. Zaminpeyma</i>	
A Study of Package Effects on the Behavior of MEMS Convective Accelerometers	4
<i>A.A. Rezik, F. Azais, N. Dumas, M. Masmoudi, F. Mailly, P. Nouet</i>	

SESSION M1: RELIABILITY AND TESTING

Leak Detection Methods for Glass Capped and Polymer Sealed MEMS Packages	8
<i>S. Millar, M.P.Y. Desmulliez, S. McCracken</i>	
Analysis of Shock-induced Polysilicon MEMS Failure: A Multi-scale Finite Element Approach	14
<i>S. Mariani, A. Ghisi, R. Martini, A. Corigliano, B. Simoni</i>	
Structure Modification of M-AFM Probe for the Measurement of Local Conductivity	20
<i>A. Fujimoto, L. Zhang, A. Hosoi, Y. Ju</i>	

SESSION C2: RF MEMS

Analysis and Design of an All Metal in Line Series Ohmic RF MEMS Switch for Microwave Applications	25
<i>M. Spasos, N. Charalampidis, K. Tsiakmakis, R. Nilavalan</i>	
A New Design of Rotational Tuneable WideBand RF MEMS Capacitor	31
<i>J. Pagazani, P. Nicole, L. Rousseau, F. Marty, G. Lissorgues</i>	
Blind Tracing of Mechanical Movement in Electro-static MEMS Structures	37
<i>V. Szekeley, P.G. Szabo</i>	
Design of a Smart CMOS High-Voltage Driver for Electrostatic MEMS Switches	42
<i>N. Dumas, L. Latorre, F. Mailly, P. Nouet</i>	

SESSION M2: SENSORS

Array of Biomimetic Hair Sensor Dedicated for Flow Pattern Recognition	46
<i>A. Dagamseh, C. Bruinink, M. Kolster, R. Wiegerink, T. Lammerink, G. Krijnen</i>	
Thermally Compensated Intelligent Irradiation Sensor	49
<i>E. Bandy, A. Foldvary, M. Rencz</i>	
Single-Cell-Based Measurement of Supraphysiological Thermal Injury in Human Carcinoma Cells Utilizing a Micropatterned Hydrogel Chip	54
<i>C. Jen, C. Huang, C. Tsai</i>	
Multilayered Magneto-impedance Microsensors for Non Destructive Control	60
<i>J. Moulin, M. Woytasik, I. Shahosseini, F. Alves</i>	
A Dual Axis CMOS Frontside Bulk Micromachined Thermal Accelerometer	65
<i>A. Garraud, A. Giani, P. Combette, B. Charlot, M. Richard</i>	

SESSION C3: COMPACT & BEHAVIORAL MODELLING

Combined Optimization of Electrical and Mechanical Parameters of an Out-of-plane Gap-closing Electrostatic Vibration Energy Harvester (VEH)	71
<i>R. Guillemet, P. Basset, D. Galayko, T. Bourouina</i>	
Modeling Analysis of a Tri-Axial Microaccelerometer with Piezoelectric Thin-Film Sensing Using Energy Method	77
<i>J. Yu, C. Lee, C. Chang, W. Guo</i>	
An Approach for Systematic Behavioral Modeling of Micro Systems	83
<i>P. Schneider, S. Reitz, G. Elst, A. Wilde</i>	

System-Level Modeling and Simulation of the Cell Culture Microfluidic Biochip ProCell	89
<i>W.H. Minhass, P. Pop, J. Madsen, M. Hemmingsen, M. Dufva</i>	
Energy Dissipation Associated with Material Damping on Vibrating MEMS Components	97
<i>G. De Pasquale, T. Veijola, A. Soma</i>	

