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Hiroyuki Fujita

CIRMM, The University of Tokyo, Tokyo, JAPAN

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*Dept. of Electrical Engineering, Stanford University,
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R. Zengerle^{1,2,3}, D. Mark¹, D. Kossel, G. Roth^{1,2}, and F.
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¹*HSG-IMIT, Wilhelm-Schickard-Straße 10, D-78052*

Villingen-Schwenningen, Germany

²*Laboratory for MEMS Applications, Department of
Microsystems Engineering - IMTEK, University of
Freiburg, Georges-Koehler-Allee 106, D-79110*

Freiburg, Germany

³*BIOSS-Centre for Biological Signalling Studies,
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T. Northemann¹, M. Maurer¹, S. Rombach¹ and Y.
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¹*Fritz Huettinger Chair of Microelectronics, Department
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²*HSG-IMIT - Institute of Micromachining and
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¹*Science and Technology on Electronic Test &
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²*Key Laboratory of Instrument Science & Dynamic
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Yung-Shih Hsiung¹, and Michael S.-C. Lu^{1,2}

¹*Department of Electrical Engineering and* ²*Institute of
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¹Department of Mechanical Engineering & KI for the NanoCentury, KAIST, Daejeon, South Korea

²Department of Materials Science and Engineering, KAIST, Daejeon, South Korea

³Intelligent Infrastructure Lab, HP Laboratory, Palo Alto, CA, USA

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¹State Key Laboratory of Transducer Technology, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, Shanghai, China

²Graduate School of the Chinese Academy of Sciences, Beijing, China

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¹Institute for Microsensors, -actuators and -systems (IMSAS), University of Bremen, Bremen, Germany

²FWBI Friedrich-Wilhelm-Bessel Forschungsgesellschaft mbH, Bremen, Germany

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¹ECE, Northeastern University, Boston, MA, USA

²Point Loma Nazarene University, San Diego, CA, USA

³CEE, Northeastern University, Boston, MA, USA

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L. Song^{1,3}, L. He^{2,3}, L. Cui¹ and W. Hu³

¹The Technical Manuscript Design Group, City, STATE/Province, COUNTRY

²The Scientific Paper Formatting Initiative, Beijing, China

³Laboratory for Abstract Submissions, Nanjing, China

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State Key Laboratory on Integrated Optoelectronics, College of Electronic Science and Engineering, Jilin University, 2699 Qianjin Street, Changchun 130012, China

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¹Service de Science des Matériaux, Faculté Polytechnique, Université de Mons, Mons, Belgium

²Plasma Surface Interaction Chemistry, CIRMAP, Université de Mons, Mons, Belgium

³Materia Nova Research Centre, Mons, Belgium

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¹CEA-LETI, MINATEC Campus, Grenoble, France

²Kavli Nanoscience Institute, California Institute of Technology, Pasadena, California USA

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¹Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan

²Department of Veterinary medicine, National Pingtung University of Science and Technology, Pingtung, Taiwan

³Department of Tropical Agriculture and International Cooperation, National Pingtung University of Science and Technology, Pingtung, Taiwan

⁴Graduate Institute of Animal Vaccine, National Pingtung University of Science and Technology, Pingtung, Taiwan

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¹Kanagawa Academy of Science and Technology, Kanagawa, Japan

²Institute of Industrial Science, The University of Tokyo, Tokyo, Japan

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¹Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan, R.O.C.

²Institute of NanoEngineering and Microsystems, National Tsing Hua University, Hsinchu, Taiwan, R.O.C.

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¹Dept. Aerospace and Mechanical Engineering

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Laboratory of Microsystems, École Polytechnique Fédérale de Lausanne, Lausanne, SWITZERLAND

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¹Department of Electrophysics, National Chiao Tung University, Taiwan, R.O.C.

²Institute of NanoEngineering and MicroSystems, National Tsing Hua University, Taiwan, R.O.C.

³Department of Power Mechanical Engineering, National Tsing-Hua University, Taiwan, R.O.C.

⁴SINONAR Company, Taiwan, R.O.C

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E. Hendarto¹ and Y.B. Gianchandani
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- ¹METU, Department of Mechanical Engineering, Ankara, TURKEY
²Cankaya University, Department of Mechanical Engineering, Ankara, TURKEY
³METU, Department of Electrical and Electronics Engineering, Ankara, TURKEY
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¹Department of Bio and Brain Engineering, KAIST, Daejeon, REPUBLIC OF KOREA
²Department of Hematology, Catholic Blood and Marrow Transplantation Center, Seoul St. Mary's Hospital, The Catholic University of Korea College of Medicine, Seoul, REPUBLIC OF KOREA
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¹Department of Precision Machinery & Instrumentation,
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¹IEMN CNRS UMR-8520, - Villeneuve d'Ascq, FRANCE

²LPPI, EA 2528, Cergy-Pontoise, FRANCE

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¹ <i>Joint International Laboratory LEMAC:</i>	
^{a)} <i>Institute for Electronics, Microelectronics and Nanotechnology, IEMN UMR CNRS 8520, ECLille, PRES Université Lille Nord de France, 59651 Villeneuve d'Ascq, France</i>	
^{b)} <i>Wave Research Center, GPI RAS, 38 Vavilov str., Moscow, 119991, Russia</i>	

²BioMEMS group, Institute for Electronics,
Microelectronics and Nanotechnology, IEMN UMR
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Liu¹

¹School of Electrical and Electronic Engineering,
Nanyang Technological University, Singapore 639798

²Institute of Microelectronics, A*STAR (Agency for
Science, Technology and Research) 11 Science Park
Road, Singapore Science Park II, Singapore 117685

³Institute of High Performance Computing, A*STAR
(Agency for Science, Technology and Research)

1Fusionopolis Way, Singapore 138632

⁴Laboratoire des Sciences et Techniques de
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¹Faculty of Science and Engineering, Vestfold
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²poLight AS, N-3192 Horten, Norway

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Tenghsien Lai¹ and Chingfu Tsou²

¹Ph. D. Program in Electrical and Communications
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¹Dep. MN2S, FEMTO-ST (UMR CNRS
6174/UFC/ENSMM/UTBM), 25000 Besançon,
FRANCE

²Dep. Microoptical Systems, Fraunhofer IOF, 07745
Jena, GERMANY

³SINTEF ICT, 7465 Trondheim, NORWAY

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Sihua Li^{1,2}, Shaolong Zhong¹, Jing Xu¹ and
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¹State Key Laboratory of Transducer Technology,
Shanghai Institute of Microsystem and Information
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²Graduate university of the Chinese Academy of
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Huang¹

¹Department of Systems and Naval Mechatronic
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²Department of Mechanical Engineering, National
Yunlin University of Science and Technology, Yunlin,
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¹School of Electrical & Electronic Engineering,
Nanyang Technological University, Singapore 639798
²School of Information Science and Technology, Fudan
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¹DTU Nanotech, Technical University of Denmark, Kgs.
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Speciale³
¹Institute of Microelectronics and Microsystems, CNR,
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²Electronics and Telecommunications Department,
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¹Department of Nanomechanics, Tohoku University,
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¹*Department of Mechanical Engineering, University of Minnesota, Minneapolis, U.S.A.*
²*Department of Electrical and Computer Engineering, University of Minnesota, Minneapolis, U.S.A.*
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¹*Electrical and Computer Engineering, Northeastern University, Boston, Massachusetts, USA*
²*Mechanical and Industrial Engineering, Northeastern University, Boston, Massachusetts, USA*
³*Center for High-rate Nanomanufacturing, Northeastern University, Boston, Massachusetts, USA*
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¹*Department of Engineering Science, National Cheng Kung University, Tainan, Taiwan*
²*Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan*
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¹*Institute of Microelectronics, A*STAR(Agency for Science, Technology and Research), SINGAPORE*
²*Department of Mechanical Engineering, Stanford University, Stanford, CA, USA*
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¹*School of Electrical & Electronic Engineering, Nanyang Technological University, Singapore 639798*
²*Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), 11 Science Park Road, Singapore Science Park II, Singapore 117685*
³*Ecole Supérieure d'Ingénieurs en Electronique et Electrotechnique (ESIEE), University of Paris Est, Paris 93162*
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¹*Laboratory for Design of Microsystems, Department of Microsystems Engineering – IMTEK, University of Freiburg, Georges-Koehler-Allee 102, D-79110, Freiburg, Germany.*
²*Currently at ABB Schweiz AG, Baden-Dättwil, Switzerland*
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C. Cepnik, U. Wallrabe
*University of Freiburg – IMTEK, Department of
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*University of Freiburg – IMTEK, Department of
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Energy Harvesting, Laboratory for Microactuators,
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Zakharov^{3,4}
¹CEA, LETI, MINATEC Campus, Grenoble, France
²SPINTEC, UMR 8191, CEA/CNRS/UJF, INAC,
Grenoble, France
³G2Elab, Grenoble Electrical Engineering Lab,
CNRS-UJF-INPG, St Martin d'Hères, France
⁴Institut Néel, CNRS-UJF, Grenoble, France
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I. Kuehne^{*1}, J. Seidel², M. Schreiter¹, H. Seidel³,
and A. Frey¹
¹Siemens AG, Corporate Technology, Corporate
Research and Technologies, Munich, Germany
²Munich University of Applied Sciences, Department of
Precision- and Micro-Engineering, Engineering Physics,
Munich, Germany
³Saarland University, Chair of Micromechanics,
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M. Guizzetti², K. Birkelund¹, E.V. Thomsen¹ and
O. Hansen^{1,3}
¹Department of Micro- and Nanotechnology, Technical
University of Denmark, DTU Nanotech, Building 345
East, DK-2800 Kongens Lyngby, Denmark
²Meggitt Sensing Systems, DK-3490 Kvistgaard,
Denmark

³CINF, Center for Individual Nanoparticle
Functionality, Technical University of Denmark
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Alexander Frey^{1*}, Julian Seidel², Matthias
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¹Siemens AG, Corporate Technology, Corporate
Research & Technologies, Munich, Germany
²Munich University of Applied Sciences, Munich,
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Yongliang Yang, Qiaochu Tang, and Xinxin Li
*State Key Lab of Transducer Technology, and, Science
and Technology on Microsystem Lab, Shanghai Institute
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*Department of Electrical Engineering, Stanford
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Jiachou Wang and Xinxin Li
*State Key Lab of Transducer Technology, and, Science
and Technology on Microsystem Lab,
Shanghai Institute of Microsystem and Information
Technology, Chinese Academy of Sciences, CHINA*

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 Uğur Sönmez^{1*}, Haluk Külâh^{1,2}, and Tayfun Akin^{1,2}
¹Department of Electrical and Electronics Engineering, METU, Ankara, Turkey
²METU-MEMS Center, Ankara, Turkey
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 J. -I. Lee, Y. Song, H.-K. Jung, J. Choi, Y. Eun and J. Kim^{*}
 School of Mechanical Engineering, Yonsei University, Seoul, KOREA
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 R.A. Dias¹, R.F. Wolffenbuttel², E. Cretu³, and L.A. Rocha¹
¹University of Minho, Guimaraes, Portugal
²Delft University of Technology, Delft, Netherlands
³University of British Columbia, Vancouver, Canada
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 Lingtao Wang¹, Youngki Choe¹, Shih-Jui Chen¹, Lukas Baumgartel², and Eun Sok Kim¹
¹Department of Electrical Engineering, University of Southern California, Los Angeles, CA, USA
²Department of Physics, University of Southern California, Los Angeles, CA, USA
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 A. Kozinda, Y. Jiang, and L. Lin
 Berkeley Sensor and Actuator Center and Mechanical Engineering Department, University of California at Berkeley, Berkeley, California, USA
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 K. Gerasopoulos^{1,2,3*}, E. Pomerantseva^{1,3*}, M. McCarthy^{7**}, J. Culver^{5*}, C. Wang^{6*} and R. Ghodssi^{1,2,3,4*}
¹MEMS Sensors and Actuators Laboratory,
²Department of Materials Science and Engineering,
³The Institute for Systems Research, ⁴Department of Electrical and Computer Engineering
⁵Department of Plant Sciences and Landscape Architecture, ⁶Department of Chemical and

Biomolecular Engineering, ⁷Department of Mechanical Engineering and Mechanics, Drexel University
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¹Micro and Nanosystems, ETH Zurich, Zurich, Switzerland
²greenTEG GmbH, Zurich, Switzerland
³Zurich Research Laboratory, IBM Research GmbH, Rüschlikon, Switzerland
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 P. Janphuang, D. Isarakorn, D. Briand, and N.F. de Rooij
 Ecole Polytechnique Fédérale de Lausanne (EPFL), Institute of Microengineering (IMT), Sensors, Actuators and Microsystems Laboratory (SAMLAB), Neuchâtel, Switzerland
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- M4B.005 DESIGN, MODELING, FABRICATION AND CHARACTERIZATION OF AN ELECTRET-BASED MEMS ELECTROSTATIC ENERGY HARVESTER**
 G. Altena^{1,*}, D. Hohlfeld², R. Elfink¹, M.H. Goedbloed¹ and R. van Schaijk¹
¹imec/Holst Centre, Eindhoven, The Netherlands
²Reutlingen University, Reutlingen, Germany
739
- M4B.006 GREEN VEHICLE SHOCK ABSORBER: MICROMACHINED WAVY SHAPED PIEZOELECTRIC CUSHION ENERGY HARVESTER AND ITS POWER GENERATING DEMONSTRATION BASED ON REAL NAVIGATION**
 Guo-Hua Feng and Min-Yiang Tsai
 Department of Mechanical Engineering, National Chung Cheng University, Chiayi, Taiwan
743
- M4B.007 LARGE ARRAY ELECTROSPUN PVDF NANOGENERATORS ON A FLEXIBLE SUBSTRATE**
 Jiyoung Chang and Liwei Lin
 Department of Mechanical Engineering, Berkeley Sensor and Actuator Center, University of California at Berkeley, Berkeley, CA USA
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SESSION I(3) - Cell Handling & Analysis

- M4C.001 SPECIFIC CELL CAPTURE AND TEMPERATURE-MEDIATED RELEASE USING SURFACE-IMMOBILIZED APTAMERS IN A MICROFLUIDIC DEVICE**

Jing Zhu¹, ThaiHuu Nguyen¹, Renjun Pei²,
Milan Stojanovic² and Qiao Lin¹
¹Department of Mechanical Engineering, Columbia
University, New York, NY, USA
²Department of Medicine, Columbia University, New
York, NY, USA

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**M4C.002 SINGLE CELL REAL TIME SECRETION ASSAY
USING AMORPHOUS FLUOROPOLYMER
MICROWELL ARRAY**

Y. Shirasaki^{1,2}, A. Nakahara², N. Shimura¹, M.
Yamagishi¹, J. Mizuno², O. Ohara^{1,3} and S.
Shoji²

¹RCAI, RIKEN, Kanagawa, Japan

²WASEDA Univ., Tokyo, Japan

³Kazusa DNA Res. Inst., Chiba, Japan

.....755

**M4C.003 MEMS MASS SENSORS WITH UNIFORM
SENSITIVITY FOR MONITORING CELLULAR
APOPTOSIS**

K. Park^{*1,2}, L. Millet^{*1,2}, N. Kim³, H. Li³, K. J.
Hsia^{2,3,4}, N. R. Aluru^{2,3,5} and R. Bashir^{1,2,4}

¹Department of Electrical and Computer Engineering,

²Micro and Nanotechnology Laboratory, ³Department

of Mechanical Science and Engineering, ⁴Department

of Bioengineering, ⁵Beckman Institute of Advanced

Science and Technology, University of Illinois at

Urbana-Champaign, Urbana, Illinois 61801, USA

*authors contributed equally

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**M4C.004 MECHANICAL STIMULATOR OF CULTURED
VASCULAR ENDOTHELIAL CELL FOR
INVESTIGATION OF DRUG PERMEABILITY OF
BLOOD VESSEL**

A. Shunori¹, K. Shimizu^{2,3}, M. Hashida^{2,4}, and
S. Konishi^{1,2,3}

¹Department of Micro System Technology, Ritsumeikan
University, Japan

²Institute for Innovative NanoBio Drug Discovery and
Development, Kyoto University, Japan

³Ritsumeikan-Global Innovation Research

Organization, Ritsumeikan University, Japan

⁴Department of Drug Delivery Research, Kyoto

University, Japan

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**M4C.005 PULSATILE SHEAR STRESS AND HIGH GLUCOSE
CONCENTRATIONS INDUCED REACTIVE
OXYGEN SPECIES PRODUCTION IN
ENDOTHELIAL CELLS**

J. Q. Yu¹, L. K. Chin¹, Y. Fu¹, T. Yu², K. Q. Luo²
and A. Q. Liu¹

¹School of Electrical & Electronic Engineering

²School of Chemical & Biomedical

Engineering, Nanyang Technological University,

Singapore 639798

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**M4C.006 PROTOZOON CLASSIFICATIONS BASED ON SIZE,
SHAPE AND REFRACTIVE INDEX USING ON-CHIP**

IMMERSION REFRACTOMETER

L. K. Chin¹, T. C. Ayi², P. H. Yap² and A. Q. Liu¹

¹School of Electrical & Electronic Engineering,

Nanyang Technological University, Singapore 639798

²Defence Medical & Environmental Institute, DSO

National Laboratories, Singapore 117510

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**M4C.007 DIAGNOSTIC DEVICE FOR COW MASTITIS
BASED ON THE DETECTION OF SUPEROXIDE
SECRETED FROM NEUTROPHILS**

S. Kimura, J. Fukuda, and H. Suzuki

Graduate School of Pure and Applied Sciences,

University of Tsukuba, Tsukuba, JAPAN

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SESSION I(4) - Chemical Sensors I

**M4D.001 INTEGRATED SILICON-BASED CHEMICAL
MICROSYSTEM FOR PORTABLE SENSING
APPLICATIONS**

K.S. Demirci^{1,2}, L.A. Beardslee¹, S. Truax¹, J.-J.
Su¹, O. Brand¹

¹School of Electrical and Computer Engineering,

Georgia Institute of Technology, Atlanta, GA, USA

²currently at: Texas Instruments Inc., Dallas, TX, USA

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**M4D.002 FREQUENCY-MULTIPLEXED COMBINATORY
MASS SENSING WITH SINGLE DATA LINE FROM
MULTIPLE INTEGRATED FILM BULK ACOUSTIC
RESONATORS**

S.J. Chen, A. Lin, L. Wang and E.S. Kim

University of Southern California, Los Angeles, USA

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**M4D.003 ULTRA-LOW POWER PALLADIUM-COATED
MEMS RESONATORS FOR HYDROGEN
DETECTION UNDER AMBIENT CONDITIONS**

J. Henriksson, L. G. Villanueva, and J. Brugger

Microsystems Laboratory, École Polytechnique Fédérale
de Lausanne (EPFL), Lausanne, Switzerland

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**M4D.004 LOCALLY SYNTHESIZED METAL OXIDE
NANOWIRE-DEVICES AND THEIR GAS SENSING
APPLICATIONS**

D. Kim¹, M. A. Lim¹, D. Yang¹, Z. Li², C.O.
Park³, and I. Park¹

¹Department of Mechanical Engineering & KI for the
NanoCentury, KAIST, Daejeon, Korea

²Intelligent Infrastructure Laboratory, Hewlett

Packard Laboratory, Palo Alto, CA, USA

³Department of Materials Science and Engineering,

KAIST, Daejeon, Korea

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**M4D.005 SINGLE CHIP NANOTUBE SENSORS FOR
CHEMICAL AGENT MONITORING**

Y. Liu¹, C.-L. Chen², V. Agarwal³, S. Sonkusale³,
M. L. Wang¹, M. R. Dokmeci¹

¹Northeastern University, Boston, MA, USA

²University of California Los Angeles, Los Angeles, CA, USA

³Tufts University, Medford, MA, USA

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M4D.006 FIELD TESTING OF A RUGGED MEMS GAS CHROMATOGRAPH PROTOTYPE: SELECTIVE ANALYSIS OF TRACE-LEVEL TCE VAPORS IN CONTAMINATED HOMES

S. K. Kim^{1,2}, H. Chang^{1,2}, J. G. Bryant^{1,2}, D. R. Burris⁴ and E. T. Zellers^{1,2,3*}

¹Center for Wireless Integrated MicroSystems (WIMS),

²Departments of Environmental Health Sciences and

³Chemistry, University of Michigan, Ann Arbor, Michigan, USA

⁴Integrated Science and Technology, Inc., 228 Harrison Avenue, Panama City, FL 32401

.....799

M4D.007 A PRESSURE PROGRAMMABLE GAS CHROMATOGRAPHY MICROSYSTEM UTILIZING MOTIONLESS KNUDSEN PUMP, FIBER-INTEGRATED OPTICAL DETECTOR, AND SILICON MICROMACHINED SEPARATION COLUMN

Jing Liu, Naveen K. Gupta, Xudong Fan, Kensall D. Wise, and Yogesh B. Gianchandani
Engineering Research Center for Wireless Integrated Microsystems, University of Michigan, Ann Arbor, MI 48109

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TUESDAY, June 7, 2011

ORAL SESSIONS

08:30 - 10:00

SESSION II(1) – CMOS-MEMS

T1A.001 Invited Speaker

MEMS TECHNOLOGY DEVELOPMENT AND MANUFACTURING IN A CMOS FOUNDRY

CM Liu, Bruce C.S. Chou, Robert Chin-Fu Tsai, Nick Y.M. Shen, Benior SF Chen, Emerson CW Cheng, Hsiao Chin Tuan, Alex Kalnitsky, Sean Cheng, Chung-Hsien Lin, Tien-Kan Chung, Kuei-Sung Chang, Yi-Shao Liu
Taiwan Semiconductor Manufacturing Company, Hsin-Chu, Taiwan

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T1A.002 A 400×400µm² 3-AXIS CMOS-MEMS ACCELEROMETER WITH VERTICALLY INTEGRATED FULLY-DIFFERENTIAL SENSING ELECTRODES

Ming-Han Tsai¹, Yu-Chia Liu¹, Chih-Ming Sun¹, Chuanwei Wang², Chun-Wen Cheng³, and Weileun Fang^{1,2*}

¹Institute of NanoEngineering and MicroSystems,

National Tsing Hua University, Hsinchu, Taiwan

²Power Mechanical Engineering Department, National Tsing Hua University, Hsinchu, Taiwan

³Taiwan Semiconductor Manufacturing Company, Hsinchu, Taiwan

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T1A.003 INTEGRATION AND PACKAGING TECHNOLOGY OF MEMS-ON-CMOS TACTILE SENSOR FOR ROBOT APPLICATION USING MOLDED THICK BCB LAYER AND BACKSIDE-GROOVED ELECTRICAL CONNECTION

M. Makihata¹, S. Tanaka¹, M. Muroyama¹, S. Matsuzaki¹, H. Yamada², T. Nakayama² U. Yamaguchi²,

K. Mima², Y. Nonomura³, M. Fujiyoshi³ and M. Esashi¹

¹Tohoku University, JAPAN, ²Toyota Motor Corp., JAPAN and ³Toyota Central R&D Labs., Inc., JAPAN

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T1A.004 A DIFFERENTIAL DIFFERENCE AMPLIFIER WITH AUTOMATIC GAIN SELECTION AS READOUT INTERFACE FOR CMOS STRESS SENSORS IN ORTHODONTIC BRACKETS

M. Kuhl¹, P. Gieschke¹, O. Paul¹, Y. Manoli^{1,2}

¹University of Freiburg, Department of Microsystems Engineering (IMTEK), Freiburg, Germany

²HSG-IMIT, Villingen-Schwenningen, Germany

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T1A.005 A FRENKEL-POOLE MODEL OF DIELECTRIC CHARGING IN CMOS MEMS

K.L. Dorsey¹ and G.K. Fedder^{1,2,3}

¹Department of Electrical and Computer Engineering, Carnegie Mellon University, Pittsburgh, PA, USA

²The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, USA

³Institute for Complex and Engineered Systems, Carnegie Mellon University, Pittsburgh, PA, USA

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SESSION II(2) – RF-MEMS

T1B.001 Invited Speaker

2×2 MIMO, MULTI-MODE, WIDEBAND TRANSCEIVER SYSTEM FOR WORLDWIDE-MWMAX (IEEE 802.16E) / WLAN (IEEE 802.11N) APPLICATIONS

K. Chun^{1,*}, S. Kang¹, Y. Jang¹, Y. E. Kim², J. Lee³, I. S. Song², J. H. Yi⁴, B. H. Kim⁵, B. Lee⁶, and H. C. Kim⁷

¹ISRC, Electrical Engineering and Computer Science, Seoul National University, Seoul, KOREA

²Samsung Electronics Co., LTD., Kyunggi-do, KOREA

³Future Communications IC Inc., Kyunggi-Do, KOREA

⁴Yujeong Systems Co., Seoul, KOREA

⁵Electronics Engineering, Catholic University of Daegu, Gyeongbuk, KOREA

⁶Mechatronics Engineering, Korea University of

Technology and Education, Chungnam, KOREA
⁷Electrical Engineering, University of Ulsan, Ulsan, KOREA

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- T1B.002 RF MEMS SWITCHES INTEGRATED WITH SEALED SUSPENDED COPLANAR WAVEGUIDES FOR RECONFIGURABLE RF CIRCUITS**
 K. Kuwabara, K. Takagahara, H. Morimura and Y. Sato
 NTT Microsystem Integration Laboratories, NTT Corporation, Kanagawa, JAPAN

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- T1B.003 VOLTAGE PROGRAMMABLE DUAL-BAND BANDPASS/BANDSTOP FILTER RESPONSE IN A SINGLE MICRO-ELECTRO-MECHANICAL DEVICE**
 X. Zou^{1*}, J. Yan¹ and A. A. Seshia¹
 Nanoscience Centre, Department of Engineering, University of Cambridge, Cambridge, United Kingdom

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- T1B.004 NANO-ELECTROMECHANICAL STORAGE ELEMENT FOR A LOW POWER COMPLIMENTARY LOGIC ARCHITECTURE USING PZT RELAYS**
 Robert M. Proie Jr.^{1,2}, Ronald G. Polcawich², Jeffrey S. Pulskamp², Tony Ivanov², Mona Zaghloul¹
¹The George Washington University, Washington, DC 20052, USA
²US Army Research Laboratory, Adelphi, MD 20783-1197, USA

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- T1B.005 SPONTANEOUS OSCILLATION DUE TO CHARGING EFFECT IN MEMS RF SWITCHES**
 Y.-C. Chen¹, T. Ishida², H. Toshiyoshi^{2,3}, R. Chen¹, and H. Fujita²
¹PME, National Tsing Hua University, Hsinchu, Taiwan
²IIS, the University of Tokyo, Tokyo, Japan
³RCAT, the University of Tokyo, Tokyo, Japan

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SESSION II(3) – Wet Assembly

- T1C.001 Invited Speaker PROGRAMMABLE SELF-ASSEMBLY FOR MICROSYSTEM INTEGRATION**
 J. H. Hoo¹, K. S. Park¹, R. Baskaran^{1,2}, K. F. Böhringer¹
¹Department of Electrical Engineering, University of Washington, Seattle, USA
²Components Research, Intel Corporation, USA
- T1C.002 LOW TEMPERATURE ENCAPSULATION OF NANOCANNELS WITH WATER INSIDE**
 C. Shen^{*}, V.R.S.S. Mokkapati, F. Santagata, A. Bossche, P.M. Sarro
 DIMES - ECTM, Delft University of Technology, Delft,

the Netherlands

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- T1C.003 ELECTRO-WETTING ENHANCED BONDING STRENGTH**
 Rong Cheng, Kewei Jiang, Xinxin Li^{*}
 State Key Lab of Transducer Technology, and, Science and Technology on Microsystem Lab, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, CHINA

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- T1C.004 POLYMERIC DROPLET DEPOSITION AND SELF-RELEASE FORMING MICRO PARTS ON HETEROGENEOUS SURFACES**
 K.Z. Tu and C.T. Chen^{*}
^μFOS Laboratory, Department of Mechanical Engineering, National Kaohsiung University of Applied Sciences, Kaohsiung, TAIWAN, Republic of China

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- T1C.005 ORIENTATION-SPECIFIC SELF-ASSEMBLY AT AIR-WATER INTERFACE USING MAGNETIC FIELD**
 K.S. Park¹, R. Baskaran^{1,2}, K.F. Böhringer¹
¹Department of Electrical Engineering, University of Washington, Seattle, USA
²Components Research, Intel Corporation, USA

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SESSION II(4) – Biomolecular Sensing

- T1D.001 Invited Speaker NANOBIODEVICE BASED SINGLE MOLECULE AND CELL SENSING FOR CANCER DIAGNOSIS AND IN VIVO IMAGING FOR STEM CELL THERAPY**
 Y. Baba^{1,2}
¹Department of Applied Chemistry, School of Engineering, Nagoya University
 FIRST Research Center for Innovative Nanobiodevice, Nagoya University
 Department of Advanced Medical Science, School of Medicine, Nagoya University, Nagoya, Japan
²Health Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Takamatsu, Japan
- T1D.002 NANOPORE DNA SENSORS IN CMOS WITH ON-CHIP LOW-NOISE PREAMPLIFIERS**
 J. Rosenstein¹, V. Ray², M. Drndic², and K. L. Shepard¹
¹Department of Electrical Engineering, Columbia University, New York, New York, USA
²Department of Physics, University of Pennsylvania, Philadelphia, Pennsylvania, USA
- T1D.003 DNA MICROARRAYS IMMOBILIZED ON UNMODIFIED PLASTICS IN A MICROFLUIDIC**

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**BIOCHIP FOR RAPID TYPING OF AVIAN
INFLUENZA VIRUS**

Y. Sun¹, I.R. Perch-Nielsen¹, M. Dufva¹, D. Sabourin¹, D.D. Bang², J. Høgborg², M. Bu¹ and A. Wolff¹

¹DTU Nanotech, Department of Micro- and Nanotechnology, Technical University of Denmark, Kgs. Lyngby, DENMARK

²DTU Vet, National Veterinary Institute, Technical University of Denmark, Aarhus, DENMARK

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**T1D.004 ULTRA-SENSITIVE CARBON NANOTUBES FOR
SINGLE-MOLECULE DETECTION OF DNA
HYBRIDIZATION KINETICS USING
CONDUCTANCE-BASED CORRELATION
SPECTROSCOPY**

S. Sorgenfrei¹, C.-Y. Chiu², C. Nuckolls², K. Shepard¹

¹Department of Electrical Engineering, Columbia University, New York, New York, USA

²Department of Chemistry, Columbia University, New York, New York, USA

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**T1D.005 MOTOR PROTEIN MOTION ALONG
MICROTUBULES FOR MOLECULAR DETECTION**
M.C. Tarhan¹, R. Yokokawa², H. Qiu¹, S.L. Karsten³ and H. Fujita¹

¹CIRMM, The University of Tokyo, Tokyo, JAPAN

²Kyoto University, Kyoto, JAPAN

³University of California Los Angeles, Los Angeles, CA, USA

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ORAL SESSIONS

10:30 - 12:15

SESSION III(1) –Physical Sensors I

**T2A.001 SINGLE CHIP FLOW SENSING SYSTEM WITH A
DYNAMIC FLOW RANGE OF MORE THAN 4
DECADES**

T.S.J. Lammerink¹, J.C. Lötters^{1,2}, R.J. Wiegerink¹, J. Groenesteijn^{1,2}, J. Haneveld^{1,2}