SESSION M3: ACTUATORS

Normally Closed Piezoelectric Micro Valve	103
<i>S. Zaehring, M. Menacher, P. Kirchner, N. Schwesinger</i>	
Photonic Micromachined Tunable Lasers	108
<i>A.Q. Liu</i>	
High-Sensitive Piezoelectrically-Transduced Silicon Disk Micro Resonator for On-Chip Human Healthcare	111
<i>J. Lu, T. Suga, Y. Zhang, T. Itoh, R. Maeda, T. Mihara</i>	
Low Voltage Piezoelectricity Actuating Variable Focus Plano-Convex Liquid Lens Module Fabrication	116
<i>H. Yang, J. Huang, Y. Lin, R.F. Shyu, M. Yeh</i>	

CAD, DESIGN AND TEST POSTERS INTRODUCTION SESSION

The Study of Energy Storage and Temperature-Controlled for the Packaging Plate with Microencapsulated Phase Change Materials	121
<i>W. Lin, D. Huang, M. Lin, C. Lai</i>	
Simulations of Surface and Bulk Acoustic Wave MEMS Biosensors	126
<i>N. Jamil, A.N. Nordin, I. Voiculescu, M. Mel</i>	
Low-Frequency MEMS Energy Harvesters for the Supplying of Vehicle Diagnostic Systems	131
<i>G. De Pasquale, A. Soma</i>	
An Investigation of the Mechanical Behavior of a Microswitch Beam under Thermal and Electrostatic loading Including Cryogenic Effect	137
<i>W.F. Faris, H.M. Mohammed, E.K. Heng</i>	
Effect of Mechanical Properties Variation of Polysilicon on Microcantilever Mass Sensor Sensitivity	141
<i>M. Maroufi, S. Zihajehzadeh, M. Shamsirsaz, A.H. Rezaie</i>	
Simple and Efficient Control of MEMS by Means of Operatorial Transformations	145
<i>E. Montseny, H. Camon</i>	
Neural Network Calibration of a Semiconductor Metal Oxide Micro Smell Sensor	151
<i>R. Nadafi, S.N. Nejad, M. Kabgani, F. Barazandeh</i>	
A Comparative Design Study on In-pipe Inspection Micro Robots Using AHP Method	155
<i>R. Nadafi, F. Edalatfar, P. Zomorodian, S.N. Nejad, M. Kabgani, F. Barazandeh</i>	
Design and Modeling of Stable, High Q-factor Curved Fabry-Perot Cavities	162
<i>M. Malak, T. Bourouina, N. Pavy, E. Richalot, F. Marty, A. Liu</i>	
Modeling and Finite Element Analysis of Mechanical Behavior of Flexible MEMS Components	168
<i>M. Pustan, S. Paquay, V. Rochus, J. Golinval</i>	
Simulation of a MEMS Piezoelectric Energy Harvester	174
<i>A.A.M. Ralib, A.N. Nordin, H. Salleh</i>	

MICROFABRICATION, INTEGRATION AND PACKAGING POSTERS INTRODUCTION SESSION

Microfabrication and Testing of Dye-Sensitized-Solar-Cells Employing Atomic-Layer-Deposition	179
<i>R. Moreira, D. Elam, R. Kotha, A. Ayon</i>	
Atomic Layer Deposited (ALD) Zinc Oxide Film Characterization for NEMS and MEMS	182
<i>R. Kotha, D. Elam, G. Collins, N. Guven, A. Chabanov, C.L. Chen, A.A. Ayon</i>	
High-Performance MEMS-Based Gas Chromatography Column with Integrated Micro-Heater	187
<i>C. Lee, L. Fu, T. Hong, S. Chen, C. Chiang, W. Kuo</i>	
Fabrication of a Metal Protector for a Fiber Sensor using Through-Mask Electrochemical Micromachining with Pulse DC Power	192
<i>W. Shih, C. Wang, H. Tsai, W. Wu</i>	
Fabrication and Characterization of MEMS-based Flow Sensors Based on Hot Films	197
<i>R. Ma, Y. Wang, Y. Tsai, C. Chang, C. Lee</i>	