¹MESA+ Institute for Nanotechnology, University of Twente, The Netherlands

²Bronkhorst High-Tech BV, Ruurlo, The Netherlands

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**T2A.002 CAPACITIVE ABSOLUTE PRESSURE SENSOR
WITH INDEPENDENT ELECTRODE AND
MEMBRANE SIZES FOR IMPROVED
FRACTIONAL CAPACITANCE CHANGE**

Chia-Fang Chiang¹, Andrew B. Graham², Matthew W. Messana¹, J. Provine¹, Daniela T. Buchman¹, Gary J. O'Brien², and Thomas W. Kenny¹

¹Stanford University, Stanford, CA, USA

²Robert Bosch LLC, Research and Technology Center, Palo Alto, CA, USA

**T2A.003 BAROMETRIC PRESSURE CHANGE
MEASUREMENT**

N. Minh-Dung, H. Takahashi, K. Matsumoto and I. Shimoyama

The University of Tokyo, Japan

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**T2A.004 SAW-PIRANI VACUUM SENSOR WITH A NEW
FUNCTIONING MODE AND A FAST RESPONSE
TIME**

D. Mercier¹, G. Bordel¹, P. Brunet-Manquat¹, S. Verrun¹, O. Elmazria², F. Sarry², B. Belgacem³, J. Bounouar⁴

¹CEA-LETI-MINATEC, 17 Rue des Martyrs 38054 Grenoble Cedex 9, France

²Institut Jean Lamour, UMR 7198 CNRS-Nancy University 54506, France

³SENSEOR, 18 Rue Alain Savary 25000 Besançon, France

⁴ADIXEN, Alcatel Vacuum Technology France, 740009 Annecy, France

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**T2A.005 A HIGHLY SENSITIVE FLEXIBLE PRESSURE AND
SHEAR SENSOR ARRAY FOR MEASUREMENT OF
GROUND REACTIONS IN PEDESTRIAN
NAVIGATION**

R. Surapaneni, K. Park, M.A. Suster, D.J. Young and C. H. Mastrangelo

University of Utah, Salt Lake City, UT, USA

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**T2A.006 MINIATURE ULTRASOUND ACOUSTIC IMAGING
DEVICES USING 2-D PMUTS ARRAY ON
EPITAXIAL PZT/SrRuO₃/Pt/ γ -Al₂O₃/Si STRUCTURE**

Daisuke Akai¹, Takahiro Yogi², Ikuo Kamja², Yasuyuki Numata², Katsuya Ozaki², Kazuaki Sawada², Nagaya Okada³, Kazuki Higuchi³, and Makoto Ishida^{1,2}

¹Electronics-Inspired Interdisciplinary Research Institute (EIIRIS), Toyohashi University of Technology, JAPAN

²Department of Electrical and Electronic Information Engineering, Toyohashi University of Technology, JAPAN

³Honda Electronics Co. Ltd., Toyohashi, JAPAN

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**T2A.007 IN SITU WAFER-LEVEL POLARIZATION OF
ELECTRET FILMS IN MEMS ACOUSTIC SENSOR
ARRAYS**

M. Kranz¹, M.G. Allen², and T. Hudson³

¹Stanley Associates, Huntsville, AL, USA

²Georgia Institute of Technology, Atlanta, GA, USA

³U.S. Army AMRDEC, Huntsville, AL, USA

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SESSION III(2) – Resonators & Oscillators

T2B.001 ONE-DIMENSIONAL LINEAR ACOUSTIC

- BANDGAP STRUCTURES FOR PERFORMANCE ENHANCEMENT OF ALN-ON-SILICON MICROMECHANICAL RESONATORS**
L. Sorenson, J.L. Fu, and F. Ayazi
Georgia Institute of Technology, Atlanta, Georgia, USA
.....918
- T2B.002 A 1.75 GHz PIEZOELECTRICALLY-TRANSDUCED SIC LATERAL OVERMODED BULK ACOUSTIC-WAVE RESONATOR**
Songbin Gong, Nai-Kuei Kuo, and Gianluca Piazza
Penn Micro and Nano Systems Lab, University of Pennsylvania, Philadelphia, PA, USA
..... 922
- T2B.003 HIGH PERFORMANCE BULK MODE GALLIUM NITRIDE RESONATORS AND FILTERS**
V.J.Gokhale¹, J.Roberts², and M.Rais-Zadeh¹
¹*University of Michigan, Ann Arbor, Michigan, USA*
²*Nitronex Corporation, Durham, North Carolina, USA*
.....926
- T2B.004 ENGINEERING OF ACOUSTIC METAMATERIALS WITH APPLICATION TO MEMS BAW RESONATORS**
X. Rottenberg, R. Jansen, P. Verheyen, R. Van Hoof, A. Verbist and H.A.C. Tilmans
Imec v.z.w., Kapeldreef 75, B-3001 Leuven, Belgium
..... 930
- T2B.005 HIGH-Q, LARGE-STOPBAND-REJECTION INTEGRATED CMOS-MEMS OXIDE RESONATORS WITH EMBEDDED METAL ELECTRODES**
Yu-Chia Liu¹, Ming-Han Tsai¹, Wen-Chien Chen², Sheng-Shian Li^{1,2}, and Weileun Fang^{1,2}
¹*Inst. of NanoEngineering and MicroSystems and*
²*Dept. of Power Mechanical Engineering National Tsing Hua University, Hsinchu, Taiwan*
..... 934
- T2B.006 VERY HIGH FREQUENCY DOUBLE-ENDED TUNING FORK NANO-MECHANICAL FIN-FET RESONATOR**
S.T. Bartsch, D. Grogg, A. Lovera, D. Tsamados, and A.M. Ionescu
Ecole Polytechnique Fédérale de Lausanne – EPFL Nanoelectronic Devices Laboratory Lausanne, SWITZERLAND
.....938
- T2B.007 ENCAPSULATED MECHANICALLY COUPLED FULLY-DIFFERENTIAL BREATHE-MODE RING FILTERS WITH ULTRA-NARROW BANDWIDTH**
S. Wang, S. A. Chandorkar, A. B. Graham, M. W. Messana, J. Salvia, and T.W. Kenny
Stanford University, Stanford, California, USA
..... 942

SESSION III(3) –Bioprobes & Biodevices

- T2C.001 HIGH-Q IN-PLANE RESONANCE-MODE**

CANTILEVER BIO/CHEMICAL SENSOR FOR REAL-TIME DETECTION IN LIQUIDS
Y.H. Tao, C.Z. Wei, H.T. Yu, P.C. Xu, T.G. Xu, B. Xiong, Xinxin Li*
State Key Lab of Transducer Technology, and, Science and Technology on Microsystem Lab, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, CHINA
..... 946

- T2C.002 SEMIPERMEABLE PARYLENE MEMBRANE AS AN ARTIFICIAL BRUCH'S MEMBRANE**
Bo Lu¹, Zhao Liu¹, Laura Liu^{2,3}, Danhong Zhu^{2,3}, David Hinton^{2,3}, Bijju Thomas², Mark S. Humayun^{2,3} and Yu-Chong Tai¹
¹*California Institute of Technology, Pasadena, CA, USA*
²*Doheny Eye Institute, Los Angeles, CA, USA*
³*University of Southern California, Los Angeles, CA, USA*
.....950

- T2C.003 LABEL-FREE REAL TIME IMAGING OF NEURAL COMMUNICATION USING ACETYLCHOLINE IMAGE SENSOR**
Shoko TAKENAGA¹, Yui TAMAI¹, Kengo HIRAI¹, Kazuhiro TAKAHASHI^{1,2}, Takashi SAKURAI^{2,3}, Susumu TERAOKAWA^{2,3}, Makoto ISHIDA^{1,2}, Koichi OKUMURA^{1,2} and Kazuaki Sawada^{1,2}
¹*Department of Electrical and Electronic Information Engineering, Toyohashi University of Technology, Toyohashi, Japan*
²*JST CREST, Tokyo, Japan*
³*Hamamatsu University School of Medicine, Hamamatsu, Japan*
..... 954

- T2C.004 NEW CLASS OF CHRONIC RECORDING MULTICHANNEL NEURAL PROBES WITH POST-IMPLANT SELF-DEPLOYED SATELLITE RECORDING SITES**
Daniel Egert and Khalil Najafi
Center for Wireless Integrated Microsystems (WIMS) University of Michigan, Ann Arbor, MI, USA
..... 958

- T2C.005 MULTILAYER PHASED MICROCOIL ARRAY FOR MAGNETIC RESONANCE IMAGING**
O. G. Gruschke^{1,*}, L. Clad², N. Baxan³, K. Kratt², M. Mohammadzadeh³, D. von Elverfeldt³, A. Peter¹, J. Hennig³, V. Badilita², U. Wallrabe², and J. G. Korvink^{1,4}
¹*Lab. of Simulation, Dept. of Microsystems Engineering - IMTEK, University of Freiburg, Germany*
²*Lab. for Microactuators, Dept. of Microsystems Engineering- IMTEK, University of Freiburg, Germany*
³*University Medical Center, Dept. of Radiology Medical Physics, Freiburg, Germany*
⁴*Freiburg Institute for Advanced Studies-FRIAS, University of Freiburg, Germany*
.....962

- T2C.006 A FLEXIBLE FISH-BONE-SHAPED NEURAL PROBE STRENGTHENED BY BIODEGRADABLE SILK COATING FOR ENHANCED BIOCOMPATIBILITY**
Fan Wu, Maesoon Im, and Euisik Yoon
*Center for Wireless Integrated Microsystem
Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI, USA*
..... 966
- T2C.007 A MEMS DIFFERENTIAL AFFINITY SENSOR FOR CONTINUOUS GLUCOSE DETECTION**
X. Huang¹, J. Oxsher², C. LeDuc³, Y. Ravussin³, Q. Wang², D. Accili⁴, R. Leibel³ and Q. Lin^{1*}
*Departments of ¹Mechanical Engineering, ³Pediatrics and ⁴Medicine, Columbia University, New York, NY, USA;
²Chemistry and Biochemistry Department, University of South Carolina, Columbia, SC, USA*
.....970

SESSION III(4) – Wafer Level Process

- T2D.001 WAFER-LEVEL THIN FILM VACUUM PACKAGES FOR MEMS USING NANOPOROUS ANODIC ALUMINA MEMBRANES**
J. Zekry^{1,2*}, D.S. Tezcan¹, J.-P. Celis², R. Puers^{1,2}, C. Van Hoof^{1,2}, and H.A.C. Tilmans¹
*¹Imec, Kapeldreef 75, B-3001 Leuven, Belgium
²Katholieke Universiteit Leuven, Leuven, Belgium*
..... 974
- T2D.002 DIRECT WAFER BONDING OF ATOMIC LAYER DEPOSITED TiO₂ AND Al₂O₃ THIN FILMS**
R. L. Puurunen¹, T. Suni^{1,2}, O. Ylivaara¹, H. Kondo³, M. Ammar⁴, T. Ishida², H. Fujita², A. Bosseboeuf⁴, S. Zaima³, H. Kattelus¹
*¹VTT Technical Research Centre of Finland, Espoo, FINLAND
²Institute of Industrial Science (IIS), University of Tokyo, Tokyo, JAPAN
³Nagoya University (NU), Nagoya, JAPAN
⁴Institut d'Electronique Fondamentale (IEF), Université Paris Sud 11, CNRS, Orsay, FRANCE*
.....978
- T2D.003 A WAFER-LEVEL POLY-SIGE-BASED THIN FILM PACKAGING TECHNOLOGY DEMONSTRATED ON**

- A SOI-BASED HIGH-Q MEM RESONATOR**
Ph. Helin*, A. Verbist, J. De Coster, B. Guo, S. Severi, A. Witvrouw, L. Haspeslagh and H.A.C. Tilmans
*Imec, Kapeldreef 75, B-3001, Leuven, Belgium
Y. Naito, K. Nakamura and K. Onishi
Advanced Devices Development Center, Panasonic Corporation, 1006 Kadoma, Kadoma City, Osaka 571-8501 Japan*
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- T2D.004 WAFER LEVEL PACKAGING BASED ON AU-AU BONDING FOR A CMOS COMPATIBLE THERMAL WIND SENSOR**
Ziqiang Dong, Ming Qin, Jingjing Chen, Yukun Qin, and Qing-An Huang*
Key Laboratory of MEMS of the Ministry of Education, Southeast University, Nanjing, CHINA
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- T2D.005 INVESTIGATIONS OF THERMOCOMPRESSION BONDING WITH THIN METAL LAYERS**
J. Froemel^{1,3}, M. Baum¹, M. Wiemer¹, F. Roscher¹, M. Haubold¹, C. Jia², T. Gessner^{1,2,3}
*¹Fraunhofer ENAS, Chemnitz, GERMANY
²Chemnitz University of Technology, Chemnitz, Germany
³WPI Advanced Institute for Materials Research, Tohoku University, Sendai, JAPAN*
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- T2D.006 CONFORMAL COATING OF POLY(GLYCIDYL METHACRYLATE) AS A LITHOGRAPHIC POLYMER BY INITIATED CHEMICAL VAPOR DEPOSITION**
S. Yoshida¹, T. Kobayashi², M. Kumano², and M. Esashi¹
*¹WPI Advanced Institute for Materials Research, Tohoku University, Sendai, Japan
²Graduate School of Engineering, Tohoku University, Sendai, Japan*
.....994
- T2D.007 HEATED MEMBRANES PREVENT CLOGGING OF APERTURES IN NANOSTENCIL LITHOGRAPHY**
S.Q. Xie¹, V. Savu¹ and J. Brugger¹
¹Microsystems Laboratory, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland
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POSTER SESSION II

13:15 - 16:15

Mechanical/Physical Sensors and Microsystems

T3P.001 IMPROVEMENT OF CMOS-MEMS

ACCELEROMETER USING POST-CMOS SELECTIVE ELECTROPLATING TECHNIQUE

Yu-Chia Liu¹, Ming-Han Tsai¹, Tsung-Lin Tang²,
and Weileun Fang^{1,2}

¹Inst. of NanoEngineering and MicroSystems and ²Dept.
of Power Mechanical Engineering National Tsing Hua
University, Hsinchu, Taiwan

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T3P.002 MONOLITHIC PRESSURE+ACCELERATION SENSOR WITH SELF-TEST FUNCTION FOR RELIABLE & LOW-COST

TIRE-PRESSURE-MONITORING-SYSTEM (TPMS) APPLICATIONS

C.Z. Wei^{1,2}, W. Zhou¹, Q. Wang¹, Xinxin Li^{1,2}

¹State Key Lab of Transducer Technology, and, Science
and Technology on Microsystem Lab, Shanghai Institute
of Microsystem and Information Technology, Chinese
Academy of Sciences, CHINA

²Graduate School of Chinese Academy of Sciences,
Beijing, China

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T3P.003 AN SOI 3-AXIS ACCELEROMETER WITH A ZIGZAG-SHAPED Z-ELECTRODE FOR DIFFERENTIAL DETECTION

M. Fujiyoshi¹, Y. Nonomura¹, H. Funabashi¹, Y.
Omura¹, T. Akashi¹, Y. Hata¹, H. Yamada², and M.
Esashi³

¹Toyota Central R&D labs., Inc., Aichi, Aichi, Japan

²Toyota Motor Corporation, Toyota, Aichi, Japan

³Tohoku University, Sendai, Miyagi, Japan

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T3P.004 PIEZOELECTRIC SWITCH TO ACTIVATE EVENT-DRIVEN WIRELESS SENSOR NODE BY SEVERAL HZ OF VIBRATION

T. Kobayashi^{1,3}, H. Okada^{1,3}, V. Z. Gang¹, R.
Maeda¹, T. Masuda^{2,3}, and T. Itoh^{1,3}

¹National Institute of Advanced Industrial Science and
Technology (AIST), Tsukuba, Ibaraki, Japan

²The University of Tokyo, Bunkyo, Tokyo, Japan,
3JST-CREST, Kawaguchi, Saitama, Japan

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T3P.005 MEMS SENSOR WITH GIANT PIEZORESISTIVE EFFECT USING METALLSEMICONDUCTOR HYBRID STRUCTURE

H.-D. Ngo^{*1}, T. Tekin¹, T.-C. Vu¹, M. Fritz¹, W.
Kurniawan¹, B. Mukhopadhyay¹, A. Kolitsch², M.
Schiffer³, K.-D. Lang¹

¹Research Center of Microperipheric Technologies,

Microsensors and Actuator Technology

Gustav-Meyer-Allee 25, TiB 4/2-1, Technical University
Berlin, GERMANY

²Forschungszentrum Dresden-Rossendorf Institute of Ion
Beam Physics and Materials Research, Dresden,
GERMANY

³TDK-EPCOS Corporation, 14532 Stansdorf,
GERMANY

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T3P.006 TRANSPARENT TOUCH PANEL WITH CONDUCTIVE LIQUID CHANNEL STRUCTURE

Koji Asano¹, Gakuto Kita¹, Mitsuhiro Shikida²,
and Kazuo Sato¹

¹Dept. of Micro-Nano Systems Engineering, Nagoya
University, Nagoya, Japan

²Center for Micro-Nano Mechatronics, Nagoya
University, Nagoya, Japan

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T3P.007 DESIGN AND IMPLEMENTATION OF A NOVEL CMOS MEMS CONDENSER MICROPHONE WITH CORRUGATED DIAPHRAGM

Chien-Hsin Huang^{1,2}, Ming-Han Tsai³,
Chien-Hsing Lee⁴, Tsung-Min Hsieh⁴, Jhy-Cheng
Liou⁴, Li-Che Chen², Ming-Chuen Yip¹, and
Weileun Fang¹

¹Power Mechanical Engineering, National Tsing Hua
University, Hsinchu, Taiwan

²United Microelectronics Corp., Hsinchu, Taiwan

³Institute of NanoEngineering and MicroSystems,
National Tsing Hua University, Hsinchu, Taiwan

⁴Solid State System Corporation (3S), Hsinchu, Taiwan

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T3P.008 PRESSURE SENSOR USING NANO-OPTO-MECHANICAL SYSTEMS (NOMS)

X. Zhao^{1,2,3}, J. M. Tsai³, H. Cai³, X. M.
Ji², J. Zhou², M. H. Bao², Y. P. Huang², D. L.
Kwang³ and A. Q. Liu^{1†}

¹School of Electrical & Electronic Engineering, Nanyang
Technological University, Singapore 639798

²School of Information Science and Technology, Fudan
University, Shanghai 200433, China

³Institute of Microelectronics, A*STAR (Agency for
Science, Technology and Research) 11 Science Park
Road, Singapore Science Park II, Singapore 117685

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T3P.009 A HIGH SENSITIVITY SOI ELECTRIC-FIELD SENSOR WITH NOVEL COMB-SHAPED MICROELECTRODES

Pengfei Yang^{1,2}, Chunrong Peng¹, Haiyan Zhang¹,
², Shiguo Liu¹, Dongming Fang¹, and Shanhong
Xia^{1*}

¹State Key Laboratory of Transducer Technology,
Institute of Electronics, Chinese Academy of
Sciences, Beijing 100190, P.R.China

²Graduate School of the Chinese Academy of Sciences
Beijing 100039, P.R.China

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- T3P.010 SELF-CLEANING MASS CALIBRATION OF A THERMOGRAVIMETRIC DEVICE USING A THIN FILM MOLYBDENUM**
E. Iervoli^{1,2}, L. Mele², F. Santagata, A. W. van Herwaarden¹, W. van der Vlist², J. F. Creemer², P. M. Sarro²
¹Xensor Integration, Distributieweg 28, 2645 EJ Delfgauw, The Netherlands (NL) [www.xensor.nl]
²Delft University of Technology, DIMES, Feldmnnweg 17, 2628 CT, NL [www.dimes.tudelft.nl]
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- T3P.011 THEORETICAL ANALYSIS ON GYROSCOPIC EFFECT IN SURFACE ACOUSTIC WAVES**
Wen Wang, Jiuling Liu
Institute of acoustics, Chinese Academy of Sciences, Beijing, 100190, P. R. China
-1042
- T3P.012 A ROBUST MICRO MECHANICAL-LATCH SHOCK SWITCH WITH LOW CONTACT RESISTANCE**
C. H. Chung, R.-P. Ma, Y.-C. Shieh, W. Hsu
Department of Mechanical Engineering, National Chiao Tung University, Taiwan
-1046
- T3P.013 A NOVEL INTEGRATED TRANSPARENT FLEXIBLE TACTILE SENSOR**
Tsun-Yi Chen¹, Yung-Chen Wang¹, Cheng-Yao Lo², and Rongshun Chen^{1,2}
¹Department of Power Mechanical Engineering, National Tsing Hua University, Taiwan
²Institutes of NanoEngineering and MicroSystems, National Tsing Hua University, Taiwan
-1052
- T3P.014 FABRICATION AND TESTING OF A HIGH RESOLUTION EXTENSOMETER BASED ON RESONANT MEMS STRAIN SENSORS**
M. Ferri¹, L. Belsito¹, F. Mancarella¹, L. Masini¹, A. Roncaglia¹, J. Yan², A. A. Seshia², J. Zalesky³, and K. Soga²
¹Institute of Microelectronics and Microsystems, CNR, Bologna, Italy
²Department of Engineering, University of Cambridge, Cambridge, United Kingdom
³Czech Technical University in Prague, Faculty of Civil Engineering, Prague, Czech Republic
-1056
- T3P.015 MICRO-CANTILEVERS FOR NON-DESTRUCTIVE CHARACTERIZATION OF NANOGRASS UNIFORMITY**
Dirch H. Petersen¹, Fei Wang¹, Mikkel B. Olesen¹, Rafal Wierzbicki¹, Michael S. Schmidt¹, Peter F. Nielsen², Peter Boggild¹, Ole Hansen^{1, 3}, and Kristian Mølhave¹.
¹DTU Nanotech, Technical University of Denmark, Building 345E, DK-2800 Kgs. Lyngby, Denmark
²CAPRES A/S, Scion-DTU, Building 373, DK-2800 Kgs. Lyngby, Denmark
³CINF - Center for Individual Nanoparticle
- Functionality, NanoDTU, Denmark
-1060
- T3P.016 IN-PROCESS PARAMETER CALIBRATION OF THERMOELECTRICAL FLOW SENSORS WITH MONOLITHIC INTEGRATED CHANNEL**
M. Kropp¹, E. Brauns¹, C. Sosna² and W. Lang¹
¹Institute for Microsensors, -actuators and -systems (IMSAS), University of Bremen, Bremen, Germany
²Diehl Gas Metering GmbH, Ansbach, Germany
-1064
- T3P.017 AN IN-PLANE COBALT-NICKEL MICRORESONATOR SENSOR WITH MAGNETIC ACTUATION AND READOUT**
O. Ergeneman¹, P. Eberle¹, M. Suter², G. Chatzipirpiridis¹, K. M. Sivaraman¹, S. Pané¹, C. Hierold², and B. J. Nelson¹
¹Institute of Robotics and Intelligent Systems, ETH Zurich, Zurich, SWITZERLAND
²Micro and Nano Systems, ETH Zurich, Zurich, SWITZERLAND
-1068
- T3P.018 ALN BASED PIEZOELECTRIC FORCE SENSOR FOR ENERGY AUTONOMOUS SENSOR SYSTEMS**
D. Feili, M. Barra, M. Ziegler and, H. Seidel
Saarland University, Department of Mechatronics, 66123 Saarbrücken, GERMANY
-1072
- T3P.019 A CMOS COMPATIBLE POLYCRYSTALLINE SILICON-GERMANIUM BASED PIEZORESISTIVE PRESSURE SENSOR**
P. Gonzalez^{1,2}, B. Guo¹, S. Severi¹, K. De Meyer^{1,2}, and A. Witvrouw¹
¹Interuniversity Electronic Center (IMEC), Leuven, Belgium
²Katholieke Universiteit Leuven, Leuven, Belgium
-1076
- T3P.020 DEVELOPMENT OF A STRAIN SENSOR FOR ROLLING CONTACT LOADS**
C. Winkelmann, O. Woitschach, E.-M. Meyer and W. Lang
University of Bremen, Institute for Microsensors, -actuators and -systems, Bremen, Germany
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- T3P.021 AC CHARACTERISATION OF THERMAL FLOW SENSOR WITH FLUID CHARACTERISATION FEATURE**
C. J. Hepp¹, F. T. Krogmann¹, J. Polak¹, M. M. Lehmann¹, G. A. Urban²
¹Innovative Sensor Technology AG, Wattwil, SWITZERLAND
²Laboratory for Sensors, Department of Microsystems Engineering (IMTEK), University of Freiburg, Freiburg, GERMANY
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- T3P.022 NOVEL METHOD FOR GATED INDUCTIVE READOUT FOR HIGHLY SENSITIVE AND LOW COST VISCOSITY AND DENSITY SENSORS**
P. Rust, J. Dual

*Institute of Mechanical Systems, Department of
Mechanical and Process Engineering, ETH
Zurich, Tannenstrasse 3, CH-8092 Zurich,
SWITZERLAND*

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**T3P.023 MODULATED ELECTRO-MECHANICAL
CONTINUOUS-TIME
LOWPASS SIGMA-DELTA-MODULATOR FOR
MICROMACHINED GYROSCOPES**

S. Rombach¹, T. Northemann¹, M. Maurer¹, M.
Dienger² and Y. Manoli^{1,2}

¹Fritz Huettinger Chair of Microelectronics, Department
of Microsystems Engineering - IMTEK, University of
Freiburg, Germany

²HSG-IMIT Institute of Micromachining and Information
Technology, Villingen-Schwenningen, Germany

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**T3P.024 DEFLECTION AMPLIFICATION MECHANISM IN A
CAPACITIVE ACCELEROMETER**

I. Zeimpekis, I. Sari, M. Kraft

*Nano Research Group, ECS, University of Southampton,
Southampton, United Kingdom*

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**T3P.025 NOVEL SINGLE-DEVICE "XOR" AND "AND"
GATES FOR HIGH SPEED, VERY LOW POWER LSI
MECHANICAL PROCESSORS**

Faisal K. Chowdhury¹, Karumbaiah N.
Chappanda¹, Daniel Saab², & Massood
Tabib-Azar¹

¹University of Utah, Salt Lake City, Utah, USA

²Case Western Reserve University, Cleveland, Ohio,
USA

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**T3P.026 DESIGN AND IMPLEMENTATION OF AN
EXTREMELY LARGE PROOF-MASS CMOS-MEMS
CAPACITIVE TILT SENSOR FOR SENSITIVITY AND
RESOLUTION IMPROVEMENT**

Chun-I Chang¹, Ming-Han Tsai¹, Yu-Chia Liu¹,
Chih-Ming Sun³, and Weileun Fang^{1,2}

¹Institute of NanoEngineering and MicroSystems ,
National Tsing Hua University, HsinChu, Taiwan

²Department of Power Mechanical Engineering ,
National Tsing Hua University, HsinChu, Taiwan

³PixArt Imaging Inc, Hsinchu, Taiwan

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**T3P.027 MEASUREMENT OF THE MAGNITUDE AND
DIRECTION OF MAGNETIC FIELD BY A
MICROMACHINED CANTILEVER**

J. Chen, M. Qin, and Q.A. Huang*

*Key Laboratory of MEMS of the Ministry of Education,
Southeast University, Nanjing 210096, CHINA*

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Chemical Sensors and Microsystems

**T3P.028 ON THE RELATIVE SENSITIVITY OF
MASS-SENSITIVE CHEMICAL MICROSENSORS**

L.A. Beardslee¹, S. Truax¹, J.-J. Su¹, S.M.

Heinrich², F. Josse³, O. Brand¹

¹School of Electrical and Computer Engineering,
Georgia Institute of Technology, Atlanta, GA, USA

²Department of Civil and Environmental Engineering,
Marquette University, Milwaukee, WI, USA

³Department of Electrical and Computer Engineering,
Marquette University, Milwaukee, WI, USA

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**T3P.029 A RESONANT CANTILEVER SENSOR FOR
MONITORING AIRBORNE NANOPARTICLES**

H. S. Wasisto^{1*}, S. Merzsch¹, A. Stranz¹, A. Waag¹,
I. Kirsch², E. Uhde², T. Salthammer² and E.
Peiner¹

¹Institute of Semiconductor Technology (IHT), TU
Braunschweig, Braunschweig, Germany

²Fraunhofer - WKI, Material Analysis and Indoor
Chemistry, Braunschweig, Germany

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**T3P.030 GOLD NANOPARTICLES IMMOBILIZED QUARTZ
CRYSTAL MICROBALANCE BIOCHIP WITH
ULTRASONIC STANDING WAVE ENHANCEMENT
FOR REAL-TIME SENSING PROTEIN-LIGAND
INTERACTION**

Guo-Hua Feng* and Shu-Xiang Yang

*Department of Mechanical Engineering National Chung
Cheng University, Chiayi, Taiwan*

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**T3P.031 OZONE SENSOR USING ZNO BASED FILM BULK
ACOUSTIC RESONATOR**

Z. Wang¹, X. Qiu², R. Tang², J. Oiler², J. Zhu², H.
Huang², H. Wang², J. Shi¹ and H. Yu²

¹Wuhan University, Wuhan, China

²Arizona State University, Tempe, USA

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**T3P.032 MEASURING THE FREQUENCY RESOLUTION OF
A MULTI DEGREE OF FREEDOM RESONATOR
FOR MASS DETECTION**

K.M. Moran and K.L. Turner

*Dept. of Mechanical Engineering, UCSB, Santa Barbara,
CA, USA*

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**T3P.033 PH MEASUREMENTS WITH ZNO BASED SURFACE
ACOUSTIC WAVE RESONATOR**

R. Tang¹, X. Qiu¹, J. Zhu¹, J. Oiler², H. Huang¹, H.
Wang² and H. Yu^{1, 2, *}

¹School of Electrical, Computer and Energy Engineering,
Arizona State University, Tempe, AZ 85287

²School of Earth and Space Exploration, Arizona State
University, Tempe, AZ 85287

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**T3P.034 CO2 MEASUREMENT USING AN ALN/SI SAW
SENSOR**

S. Fanget, H. Grange, F. Palancade, G. Ganuchaud,
M. Matheron, S. Charlot, T. Bordy, T. Hoang, P.
Rey, D. Mercier, P. Brunet-Manquat and P. Robert
CEA-Leti, MINATEC Campus, 17 Rue des Martyrs -
38054 GRENOBLE Cedex 9, FRANCE

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- T3P.035 SURFACE ACOUSTIC WAVE GAS SENSOR FOR MONITORING LOW CONCENTRATION AMMONIA**
T.H. Lin¹, Y.T. Li¹, H.C.Hao¹, I.C. Fang¹, C.M. Yang², and D.J. Yao¹

¹Institute of NanoEngineering and MicroSystems, National Tsing Hua University, Hsinchu, Taiwan