Static and Dynamic Mechanical Properties Measurement of Micro-Nano Metal Thin Film Using Cantilever Beam Deflection	200
<i>Y. Cheng, M. Lin, P.C. Chen, C. Tong</i>	
Fabrication of Wireless Sensor Platform on Transparent Flexible Film Using Screen Printing and Via Interconnect	206
<i>C.W.P. Shi, X. Shan, G. Tarapata, R. Jachhowicz, C.W. Lu, H.T. Hui</i>	
Investigation of Parallel Heat-flow Path in Electrothermal Microsystems	212
<i>P.G. Szabo, V. Szekely</i>	
Thermal Behaviour of Thin Photoactive Layer Crystalline Solar Cells	218
<i>B. Plesz, E. Bandy, A. Foldvary, V. Timar-Horvath, J. Mizsei</i>	
Nanoindentation Experiments with Small Tip Radii: An Experimental Method	222
<i>J. Maregoutte, C. Seguineau, C. Malhaire, T. Fourcade, J. Desmarres, X. Lafontan, P. Francis</i>	
Phase Shifting Microwave Structure Employing Atomic Layer Deposited (ALD) and Ferroelectric Films on Flexible Substrates	228
<i>R. Kotha, D. Elam, A. Chabanov, C.L. Chen, A.A. Ayon</i>	
Wafer-Level Glass Capping with Optical Integration	233
<i>U. Hansen, S. Maus, J. Leib, M. Toepper</i>	
Hermetic BSG Thin Film Coatings for Harsh Environments Applications	238
<i>S. Maus, U. Hansen, J. Leib, M. Toepper</i>	
Advances in the Design and Test of a Novel Open Ended Microwave Oven	243
<i>S.K. Pavuluri, T. Tilford, G. Goussetis, M.P.Y. Desmulliez, M. Ferenets, R. Adamietz, F. Eicher, C. Bailey</i>	
Avian Influenza Surveillance System in Poultry Farms Using Wireless Sensor Network	249
<i>H. Okada, K. Suzuki, T. Kenji, T. Itoh</i>	

SESSION C4: NEW DEVICE AND COMPONENTS

A Piezoelectric Energy Harvester with a Mechanical End Stop on One Side	255
<i>L.J. Blystad, E. Halvorsen</i>	
Nonlinear Behaviour of a Micromachined SOI Device for Energy Harvesting Application	259
<i>B. Ando, S. Baglio, N. Dumas, L. Latorre, P. Nouet, C. Trigona</i>	
Study of a 3D MEMS-based Tactile Vibration Sensor for the Use in Middle Ear Surgery	262
<i>Y. Arthaud, L. Rufer, S. Mir</i>	

SESSION M4: EMBOSsing AND MOULD

Hot Embossing of High Performance Polymers	268
<i>M. Worgull, A. Kolew, M. Heilig, M. Schneider, H. Dinglreiter, B. Rapp</i>	
Alternative Mould Insert Fabrication Technology for Micromoulding by Galvanic Replication	274
<i>M. Wissmann, M. Guttman, M. Hartmann, A. Hofmann, B. Hummel</i>	
New High Fill-Factor Dual-Curvature Microlens Array Fabrication Using UV Proximity Printing	280
<i>T. Lin, H. Yang, C. Chao</i>	
Technology of Microthermoforming of Complex Three-dimensional Parts with Multiscale Features	285
<i>M. Heilig, M. Schneider, T. Ide, M. Worgull</i>	

SESSION M5: CHARACTERIZATION

Alternative Materials for RF MEMS Switches in III-V Technology	291
<i>A. Persano, F. Quaranta, A. Cola, M.C. Martucci, P. Creti, A. Taurino, P. Siciliano</i>	
Combining Indirect Microfluidic Systems with Polymer Components Manufactured from Photocurable Perfluoropolyethers	295
<i>B.E. Rapp, M. Worgull</i>	
Influence of Deposition Temperature of ZnO Thin Films for Self Powered Wearable Fabrics using ALD	297
<i>D. Elam, R. Kotha, R. Hackworth, A. Ayon, C. Chen, A. Chabanov</i>	