²Department of Chemistry, National Tsing Hua University, Hsinchu, Taiwan

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- T3P.036 ADVANCES IN POLYMER-COATED SURFACE ACOUSTIC WAVE GAS SENSOR**
Shitang He, Wen Wang, Shunzhou Li, and Minghua Liu
Institute of Acoustics, Chinese Academy of Sciences, Beijing, CHINA

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- T3P.037 A MICROFABRICATED PRECONCENTRATING DEVICE FOR EXHALED BREATH ANALYSIS**
M. Li¹, S. Biswas², M. H. Nantz², R. M. Higashi^{2,3,4} and X. A. Fu^{*1}

¹Department of Chemical Engineering

²Department of Chemistry

³Center for Regulatory and Environmental Analytical Metabolomics (CREAM)

⁴James Graham Brown Cancer Center University of Louisville, Kentucky, USA

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- T3P.038 FLEXIBLE POLYMER HUMIDITY SENSOR FABRICATED BY INKJET PRINTING**
E. Starke^{*}, A. Türke, M. Krause, and W.-J. Fischer
Technische Universität Dresden, Institute of Semiconductors and Microsystems, 01062 Dresden, Germany

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- T3P.039 A TEXTILE INTEGRATED SENSOR SYSTEM FOR MONITORING HUMIDITY AND TEMPERATURE**
T. Kinkeldei, C. Zysset, K.H. Cherenack and G. Tröster
Swiss Federal Institute of Technology Zurich, Wearable Computing Lab, Zurich, Switzerland

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- T3P.040 FEM MODELING SAW HUMIDITY SENSOR BASED ON ZNO/IDTS/ALN/SI STRUCTURES**
D.T. Phan and G.S. Chung
School of Electrical Engineering, University of Ulsan, San 29, Mugeodong, Namgu, Ulsan, KOREA

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- T3P.041 RAPID HORMONE IMMUNOSENSOR WITH FLUID CONTROL MECHANISM**
M. Yamaguchi¹, Y. Matsuda¹, S. Yoshikawa¹, M. Sasaki¹, Y. Imai², D. Niwa², and V. Shetty³

¹Iwate University, Morioka, Iwate, Japan

²Rohm Co., Ltd., Kyoto, Kyoto, Japan

³University of California, Los Angeles, CA, USA

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- T3P.042 FLUORENE-THIOPHENE-BASED THIN-FILM FLUORESCENT CHEMOSENSOR FOR METHAMPHETAMINE VAPOR**

Y.Y. Fu¹, L.Q. Shi¹, D. F. Zhu¹, C. He^{1,2}, D. Wen^{1,2}, C.M. Deng^{1,2}, Q.G. He¹, H. M. Cao¹, J. G. Cheng¹

¹State Key Laboratory of Transducer Technology, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, Shanghai, China

²Graduate School of the Chinese Academy of Sciences, Beijing, China

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Bio-Sensors and Bio-Microsystems

- T3P.043 LOCALIZED ELECTROPORATION OF MOUSE EMBRYO USING DIELECTRIC GUIDES**

E. Mazari¹, M. Mantelet¹, J. Irazzo², A. Perea-Gomez², and C. Gosse¹

¹Laboratoire de Photonique et de Nanostructures, LPN-CNRS, Marcoussis, France

²Institut Jacques Monod, Université Paris 7 - CNRS, Paris, France

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- T3P.044 RAPID ON-SITE MEASUREMENT OF THE FRESHNESS OF RICE ON A MICRO ELECTROCHEMICAL DEVICE**
E. Koyachi¹, K. Kojima¹, T. Satake², and H. Suzuki¹

¹Graduate School of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Ibaraki, JAPAN

²Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki, JAPAN

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- T3P.045 AN ALL-DIGITAL, TIME-GATED 128X128 SPAD ARRAY FOR ON-CHIP, FILTER-LESS FLUORESCENCE DETECTION**
Y. Maruyama and E. Charbon
Circuits and Systems, Delft University of Technology, Delft, The Netherlands

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- T3P.046 MAGNETIC MICROHEATERS FOR CELL SEPARATION, MANIPULATION, AND LYSING**
Angelo Gaitas^{1,2}, Paddy French²
¹PicoCal Inc., 333 Parkland Plaza, Ann Arbor, Michigan, USA
²EI/EWI-DIMES, Delft University of Technology, Mekelweg 4 2628CD Delft, the Netherlands

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- T3P.047 MULTI-SITE ELECTRORETINOGRAM RECORDINGS INSIDE ISOLATED MOUSE RETINA USING FLEXIBLE SPATIALLY ARRANGED MICROELECTRODE PROBES**
Wataru Tonomura¹, Shun Taga¹, Chieko Koike^{1,2} and Satoshi Konishi¹
¹Ritsumeikan University, Kusatsu, Shiga, JAPAN
²PRESTO, JST, Kawaguchi, Saitama, JAPAN

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- T3P.048 A MICRO DEVICE FOR IMPEDANCE AND MECHANICAL CHARACTERIZATION OF**

BIOLOGICAL CELLS

Jian Chen*, Yi Zheng*, Qingyuan Tan, Yan Liang Zhang, Jason Li, Steve To, and Yu Sun**
Advanced Micro and Nanosystems Lab, University of Toronto, Canada

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T3P.049 LOW COST AND HIGH SPECIFIC ANESTHETIC BIOSENSORS WITH FUNCTIONALLY IMPRINTED NANOCAVITIES ON POLYMER FILMS

Chien-Chong Hong¹, Chih-Chung Lin², Chian-Lang Hong², and Po-Hsiang Chang¹

¹BioMEMS and NanoBiosystems Lab, Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan

²Department of Anesthesia, Chang Gung Memorial Hospital, Linkou, Taiwan

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T3P.050 HIGH-DENSITY MICROELECTRODE ARRAY SYSTEM AND OPTIMAL FILTERING FOR CLOSED-LOOP EXPERIMENTS

David Jäckel, Jan Müller, Muhammad Usman Khalid, Urs Frey, Douglas Bakkum, Andreas Hierlemann

ETH Zurich, Department of Biosystems Science and Engineering, 4058 Basel, Switzerland

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T3P.051 EVALUATION OF THE PACKAGING AND ENCAPSULATION RELIABILITY IN FULLY INTEGRATED, FULLY WIRELESS 100 CHANNEL UTAH SLANT ELECTRODE ARRAY (USEA): IMPLICATIONS FOR LONG TERM FUNCTIONALITY

A. Sharma¹, L. Rieth¹, P. Tathireddy¹, R. Harrison^{1,2}, H. Oppermann³, M. Klein³, M. Töpper³, E. Jung³, R. Normann², G. Clark² and F. Solzbacher^{1,2}

¹Dept. of Electrical and Computer Engineering, Univ. of Utah, Salt Lake City, Utah, 84112, USA

²Dept. of Bioengineering, Univ. of Utah, Salt Lake City, Utah, 84112, USA

³Fraunhofer Institute for Reliability and Microintegration, 13355 Berlin, Germany

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Medical Microsystems

T3P.052 WIRELESS RECHARGING OF BATTERY OVER LARGE DISTANCE FOR IMPLANTABLE BLADDER PRESSURE CHRONIC MONITORING

M.A. Suster and D.J. Young

University of Utah, Salt Lake City, Utah, USA

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T3P.053 FLEXIBLE MICRO-TACTILE SENSOR FOR NORMAL AND SHEAR ELASTICITY MEASUREMENTS

P. Peng¹, R. Rajamani¹, and X. Yu²

¹University of Minnesota, Minneapolis, Minnesota, USA

²University of Minnesota, Duluth, Minnesota, USA

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T3P.054 DEVELOPMENT OF A MICROFLUIDIC DEVICE WITH MICROCANTILEVER ARRAY FOR PROBING SINGLE CANCER CELL MECHANICS

T. I. Yin^{1*}, Y. Zhao¹, C. F. Lin², H. H. Tsai², Y. Z. Juang², G. A. Urban¹

¹IMTEK, University of Freiburg, Freiburg, Germany

²National Chip Implementation Center, National Applied Research Laboratories, Hsinchu, Taiwan

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T3P.055 ANIMAL EXPERIMENTAL STUDY ON THE NERVE ROOT RETRACTION WITH A SILICON PRESSURE SENSOR

Xing Liu¹, Qing-An Huang¹, Ming Qin¹, Hui Chen², and Darrin Young³

¹Key Laboratory of MEMS of the Ministry of Education, Southeast University, Nanjing 210096, China

²Medical College, Southeast University, Nanjing 210009, China

³Department of Electrical and Computer Engineering, University of Utah, Salt Lake City UT 84112, USA

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T3P.056 INDIVIDUALLY-ADDRESSABLE PARYLENE MICRONEEDLE ARRAYS WITH INTEGRATED MICROCHANNELS FOR RETINAL PROSTHESIS STUDY

H. Tu, Y. Li, P. Finlayson, R. Iezzi, and Y. Xu

Wayne State University, Detroit, MI, USA

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T3P.057 PRELIMINARY THERMAL CHARACTERIZATION OF A FULLY-PASSIVE WIRELESS BACKSCATTERING NEURO-RECORDING MICROSYSTEM

H. N. Schwerdt¹, W. Xu¹, S. Shekhar¹, F. A. Miranda², J. Chae¹

¹Arizona State University, School of Electrical, Computer, and Energy Engineering, Tempe, AZ, USA

²NASA Glenn Research Center, Cleveland, OH, USA

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T3P.058 A FABRY-PÉROT PRESSURE SENSOR FABRICATED ON LEFT VENTRICULAR ASSIST DEVICE FOR HEART FAILURE IMPLANT

M. D. Zhou¹, C. Yang², Z. Liu², J. P. Cysyk³, and S. Y. Zheng¹

¹Department of Bioengineering,

²Department of Electrical Engineering, Pennsylvania State University University Park, Pennsylvania, U. S. A.

³Department of Surgery, College of Medicine, Pennsylvania State University, Hershey, Pennsylvania, U. S. A.

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H.X. Yu^{1,2}, D.C. Li¹, R.C. Roberts², W.S. Liang¹,

- K.X. Xu¹, and N.C. Tien²
¹State Key Laboratory of Precision Measuring Technology and Instruments, Tianjin University, China
²Department of Electrical Engineering & Computer Science, Case Western Reserve University, USA
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Department of Engineering Science and Mechanics, The Pennsylvania State University, University Park, PA 16802 US
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Department of Micro and Nanotechnology (DTU Nanotech), Technical University of Denmark, Kgs. Lyngby, DK-2800, DENMARK
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Y.-W. Hsu¹, C.-H. Chen¹, and S.-K. Fan^{1,2}
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²Department of Materials Science and Engineering, National Chiao Tung University, Hsinchu, Taiwan
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C. Lin^{1*}, C.J. Chen¹, C.C. Chieng¹, and F.G.Tseng^{1,2}
¹Department of Engineering and System Science, National Tsing Hua University, Taiwan, R.O.C
²Division of Mechanics, Research Center for Applied Sciences, Academia Sinica, Taiwan, R.O.C.
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B. Daunay¹, P. Lambert¹, L. Jalabert¹, D. Collard¹ and H. Fujita²
¹LIMMS-CNRS/IIS, UMI2820, The University of Tokyo
²CIRMM, IIS, The University of Tokyo
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¹Crump Institute for Molecular Imaging and Dept. of Molecular & Medical Pharmacology
²Bioengineering Dept.
³Mechanical and Aerospace Engineering Dept., UCLA, Los Angeles CA 90095, USA
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T. Guan¹, F. Ceyssens¹, and R. Puers¹
¹KULeuven, dept. ESAT-MICAS, Leuven, BELGIUM
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S.E. Wang^{1,2}, Z.L. Dong¹, Y.L. Qu¹, G.B. Lee^{1,3}, and W.J.Li^{1,4}
¹State Key Laboratory of Robotics, Shenyang Institute of Automation, CAS, Shenyang, China
²The Graduate University of the Chinese Academy of Sciences, China
³Dept. of Engineering Science, NCKU, Taiwan
⁴Centre for Micro and Nano Systems, CUHK, Hong Kong
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¹Microsystems and Control Laboratory, Power Mechanical Engineering Department, NTHU, Hsinchu, Taiwan, R.O.C.
²Department of Electrophysics, National Chiao Tung University, Taiwan, R.O.C.
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Taotao Zhu¹, Rui Cheng², and Leidong Mao²
¹Department of Chemistry, Nanoscale Science and Engineering Center
²Faculty of Engineering, Nanoscale Science and Engineering Center
University of Georgia, Athens, Georgia 30602, USA
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H. Huang^{1,2*}, X. M. Ji¹, J. Zhou¹, T. J. Huang², and

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¹Institute of Communication Technology, Nanjing University of Posts and Telecommunications, Nanjing, Jiang-Su 210003, People's Republic of China

²Department of Nanomechanics, Tohoku University, Sendai 980-8579, Japan

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*Anirban Chakraborty, Xinchuan Liu and Cheng Luo

Mechanical and Aerospace Engineering, University of Texas at Arlington, Arlington, TX 76019 USA

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J. Braeuer^{1*}, J. Besser¹, M. Wiemer¹ and T. Gessner^{1,2}

¹Fraunhofer Institute for Electronic Nano Systems, Chemnitz, Germany

²Chemnitz University of Technology, Chemnitz, Germany

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J. El-Rifai^{1,2,3}, S. Sedky^{2,4}, R. Van Hoof¹, S. Severi¹, D. Lin¹, R. Puers^{1,3}, C. Van Hoof^{1,3} and A. Witvrouw¹

¹imec, Leuven, Belgium

²YJ-Science and Technology Research Center, AUC, New Cairo, Egypt

³Katholieke Universiteit Leuven, Leuven, Belgium

⁴Physics Department, The American University in Cairo (AUC), New Cairo, Egypt

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P. Rezai, P. R. Selvaganapathy* and G. R. Wohl
Department of Mechanical Engineering, McMaster University, Hamilton, ON, CANADA

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R. J. Hergert^{1,2}, B. Hanrahan^{2,3}, A. S. Holmes¹, and R. Ghodssi²

¹Optical and Semiconductor Devices Group, Department of Electrical and Electronics Engineering, Imperial College London, UK

²MEMS Sensors and Actuators Laboratory, Department of Electrical and Computer Engineering, Institute for Systems Research, University of Maryland College Park, MD, USA

³The US Army Research Laboratory, Adelphi, MD, USA

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T. Kobayashi, A. Akazawa, Y. Furuno, W. Tonomura and S. Konishi

Ritsumeikan University, Kusatsu, Shiga, JAPAN

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M. Nowack¹, S. Leidich², D. Reuter^{1,2}, S. Kurth², M. Kuchler², A. Bertz^{1,2} and T. Gessner^{1,2}

¹Chemnitz University of Technology, Center for Microtechnologies, Chemnitz, Germany

²Fraunhofer Institute for Electronic Nano Systems, Chemnitz, Germany

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J. Courbat, Y.B. Kim, D. Briand, and N.F. de Rooij
Ecole Polytechnique Fédérale de Lausanne (EPFL), Institute of Microengineering (IMT),

Sensors, Actuators and Microsystems Laboratory (SAMLAB), Neuchâtel, Switzerland

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M. Antelius, A. C. Fischer, N. Roxhed, G. Stemme and F. Niklaus

KTH Royal Institute of Technology, Stockholm, SWEDEN

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Karumbaiah N.Chappanda, Abhishek Mathur¹ and Massood Tabib-Azar^{1,2}

¹Department of electrical and computer engineering

²Department of bioengineering, University of Utah, Salt Lake City, Utah, USA

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T. Namazu^{1,2}, K. Ohtani¹, K. Yoshiki¹, and S. Inoue¹

¹Department of Mechanical and Systems Engineering, University of Hyogo, Himeji, Japan

²JST PRESTO, Japan Science and Technology Agency, Saitama, Japan

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Jungkwun 'J.K.' Kim^{1, 2}, Pitfee Jao², Cheolbok Kim², and Yong-Kyu 'YK' Yoon^{1, 2}

¹State University of New York at Buffalo, Buffalo, NY,

USA

²University of Florida, Gainesville, FL, USA

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M. Fujii¹, T. Namazu^{1,2}, K. Yoshiki¹, and S. Inoue¹

¹Department of Mechanical and Systems Engineering, University of Hyogo, JAPAN

²JST PRESTO, Japan Science and Technology Agency, Saitama, Japan

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Y.-J. Fang¹, T. Mukherjee¹, and G.K. Fedder^{1,2,3}

¹Department of Electrical and Computer Engineering,

²The Robotics Institute,

³Institute for Complex Engineered Systems, Carnegie Mellon University, Pittsburgh, PA, USA 15213

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S. Yamamoto¹, E. Higurashi², T. Suga¹, R. Sawada³

¹Department of Precision Engineering, School of Engineering, The University of Tokyo, Tokyo, Japan

²Research Center for Advanced Science and Technology, The University of Tokyo, Tokyo, Japan

³Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan

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Y.B. Wu^{1,2}, G.F. Ding^{1*}, H. Wang¹ and C.C. Zhang¹

¹National Key Lab of Nano/Micro Fabrication Technology, Key Lab for Thin Film and Micro fabrication of the Ministry of Education, Institute of Micro and Nano Science and Technology, Shanghai Jiao Tong University, Shanghai, China

²Power Electronics Business Unit, Zhuzhou CSR Times Electric Co., Ltd., Zhuzhou, Hunan, China

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Xuming Sun¹, Student Member IEEE, Quan Yuan¹, Student Member IEEE, Dongming Fang², Member IEEE, and Haixia Zhang^{1*}, Senior Member IEEE

¹National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, Beijing 100871, China

²State Key Laboratory of Transducer Technology,

Institute of Electronics,

Chinese Academy of Sciences, Beijing 100190, China

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Wang-Shen Su¹, Chang-Hung Chen², Chih-Chun Lee³, Yu-Cheng Lin⁴, and Weileun Fang^{1,2,3}

¹National Nano Device Laboratories, Hsinchu, Taiwan

²Power Mechanical Eng. Dept.,³NEMS Inst., National Tsing Hua Univ., Hsinchu, Taiwan

⁴Dept. of Engineering Science, National Cheng Kung Univ., Tainan, Taiwan

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Firas Sammoura^{1,2,3} and Ken Yang²

¹Masdar Institute of Science and Technology, Abu Dhabi, UAE

²MEMS/Sensors Division, Analog Devices, Wilmington, MA 01887

³Technology and Development Program, Massachusetts Institute of Technology, Cambridge, MA02139

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W. Zhang, Y. Zhao, D. Ha, W. Cai and P. Wang
Zhejiang University, Hangzhou, Zhejiang Province, CHINA

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X. Liu^{*}, X.M. Wu, and T.L. Ren

¹Institute of Microelectronics, Tsinghua University, Beijing 100084, China

²Tsinghua National Laboratory of Information Science and Technology, Tsinghua University, Beijing 100084, China

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Hsieh-Shen Hsieh^{1,2}, Heng-Chung Chang^{1,2}, Chih-Fan Hu¹, Chao-Lin Cheng¹, Weileun Fang¹

¹Power Mech. Eng. Dept National Tsing Hua University, Hsinchu, Taiwan

²MEMS/MST R&D Department, Research Center, Delta Electronics, Inc., Taoyuan, Taiwan

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Weiwei Zhang, Hong Yu, and Qing-An Huang*
Key Laboratory of MEMS of Ministry of Education,
Southeast University,
Nanjing 210096, CHINA

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J.-J. Su¹, C. Carron¹, S. Truax¹, K.S. Demirci^{1,2},
L.A. Beardslee¹, O. Brand¹

¹School of Electrical and Computer Engineering,
Georgia Institute of Technology, Atlanta GA, USA

²currently at: Texas Instruments Inc., Dallas, TX, USA

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W. O. Davis

MicroVision, Inc., Redmond, WA, USA

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Po-Yau Ju¹, Chien-Hsiung Tsai², Lung-Ming Fu²
and Che-Hsin Lin^{1,*}

¹National Sun Yat-sen University, Kaohsiung, Taiwan

²National Pingtung University of Science and Technology,
Pingtung, Taiwan

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Ping Du, Xiaoyu Zheng, I-Kuan Lin, and Xin
Zhang

Department of Mechanical Engineering, Boston
University, Boston, MA, USA

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M. Ren^{1,2}, Y. F. Yu¹, J. M. Tsai², H. Cai², W. M.
Zhu¹, D. L. Kwong² and A. Q. Liu¹

¹School of Electrical & Electronic Engineering,
Nanyang Technological University, Singapore 639798

²Institute of Microelectronics, A*STAR (Agency for
Science, Technology and Research) 11 Science Park
Road, Singapore Science Park II, Singapore 117685

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B. Eminoglu¹, S.E. Alper², and T. Akin^{1,2}

¹Middle East Technical University, Department of
Electrical and Electronics Eng., Ankara, TURKEY

²METU-MEMS Research and Application Center,
Ankara, TURKEY

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T.D. Chiang¹, C.F. Fong¹, G.L. Jiang¹, C.W. Hong¹,
H.C. Liu² and M.T. Hou^{1,*}

¹Department of Mechanical Engineering, National
United University, Miaoli, Taiwan

²Department of Mechanical Engineering, China
University of Science and Technology, Taipei, Taiwan

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*L. Qiao, D. Xiao, F.K. Lu and C. Luo

Mechanical and Aerospace Engineering, University of
Texas at Arlington, Arlington, TX, USA

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N. Lass¹, A. Tropmann¹, A. Ernst², R.
Zengerle¹ and P. Koltay^{1,2}

¹Laboratory for MEMS Applications, IMTEK, University
of Freiburg, Germany

²BioFluidix GmbH, Georges Köhler Allee 106, 79110
Freiburg Germany

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V. Badilita*, S. Rzesnik, K. Kratt, and U. Wallrabe

Laboratory for Microactuators, Dept. of Microsystems
Engineering – IMTEK, University of Freiburg, Germany

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A. Tropmann¹, N. Lass¹, N. Paust², C. Ziegler¹, R.
Zengerle^{1,2} and P. Koltay^{1,3}

¹Laboratory for MEMS Applications, IMTEK, University
of Freiburg, Germany

²HSG-IMIT – Institut fuer Mikro- und
Informationstechnik, Villingen-Schwenningen, Germany

³BioFluidix GmbH, Georges-Koehler-Allee 106, 79110
Freiburg, Germany

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G. L. Smith¹, R. Q. Rudy^{1,2}, D. L. DeVoe², and R. G.
Polcawich¹

¹U.S. Army Research Laboratory, Adelphi, MD, USA

²University of Maryland, College Park, USA

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X. Zhao^{1,2,3}, J. M. Tsai³, H. Cai³, X. M. Ji², J. Zhou²,
M. H. Bao², Y. P. Huang², D. L. Kwang³ and A.

Q.Liu¹

¹School of Electrical & Electronic Engineering,
Nanyang Technological University, Singapore 639798

²School of Information Science and Technology, Fudan
University, Shanghai 200433, China

³Institute of Microelectronics, A*STAR (Agency for
Science, Technology and Research)

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USING INDUCTIVELY-TRIGGERED
TRANSFORMATIVE POLYMERS FOR
POINT-OF-CARE DIAGNOSTICS**

Chien-Chong Hong¹, Cheng-Han Tsai¹, Szu-Ying
Chen¹ and Chie-Pein Chen²

¹BioMEMS and NanoBiosystems Lab, Department of
Power Mechanical Engineering, National Tsing Hua
University, Hsinchu, Taiwan

²Department of Obstetrics and Gynecology, Mackay
Memorial Hospital, Taipei, Taiwan

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M. Lee¹, Y.-C. Chen², C. Chang¹, M. Hou³ and
R.Chen^{1,2}

¹Institute of NanoEngineering and MicroSystems,
National Tsing Hua University, Hsinchu, Taiwan

²Department of Power Mechanical Engineering
National Tsing Hua University, Hsinchu, Taiwan

³Department of Mechanical Engineering, National
United University, Miaoli, Taiwan

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Th. Martin¹, U. Gengenbach¹, P. Ruther², O. Paul²,
G. Bretthauer¹

¹Karlsruhe Institute of Technology, Institute for Applied
Computer Science, Germany

²Department of Microsystems Engineering (IMTEK),
University of Freiburg, Germany

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**T3P.121 THERMALLY-ACTUATED HIGH SPEED DROPLET
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E. Yakhshi-Tafti, R. Kumar, and H. J. Cho
Department of Mechanical, Materials and Aerospace
Engineering, University of Central Florida Orlando,
Florida, USA

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RF MEMS, Resonators, and Oscillators

**T3P.122 WIDEBAND TUNABLE LOVE WAVE FILTER USING
ELECTROSTATICALLY-ACTUATED MEMS
VARIABLE CAPACITORS INTEGRATED ON
LITHIUM NIOBATE**

T. Yasue¹, T. Komatsu², N. Nakamura², K.
Hashimoto², H. Hirano¹, M. Esashi¹ and S.
Tanaka^{1*}

¹Tohoku University, Sendai, JAPAN

²Chiba University, Chiba, JAPAN

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CANTILEVER-BASED OSCILLATOR SYSTEM**

Mamoru Nakajima¹, Dong F. Wang¹, Tsuyoshi
Ikehara², and Ryutaro Maeda²

¹Micro Engineering & Micro Systems Laboratory,
Ibaraki University (College of Eng.), Hitachi, Japan

²Ubiquitous MEMS & Micro Engineering Research
Center (UMEMSME), AIST, Tsukuba, Japan

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M. Gil¹, T. Manzaneque¹, J. Hernando-García¹, A.
Ababneh², H. Seidel³, J. L. Sánchez-Rojas¹

¹Dpto. de Ingeniería Eléctrica, Electrónica,
Automática y Comunicaciones, ETSI Industriales,
Campus Universitario UCLM, 13071 Ciudad Real,
Spain.

²Yarmouk University, Electronic Engineering
Department, Hijawi Faculty for Engineering
Technology, Jordan.

³Chair of Micromechanics,
Microfluidics/Microactuators,
Faculty of Natural Sciences and Technology II,
Saarland University, D-66123 Saarbrücken, Germany

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PLATE RESONATOR WITH HIGH Q AND LOW
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Ming-Huang Li¹, Wen-Chien Chen², and
Sheng-Shian Li^{1,2}

¹Inst. of NanoEngineering and MicroSystems, 2Dept. of
Power Mechanical Engineering
National Tsing Hua University, Hsinchu, Taiwan

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RESONATOR EXTERNAL CAVITY VIA
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M. Ren^{1,2}, H. Cai², J. M. Tsai², W. M. Zhu¹, D. L.
Kwong² and A. Q. Liu¹

¹School of Electrical & Electronic Engineering,
Nanyang Technological University, SINGAPORE
639798

²Institute of Microelectronics, A*STAR (Agency for
Science, Technology and Research)

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T. Abe¹, Y. Itasaka²

¹Niigata University, Niigata, Japan

²Tohoku University, Sendai, Japan

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Chih-Ming Lin^{1*}, Yun-Ju Lai¹, Ting-Ta Yen¹, Jin-Chen Hsu², Yung-Yu Chen³, Debbie G. Senesky¹, and Albert P. Pisano¹

¹Department of Mechanical Engineering, University of California, Berkeley, California, USA

²Department of Mechanical Engineering, National Yunlin University of Sci. & Tech., Yunlin, Taiwan

³Department of Mechanical Engineering, Tatung University, Taipei, Taiwan

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Zhiqiang Zhang, Xiaoping Liao*, and Lei Han
Key Laboratory of MEMS of Ministry of Education, Southeast University, Nanjing 210096, China

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R. Tabrizian and F. Ayazi
School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA

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Jinhong Kim and Erik R. Deutsch
Block MEMS LLC, Marlborough, Massachusetts, United States

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U. Hofmann, H.J. Quenzer, C. Eisermann, J. Janes, C. Schroeder, B. Jensen, J. Hagge, F. Soerensen, F. Senger, D. Vick, O. Schwarzelbach, L. Ratzmann, T. Giese, B. Wagner, W. Benecke

¹Fraunhofer Institute for Silicon Technology ISIT, Itzehoe, GERMANY

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C.T. Chan and J.A. Yeh
Institute of NanoEngineering and MicroSystems, National Tsing-Hua University, Hsinchu, Taiwan

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H. Miao^{1, 2}, K. Srinivasan¹, M. T. Rakherl, M. Davanco^{1, 2} and V. Aksyuk¹

¹Center for Nanoscale Science and Technology, National Institute of Standards and Technology, Gaithersburg, MD, USA

²Maryland Nanocenter, University of Maryland, College

Park, MD, USA

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K.B. Gylfason, M. Antelius, and H. Sohlström
Microsystem Technology Laboratory, KTH – Royal Institute of Technology, SWEDEN

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T. Lee¹, A. Higo¹, H. Fujita², Y. Nakano¹, and H. Toshiyoshi^{1, 2}

¹Research Center for Advanced Science and Technology, The University of Tokyo, Tokyo, JAPAN

²Institute of Industrial Science, The University of Tokyo, Tokyo, JAPAN

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P. Li^{1, 2*}, T. Sasaki¹, L.F. Pan², and K. Hane¹

¹Department of Nanomechanics, Tohoku University, Sendai, Japan

²Department of Precision Instruments and Mechanology, Tsinghua University, Beijing, China

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P. Müller, A. Kloss, W. Mönch, and H. Zappe
Department of Microsystems Engineering – IMTEK, University of Freiburg, Freiburg, GER

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G. Pandraud^{1*}, L. Mele¹, B. Morana¹, E. Margallo-Balbás², P.J. French³ and P.M. Sarro¹

¹DIMES-ECTM, Delft University of Technology, Delft, The Netherlands

²Medlumics S.I., Madrid, Spain

³DIMES-EI, Delft University of Technology, Delft, The Netherlands

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J. Brunne¹, R. Grunwald² and U. Wallrabe¹

¹University of Freiburg - IMTEK, Department of Microsystems Engineering, Laboratory for Microactuators, Freiburg, Germany

²Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany

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MEMS MICROMIRRORS DEEPKISHORE

Mukhopadhyay¹, Donald Walko², Il Woong Jung¹, Jin Wang², Gopal Shenoy² and Danie¹ López¹

¹Center for Nanoscale Materials, Argonne National Laboratory, Argonne, IL, USA

²Advanced Photon Source, Argonne National Laboratory, Argonne, IL, USA

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C. Pang¹, M. Yu^{1*}, X.M. Zhang², A.K. Gupta¹, and K.M. Bryden³

¹Department of Mechanical Engineering, University of Maryland, College Park, USA

²Department of Applied Physics, Hong Kong Polytechnic University, Hong Kong, China

³Department of Mechanical Engineering, Iowa State University, Ames, USA

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Wei-Chih Wang^{1,2}, Chi Leung Tsui¹, and Menglu Wu¹

¹Department of Mechanical Engineering,

²Department of Electrical Engineering, University of Washington, Seattle, WA, 98195, USA

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K. Gu¹, C.-C. Lee³, W. Cui¹, M. Wu and W.-C. Wang^{1,2*}

¹Department of Mechanical Engineering, University of Washington, Seattle, Washington, USA

²Department of Electrical Engineering, University of Washington, Seattle, Washington, USA

³School of Science and Engineering, Teesside University, Middlesbrough, UK

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J.C. Park¹, J.Y. Park¹, J. Y. Won², D.H. Kim², and J. Park¹

¹Department of Electronic Engineering, Kwangwoon University, Seoul, Korea

²Program for Nanomedical Science and Technology, Yonsei University, Seoul, Korea

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B. Aldalali¹, C. Li¹, L. Zhang^{2,3}, and H. Jiang^{1,3}

¹Department of Electrical and Computer Engineering,

University of Wisconsin-Madison, Madison, WI, USA

²Department of Computer Science, University of Wisconsin-Madison, Madison, WI, USA

³Eye Research Institute, University of Wisconsin-Madison, WI, USA

T3P.147 INDIRECT WAVELENGTH SELECTIVE INFRARED EMITTER USING SURFACE PLASMON POLARITON

K. Masuno¹, T. Sawada¹, S. Kumagai¹, and M. Sasaki¹

¹Toyota Technological Institute, Nagoya, Aichi, Japan

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Nanoscale Materials And Fabrication, Devices and Systems

T3P.148 IC COMPATIBLE TOP DOWN PROCESS FOR SILICON NANOWIRE FET ARRAYS WITH THREE {100} SURFACES FOR (BIO) CHEMICAL SENSING

T.S.Y. Moh^{1, 2}, Y. Maruyama³, C. Shen¹, G. Pandraud¹, L.C.P.M. de Smet², H.D. Tong⁴, C. van Rijn⁴, E.J.R. Sudhölter² and P.M. Sarro¹

Delft University of Technology, The Netherlands.