SPECIAL SESSION ON LARGE AREA MANUFACTURING

A Novel Chip-on-Glass method for Slim LCD Packaging	301
<i>G. Wang, Y. Lin, K.J. Chang</i>	

Large Area Micro Roller Embossing Using Low Cost Flexible Mould Fabricated from Polymer-Metal Film	307
<i>X. Shan, Y.C. Soh, L. Jin, C.W. Lu</i>	
Continuous Nano/Micro-machining and Weaving Integration Process for Fiber Substrates	311
<i>T. Itoh, S. Takamatsu, T. Kobayashi, N. Shibayama, K. Miyake</i>	
Roll-to-Roll Hot Embossing of Microstructures	317
<i>T. Velten, F. Bauerfeld, H. Schuck, S. Scherbaum, C. Landesberger, K. Bock</i>	

INVITED TALK 2: VALUE & PACKAGING

Value Added Packaging of Microsystems	323
<i>E. Jung</i>	

SESSION C5: MICROFABRICATION, RELIABILITY & TESTS

Replication of Micro and Sub-micro Structures by Means of Hot Embossed Polymer Inserts	330
<i>A. Kolew, K. Sikora, D. Munch, M. Worgull</i>	
Synthesis of Biochemical Applications on Digital Microfluidic Biochips with Operation Variability	335
<i>M. Alistar, E. Maftie, P. Pop, J. Madsen</i>	

SESSION M6: ASSEMBLY & PACKAGING

Low-Temperature Bonding for Microdevices	343
<i>Y. Wang, J. Lu, T. Suga</i>	
Parametric Study of Flip Chip Packaging for MEMS Device with Diaphragm	347
<i>C. Chuang, W. Li, C. Wang, S. Lee</i>	
Design of a Fully Automated Assembly Unit for Integration of Surface Acoustic Wave Sensors into Polymer Housings for Biomedical Applications	351
<i>A. Gunther, B.E. Rapp</i>	

SPECIAL SESSION CONTROL & READ-OUT ARCHITECTURES FOR MEMS AND NEMS

Design of a Co-integrated CMOS/NEMS Oscillator with a Simple Electronic Circuit	353
<i>G. Arndt, E. Colinet, J. Juillard</i>	
An Optimized Electronic Architecture for Resistive Sensors	357
<i>B. Alandry, E.M. Boujamaa, S. Hacine, L. Latorre, F. Mailly, P. Nouet</i>	
Identification of Dynamic Nonlinear Thermal Transfers for Precise Correction of Bias induced by Temperature Variations	361
<i>C. Casenave, G. Montseny, H. Camon, F. Blard</i>	

SESSION M7: MANUFACTURING

Fabrication of the Novel Multi-D-Shape Fiber Sensor by Femtosecond Laser Machining with the Diffractive Optical Element	367
<i>C. Chen, J. Tang, W. Wu</i>	
Fabrication of a Novel Microcantilever Probe with Inverted Pyramidal Microdischarge for Maskless Scanning Plasma Etching	372
<i>L. Wen, Q. Zhang, W. Xiang, H. Wang, L. He, J. Chu</i>	
Calculated Performance Characteristics of Micromachined Thermopiles in Wearable Devices	376
<i>V. Leonov, J. Su, R.J.M. Vullers</i>	

SESSION M8: APPLICATIONS

An Experimental Characterization of Au-, Ru-, Rh and Ni- Based Microcontacts for MEMS	382
<i>A. Broue, J. Dhennin, P. Charvet, F. Courtade, P. Heeb, P. Pons, R. Plana</i>	
Feasibility Study of a CMOS-Compatible Integrated Solar Photovoltaic Cell Array	388
<i>B. Plesz, L. Juhasz, J. Mizsei</i>	

Design, Fabrication and Characterization of a Fully Programmable Micro Diffraction Grating	392
---	-----

R. Lockhart, R.P. Stanley, M. Tormen

Author Index