¹Delft Institute of Microsystems and Nanoelectronics,

²Department of Chemical Engineering, Nano Organic Chemistry,

³Circuits and Systems,

⁴Nanosens, The Netherlands

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C.J. Camargo^{1*}, N. Torras¹, H. Campanella¹, J.E. Comrie², E.M. Campo³, K. Zinoviev¹, E.M. Terentjev² and J.Esteve¹

¹Instituto de Microelectrónica de Barcelona IMB-CNM (CSIC), Bellaterra, Barcelona, SPAIN

²Cavendish Laboratory, University of Cambridge, Cambridge CB3 0HE, UK

³Laboratory for Research on the Structure of Matter, University of Pennsylvania, Philadelphia PA, USA

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E. Martinelli¹, F. Dini¹, D. Monti², G. Pomarico², R. Paolesse^{2,3}, C. Di Natale^{1,3}

¹Department of Electronic Engineering, University of Rome Tor Vergata, Rome, Italy

²Department of Chemical Science and Technology, University of Rome Tor Vergata, Rome, Italy

³CNR – IDASC, Rome, Italy

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W.R. Wang^{1,3}, Y.X. Zhou^{1,3}, T. Li^{1*}, M.F. Wang², X.M. Xie², Y.L. Wang¹

¹State Key Laboratories of Transducer Technology, Science and Technology on Microsystem Laboratory,

²State Key Laboratory of Functional Materials for Informatics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Science, Shanghai, China

³Graduate School of Chinese Academy of Sciences, Beijing, China

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T3P.152 DIAGNOSTIC OF MICROPLASMA REACTOR FOR SCANNING PLASMA ETCHING

H. Wang^{1,2}, Y.H. Tong^{1,2}, L. Wen³ and Z. Li^{1,2}

¹School of Mechanical and Automotive Engineering, Anhui Polytechnic University, Wuhu, Anhui, China

²Anhui Key Laboratory of Advanced Numerical Control & Servo Technology, Wuhu, Anhui, China

³Department of Precision Machinery and Precision Instrumentation, University of Science and Technology of China, Hefei, China

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T3P.153 ELECTROSTATIC GATING OF ION AND MOLECULE TRANSPORT THROUGH A NANOCHANNEL-ARRAY MEMBRANE

*G. Pardon and W. van der Wijngaart

Microsystem Technology Lab, KTH Royal Institute of Technology, Stockholm, SWEDEN

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M.T. Stamm¹, Z. Zha^{1,2}, L. Jiang¹, Z. Dai², and Y. Zohar¹

¹The University of Arizona, Tucson, Arizona, USA

²Harbin Institute of Technology, Harbin, China

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J.Z. Sun¹, Y. Li^{1,2}, C. Bian¹, J.H. Tong¹, H.P. Dong¹, H. Zhang¹, Q.Y. Chen^{1,2}, S.H. Xia¹

¹State Key Laboratory of Transducer Technology, Institute of Electronics, Chinese Academy of Sciences, Beijing, China

²Graduate University of Chinese Academy of Sciences, Beijing, China

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Wen Yuan, Karumbaiah H. Chappanda and Massood Tabib-Azar

University of Utah, Salt Lake City, UT, USA

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Y. Eun, J.-I. Lee, J. Choi, Y. Song and J. Kim*

School of Mechanical Engineering, Yonsei University, Seoul, KOREA

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T3P.158 FABRICATION OF 3-D HYBRID POLYMER-MAGNETITE NANOSTRUCTURES WITH GEOMETRIC SHAPE ANISOTROPY

Z. Liu¹, F. Herrault², S.-H. Kim², D. G. Bucknall¹ and M. G. Allen²

¹School of Materials Science and Engineering, Georgia

Institute of Technology, GA, USA, 30332

²School of Electrical and Computer Engineering, Georgia Institute of Technology, GA, USA, 30332

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T3P.159 NANO-PHOTONIC DISPLACEMENT SENSING MECHANISM

Hongbin Yu^{1,2}, Guangya Zhou¹, Xiongyue Chew¹, Sujeet K. Sinha², and Fook Siong Chau¹

¹Micro/Nano Systems Initiative, Department of Mechanical Engineering, National University of Singapore, Singapore

²Material laboratory, Department of Mechanical Engineering, National University of Singapore, Singapore

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T3P.160 2D PHOTONIC CRYSTAL TM POLARIZER FABRICATED BY ONE-STEP COMBINED NANOIMPRINT AND PHOTOLITHOGRAPHY

K.-H. Choi^{1*}, J. Huh^{2*}, Y. Cui¹, B.-K. Ju², W. Hu¹, and J.-B. Lee¹

¹The University of Texas at Dallas, Richardson, Texas, U.S.A.

²Korea University, Seoul, Republic of Korea

*These authors contributed equally to this work

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Energy and Power MEMS

T3P.161 BIOCOMPATIBLE ALN-BASED PIEZO ENERGY HARVESTERS FOR IMPLANTS

N. Heidrich^{1,2}, F. Knöbber^{1,2}, R.E. Sah¹, W.

Pletschen¹, S. Hampl³, V. Cimalla¹ and V. Lebedev¹

¹Fraunhofer Institute for Applied Solid State Physics, Freiburg, Germany

²IMTEK, University of Freiburg, Freiburg, Germany

³IMN MacroNano®, Ilmenau University of Technology, Ilmenau, Germany

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T3P.162 PHOTOVOLTAICALLY RECHARGEABLE FUEL CELL ACCUMULATOR FOR ENERGY SELF-SUFFICIENT MICROSYSTEMS

D. Hertkorn¹, C. Bretthauer¹, F. Bükler¹, B. Herr¹, M. Müller¹, F. Paul², C. Müller¹, J. Haußelt², H. Reinecke¹

Laboratory for Process Technology¹ and Laboratory for Materials Process Technology², Department of Microsystems Engineering- IMTEK, University of Freiburg, GERMANY

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T3P.163 THINNED-PZT ON SOI PROCESS AND DESIGN OPTIMIZATION FOR PIEZOELECTRIC INERTIAL ENERGY HARVESTING

Ethem Erkan Aktakka, Rebecca L. Peterson, and Khalil Najafi

Center for Wireless Integrated Microsystems (WIMS) University of Michigan, Ann Arbor, MI, USA

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- T3P.164 HIGHLY SCALABLE AND SENSITIVE BROADBAND 1HZ ~ 1KHZ VIBRATED ENERGY HARVESTER WITH NOVEL SELF-ALTERNATION MAGNETIC-FLUX AND 3D COILS**
Y. S. Lai¹, M. Q. Wei², H. C. Lin¹, Y. J. Cheng², Y. B. Lin³, and C. H. Ho¹
¹National Nano Device Laboratories, Hsinchu, Taiwan
²National Chi Nan University, Nantou, Taiwan
³National Center for Research on Earthquake Engineering, Taipei, Taiwan
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- T3P.165 MICROELECTROMAGNETIC ENERGY HARVESTER WITH INTEGRATED MAGNETS**
Q. Zhang¹, S.J. Chen¹, L. Baumgartel², A. Lin¹ and E.S. Kim¹
¹Department of Electrical Engineering, University of Southern California, Los Angeles, USA
²Department of Physics, University of Southern California, Los Angeles, USA
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- T3P.166 HARVESTING TRAFFIC-INDUCED BRIDGE VIBRATIONS**
T. Galchev, J. McCullagh, R. L. Peterson, and K. Najafi
Center for Wireless Integrated Microsystems (WIMS)
University of Michigan, Ann Arbor, Michigan
48109-2122, USA
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- T3P.167 A MICRO INITIATOR REALIZED BY REACTIVE NI/AL NANOLAMINATES FOR MEMS APPLICATIONS**
X. Qiu¹, R. Tang¹, R. Liu², S. Guo², H. Yu¹, ^{3*}
¹School of Electrical, Computer and Energy Engineering, Arizona State University, Tempe, AZ 85287
²Department of Mechanical Engineering, Louisiana State University, Baton Rouge, LA 70803
³School of Earth and Space Exploration, Arizona State University, Tempe, AZ 85287
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- T3P.168 STUDY OF VIBRATION-INDUCED BROADBAND FLEXIBLE PIEZOELECTRIC ZNO MICRO-HARVESTER WITH STORAGE SYSTEM**
C.T. Pan¹, Z.H. Liu¹, Y.C. Chen², W.T. Chang², and Y.J. Chen¹
¹Department of Mechanical and Electro-Mechanical Engineering, and Center for Nanoscience & Nanotechnology, National Science Council Core Facilities Laboratory for Nano-Science and Nano-Technology in Kaohsiung-Pingtung area, National Sun Yat-Sen University, Kaohsiung 804, Taiwan
²Department of Electrical Engineering, National Sun Yat-Sen University, Kaohsiung 804, Taiwan
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- T3P.169 LIQUID-ENCAPSULATED ENERGY HARVESTER FOR LOW FREQUENCY VIBRATIONS**
L. Bu, X.M. Wu^{*}, X.H. Wang, and L.T. Liu
Institute of Microelectronics, Tsinghua University,

Beijing, China Tsinghua National Laboratory for Information Science and Technology, Beijing, China
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ORAL SESSIONS

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Guo-Hua Feng^{*} and Min-Yiang Tsai
Department of Mechanical Engineering, National Chung Cheng University, Chiayi, Taiwan
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Y.J. Hsu and I. Kymissis
Department of Electrical Engineering, Columbia University, New York City, New York, U. S.A
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- T4A.003 NONLINEAR VIBRATION IN RESONANT SILICON BRIDGE PRESSURE SENSOR: THEORY AND EXPERIMENT**
Qingfeng Li¹, Shangchun Fan¹, Zhangyang Tang¹ and Weiwei Xing¹
¹School of Instrument Science & Opto-electronics Engineering, BeiHang University, Beijing, CHINA
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- T4A.004 ANALYSIS OF ACOUSTIC RADIATION AND VISCOUS DAMPING ON THE VIBRATION OF PIEZOELECTRIC CIRCULAR MICRODIAPHRAGMS**
M. Olfatnia, A.G.P. Kottapalli, T. Xu, J. Miao, L. S. Ong
School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore
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- T4A.005 MIXED-LEVEL MODELING OF SQUEEZE FILM DAMPING IN MEMS: SIMULATION AND PRESSURE-DEPENDENT EXPERIMENTAL VALIDATION**
M. Niessner¹, G. Schrag¹, J. Iannacci², and G. Wachutka¹
¹Institute for Physics of Electrotechnology, Munich University of Technology, Munich, Germany
²MEMS Research Unit, Fondazione Bruno Kessler, Povo di Trento, Italy
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- T4A.006 SUBPIXEL TRANSLATION OF MEMS MEASURED BY DISCRETE FOURIER TRANSFORM ANALYSIS OF CCD IMAGES**
C. Yamahata¹, E. Sarajlic², M. Stranczi¹, G.J.M. Krijnen³, and M.A.M. Gijs¹
¹Laboratory of Microsystems, Ecole Polytechnique

Fédérale de Lausanne, Lausanne, SWITZERLAND

²SmartTip B.V., Enschede, THE NETHERLANDS

³Transducers Science & Technology, MESA+,
University of Twente, Enschede, THE NETHERLANDS
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- T4A.007 A NOVEL TEST METHOD FOR SIMULTANEOUS MEASUREMENT OF THERMAL CONDUCTIVITY, CTE, RESIDUAL STRESS AND YOUNG'S MODULUS OF SUSPENDED THIN FILMS USING A LASER DOPPLER VIBROMETER**
J. De Coster, M. Lofrano, R. Jansen, X. Rottenberg, S. Severi, J. Borremans, G. Van der Plas, S. Donnay, H.A.C. Tilmans and I. De Wolf¹
imec, Leuven, BELGIUM¹ also at Katholieke Universiteit Leuven, MTM, Leuven, BELGIUM
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SESSION IV(2) – Actuators

- T4B.001 A THREE-TERMINAL SINGLE-WALLED CARBON NANOTUBE THIN FILM MEMS SWITCH FOR DIGITAL LOGIC APPLICATIONS**
Min-Woo Jang¹, Chia-Ling Chen¹, Walter E Partlo III², Shruti R Patil¹, Dongjin Lee³, Zhijang Ye³, David Lilja¹, T. Andrew Taton², Tianhong Cui³ and Stephen A. Campbell^{1*}
¹Department of Electrical and Computer Engineering, University of Minnesota, Minneapolis, USA
²Department of Chemistry, University of Minnesota, Minneapolis, USA
³Department of Mechanical Engineering, University of Minnesota, Minneapolis, USA
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- T4B.002 NANO-OPTO-MECHANICAL LINEAR ACTUATOR UTILIZING GRADIENT OPTICAL FORCE**
H. Cai¹, K. J. Xu², J. M. Tsai¹, G. Q. Lo¹, D. L. Kwong¹ and A. Q. Liu²
¹Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research) 11 Science Park Road, Singapore Science Park II, Singapore 117685
²School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore 639798
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- T4B.003 NOVEL TWEEZERS USING ACOUSTICALLY OSCILLATING TWIN BUBBLES**
K. H. Lee, J. H. Lee, J. M. Won, and S. K. Chung
Department of Mechanical Engineering, Myongji University, Yongin 449-728, South Korea
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- T4B.004 HYGROSCOPIC BIOMIMETIC TRANSDUCERS MADE FROM CNT-HYDROGEL COMPOSITES**
M. De Volder¹, S. Tawfik², D. Copic² and A.J. Hart²
¹IMEC, Heverlee, Belgium and KULeuven, Leuven - Belgium
²The University of Michigan, Ann Arbor, MI – USA
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- T4B.005 A FUNCTIONAL MICROPROBE INTEGRATED WITH SHARP TIP AND HUGE DEFLECTION CRANK-SLIDER STRUCTURAL CANTILEVER FOR VERSATILE INSTRUMENT**
X. Chen and D.W. Lee*
MEMS & Nanotechnology Laboratory, School of Mechanical Systems Engineering, Chonnam National University, Gwangju, Republic of Korea
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- T4B.006 3D OMNIDIRECTIONAL CONTROLLABLE ELASTIC IPMC TWEEZER WITH SELF-SENSING AND ADJUSTABLE CLAMPING FORCE ABILITIES FOR BIOMEDICAL APPLICATIONS**
Guo-Hua Feng* and Jen-Wei Tsai
Department of Mechanical Engineering, National Chung Cheng University, Chiayi, Taiwan
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- T4B.007 A MICRO ELECTROSTATIC LINEAR ACCELERATOR BASED ON ELECTROMAGNETIC LEVITATION**
I. Sari and M. Kraft
School of Electronics and Computer Science, University of Southampton, Southampton, UK
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- T4C.001 BIONANO CRYSTALLIZED POLY-SI FILM FOR INCREASING TENSILE STRESS IN MEMS/NEMS DEVICE STRUCTURES**
S. Kumagai^{1,3*}, S. Miyachi¹, I. Yamashita^{2,3}, Y. Uraoka^{2,3}, and M. Sasaki^{1,3}
¹Dept. of Advanced Science and Technology, Toyota Technological Institute, Nagoya, Japan
²Graduate School of Materials Science, Nara Institute of Science and Technology, Nara, Japan
³CREST, Japan Science and Technology, Saitama, Japan
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- T4C.002 THREE DIMENSIONAL NANOSCALE FABRICATION AND MODELING OF DYNAMIC MODE MULTIDIRECTIONAL UV LITHOGRAPHY**
Jungkwun 'J.K.' Kim^{1, 2, 3}, Xiaoyu Cheng², David E.Senior², Mark G. Allen³, and Yong-Kyu 'YK' Yoon^{1, 2}
¹State University of New York at Buffalo, Buffalo, NY, USA
²University of Florida, Gainesville, FL, USA
³Georgia Institute of Technology, Atlanta, GA, USA
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- T4C.003 ELECTRICAL CATCHING AND TRANSFER OF NANOPARTICLES VIA NANOTIP SILICON PROBE ARRAYS**
A. Goryu¹, A. Ikeda¹, M. Ishida¹ and T. Kawano¹
¹Toyohashi University of Technology, Toyohashi, Aichi, Japan
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- T4C.004 BIOASSISTED SELECTIVE-CAPTURE AND**

RELEASE OF NANOPARTICLES TOWARD APPLICATION ON MICROFLUIDIC DEVICES
Y. Shimada^{1,*}, M. Suzuki², M. Sugiyama^{1,2}, I. Kumagai³ and M. Umetsu^{2,3}

¹The University of Tokyo, Tokyo, Japan

²3D BEANS center, BEANS project, Tokyo, Japan

³Tohoku University, Sendai, Japan

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T4C.005 LAYER-BY-LAYER DEPOSITION OF COLLOIDAL SEMICONDUCTOR NANOCRYSTALS FOR INTEGRATION OF INFRARED

PHOTON-DETECTORS ON 3D TOPOGRAPHY

J. Wei¹, Y. Gao^{2,3}, A.J. Houtepen², G. Pandraud¹, P.M. Sarro¹

¹DIMES/Delft University of Technology, Delft, Netherlands

²Chemical Engineering/Delft University of Technology, Delft, Netherlands

³Kavli Institute of Nanoscience/Delft University of Technology, Delft, Netherlands

.....1749

T4C.006 A NEMS OPTICAL SWITCH DRIVEN BY OPTICAL FORCE

J. F. Tao^{1,2,3}, H. Cai³, A. B. Yu³, Q. X. Zhang³, J. Wu², K. Xu², J. T. Lin², G. Q. Lo³, D. L. Kwong³ and A. Q. Liu^{1*}

¹School of Electrical & Electronic Engineering, Nanyang Technological University, Singapore 639798

²Beijing University of Posts and Telecommunications, Beijing 100876, China

³Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), 11 Science Park Road, Singapore Science Park II, Singapore 117685

.....1753

T4C.007 GATE-ALL-AROUND SINGLE-CRYSTALLINE SILICON NANOWIRE OPTICAL SENSOR

B.M. Ziaei-Moayyed, B. Draper, and M. Okandan

Department of Advanced MEMS, Sandia National Laboratories, Albuquerque, NM, USA

.....1757

SESSION IV(4) –Microfluidics I

T4D.001 CONTINUOUS FLOW LAYER-BY-LAYER MICROBEAD FUNCTIONALIZATION VIA A MICROPOST ARRAY RAILING SYSTEM

Ryan D. Sochol, Ryan Ruelos, Valerie Chang, Megan E. Dueck, Luke P. Lee, and Liwei Lin
Berkeley Sensor and Actuator Center University of California, Berkeley, USA

.....1761

T4D.002 IN-SITU GENERATION AND SHRINKAGE OF MONODISPERSE WATER-IN-OIL EMULSION FOR FEMTOLITER COMPARTMENTALIZATION USING CAPILLARY TRAPS

Tianzhun Wu^{1,2}, Hiroaki Suzuki^{2,3}, and Tetsuya

Yomo^{2,3,4}

¹School of Physics and Engineering, Sun Yat-sen University, CHINA

²ERATO, JST, JAPAN

³Graduate School of Information Science and Technology, Osaka University, JAPAN

⁴Graduate School of Frontier Biosciences, Osaka University, JAPAN

.....1765

T4D.003 AN ACTIVE GYROSCOPIC MAGNETIC MICROMIXER FOR RAPID FLUID MIXING IN DROPLET BASED MICROFLUIDIC SYSTEMS

Yi Zhang¹ and Tza-Huei Wang²

¹Department of Biomedical Engineering, Sidney Kimmel Comprehensive Cancer Center, Johns Hopkins University, Baltimore, MD, USA

²Department of Mechanical Engineering, Department of Biomedical Engineering, Sidney Kimmel

Comprehensive Cancer Center, Center of Cancer Nanotechnology Excellence at Johns Hopkins, Johns Hopkins University, Baltimore, MD, USA

.....1769

T4D.004 HIGH-SPEED PULSED MIXING WITH HIGH-FREQUENCY SWITCHING OF MICROPUMP DRIVING AND ITS APPLICATION TO NANOPARTICLE SYNTHESIS

K. Sugano, H. Yoshimune, A. Nakata, Y. Hirai, T. Tsuchiya, and O. Tabata

Department of Micro Engineering, Kyoto University, Kyoto, Japan

.....1773

T4D.005 INERTIAL PARTICLE FOCUSING IN PARALLEL MICROFLUIDIC CHANNELS FOR HIGH-THROUGHPUT FILTRATION

J. Hansson¹, J.M. Karlsson², T. Haraldsson², W. van der Wijngaart², A. Russom¹

¹Div. Cell Physics, Dept. Applied Physics, KTH Royal Institute of Technology, Stockholm, SWEDEN

²Microsystem Technology Lab, KTH Royal Institute of Technology, Stockholm, SWEDEN

.....1777

T4D.006 A WAFER-LEVEL, HETEROGENEOUSLY INTEGRATED,HIGH FLOW SMA-SILICON GAS MICROVALVE

H. Gradin, S. Braun, G. Stemme and W. van der Wijngaart

Microsystem Technology Lab, KTH Royal Institute of Technology, Stockholm, SWEDEN

.....1781

T4D.007 A PASSIVE CHECK VALVE USING MICROSPHERES FOR LOW PRESSURE AND LOW FLOW RATE APPLICATIONS

K. Ou, M. Chiao

Department of Mechanical Engineering, The University of British Columbia, Vancouver, BC, CANADA

.....1785

WEDNESDAY, JUNE 8, 2011

ORAL SESSIONS

08:30 - 10:00

SESSION V(1) –3D Integration

W1A.001 Invited Speaker

MICROBALL BEARING TECHNOLOGY FOR MEMS DEVICES AND INTEGRATED MICROSYSTEMS

R. Ghodssi¹, B. Hanrahan^{1,2}, and M. Beyaz¹

¹*MEMS Sensors and Actuators Laboratory (MSAL), Department of Electrical and Computer Engineering, Department of Materials Science and Engineering, Institute for Systems Research, University of Maryland, College Park, MD 20742, USA*

²*U. S. Army Research Laboratory, Adelphi, MD 20783, USA*

.....1789

W1A.002 A NOVEL MEMS CONFIGURATION FOR THREE DIMENSIONAL FINE POSITIONING AND MECHANICAL FIXING OF A BALL LENS IN THE PACKAGING OF SILICON PHOTONICS

Q. X. Zhang¹, Y. Du^{1,2}, C.W. Tan¹, J. Zhang¹, M. B. Yu¹, G. Q. Lo¹, and D. L. Kwong¹

¹*Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), Singapore*

²*Dept. of Mechanical Engineering, National University of Singapore*

.....1795

W1A.003 DIE-LEVEL TSV FABRICATION PLATFORM FOR CMOS-MEMS INTEGRATION

Y. Temiz, M. Zervas, C. Guiducci, and Y. Leblebici

École Polytechnique Fédérale de Lausanne, Lausanne, SWITZERLAND

.....1799

W1A.004 PLANAR MEMS RF CAPACITOR INTEGRATION

A. K. Stamper¹, C. V. Jahnes², S. R. Dupuis¹, A. Gupta¹, Z.-X. He¹, R. T. Herrin¹, S. E. Luce¹, J. Maling¹, D. R. Miga¹, W. J. Murphy¹, E. J. White¹, S. J. Cunningham³, D. R. DeReus³, I. Vitomirov³, and A. S. Morris³

¹*IBM, Essex Junction, VT USA,*

²*IBM, Yorktown Heights, NY USA*

³*Wispry, Irvine, CA USA*

.....1803

SESSION V(2) –Optofluidics

W1B.001 Invited Speaker

OPTOFLUIDICS

Demetri Psaltis

EPFL - Ecole Polytechnique Fédérale de Lausanne,

Lausanne, Switzerland

.....1807

W1B.002 CORTICAL BLOOD FLOW IMAGING WITH A PORTABLE MEMS BASED 2-PHOTON FLUORESCENCE MICROENDOSCOPE

W. Piyawattanametha^{1,3}, O. Solgaard², and M. J. Schnitzer¹

¹*NECTEC, Pathumthani, Thailand 12120,* ²*Edward L. Ginzton Laboratory, Stanford University, Stanford, CA 94305,* ³*James H. Clark Center for Biomedical Engineering & Sciences, Stanford University, Stanford, CA 94305*

.....1809

W1B.003 PHOTOTHERMAL NANOBLADE FOR LARGE CARGO DELIVERY INTO MAMMALIAN CELLS

T.-H. Wu^{1,2}, T. Teslaa², S. Kalim², C.T. French³, S. Moghadam³, R. Wall³, J.F. Miller³, O.N. Witte³, M.A. Teittel², and P.-Y. Chiou¹

¹*Department of Mechanical and Aerospace Engineering, University of California at Los Angeles (UCLA), Los Angeles, California, USA*

²*Department of Pathology and Laboratory Medicine, UCLA, Los Angeles, California, USA*

³*Department of Microbiology, Immunology and Molecular Genetics, UCLA, Los Angeles, California, USA*

.....1813

W1B.004 MULTISPECTRAL ANALYSIS OF CANCER CELLS USING QUANTUM DOT LEDS PATTERNED ON-CHIP

Ashwini Gopal, Zhiguo Wang, Kazunori Hoshino, Xiaojing Zhang

Department of Biomedical Engineering, The University of Texas at Austin, Austin, Texas, USA

.....1817

W1B.005 PORTABLE ORAL CANCER DETECTION USING MINIATURE CONFOCAL IMAGING PROBE WITH LARGE FIELD OF VIEW

Youmin Wang, Milan Raj, H. Stan McGuff, TingShen, Xiaojing Zhang

Department of Biomedical Engineering, University of Texas at Austin, Austin, USA ; Department of Pathology, University of Texas Health Science Center San Antonio, Austin, USA; NanoLite Systems, Inc., Austin, TX, USA

.....1821

SESSION V(3) –Bioanalysis Tools

W1C.001 Invited Speaker

EFFICIENT AND HIGH-THROUGHPUT ELECTROPORATION CHIPS

Zhihong Li¹, Zewen Wei¹, Xueming Li¹, Quan Du², and Zicai Liang²

¹*National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, China*

²*Institute of Molecular Medicine, Peking University, China*

-1825
- W1C.002 MULTI-SITE MONITORING OF CHOLINE AND GLUTAMATE USING BIOSENSOR MICROPROBE ARRAYS IN COMBINATION WITH CMOS CIRCUITRY**
 O. Frey¹, J. Rothe¹, M.K. Lewandowska¹, P.D. van der Wal², N.F. de Rooij², and A. Hierlemann¹
¹Bio Engineering Laboratory, D-BSSE, ETH Zurich, Basel, SWITZERLAND
²Sensors, Actuators and Microsystems Laboratory, IMT, EPF Lausanne, Neuchatel, SWITZERLAND
-1829
- W1C.003 A COMPACT HALL-EFFECT SENSOR ARRAY FOR THE DETECTION AND IMAGING OF SINGLE MAGNETIC BEADS IN BIOMEDICAL ASSAYS**
 K. Skucha, P. Liu, M. Megens, J. Kim and B. Boser
 University of California at Berkeley, Berkeley, California, USA
-1833
- W1C.004 3D LOBULE-MIMETIC CHIP VIA POSITIVE DIELECTROPHORESIS FORCE WITH SINUSOIDAL SPACING POLY (ETHYLENE GLYCOL)-DIACRYLATE MICROWALLS**
 Yu-Shih Chen¹, Ling-Yi Ke², and Cheng-Hsien Liu^{1,2}
¹Institute of NanoEngineering and MicroSystems,
²Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan, R.O.C.
-1837
- W1C.005 RESIDUAL STRESS-FREE 100 MHZ PZT-BASED CONCAVE DIAPHRAGM RESONATOR FOR LABEL-FREE PROTEIN-LIGAND BIOSENSING WITH SELF-ENHANCING MECHANISM**
 Guo-Hua Feng and Zhi-Dain Lin
 Department of Mechanical Engineering, National Chung Cheng University, Chiayi, Taiwan
-1841

SESSION V(4) –Energy Harvesting

- W1D.001 Invited Speaker MICROSYSTEMS FOR ENERGY HARVESTING**
 K. Najafi, T. Galchev, E.E. Aktakka, R.L. Peterson, and J. McCullagh
 Center for Wireless Integrated Microsystems (WIMS), University of Michigan, Ann Arbor, Michigan 48109-2122, USA
-1845
- W1D.002 A MICRO TESLA TURBINE FOR POWER GENERATION FROM LOW PRESSURE HEADS AND EVAPORATION DRIVEN FLOWS**
 Vedavalli G. Krishnan¹, Zohora Iqbal¹ and Michel M. Maharbiz¹
¹University of California Berkeley, CA., US
-1851
- W1D.003 DESIGN AND MICROFABRICATION OF**

INTEGRATED MAGNETIC MEMS ENERGY HARVESTER FOR LOW FREQUENCY APPLICATION

Quan Yuan¹, Student Member, IEEE, Xuming Sun¹, Student Member, IEEE, Dong-Ming Fang², Member, IEEE, Haixia Zhang¹, Senior Member, IEEE

¹National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, Beijing 100871, P. R. China.

²State Key Laboratory of Transducer Technology, Institute of Electronics, Chinese Academy of Sciences, Beijing 100190, China

-1855
- W1D.004 HIGHLY EFFICIENT PIEZOELECTRIC MICRO HARVESTER FOR LOW LEVEL OF ACCELERATION FABRICATED WITH A CMOS COMPATIBLE PROCESS**

M. Defosseux¹, M. Allain¹, P. Ivaldi², E. Defay² and S. Basrour¹

¹TIMA Laboratory (CNRS-Grenoble INP-UJF), Grenoble, France

²CEA LETI Minattec Campus, Grenoble, France

-1859
- W1D.005 A MILLIMETER-SIZED ELECTRET- ENERGY-HARVESTER WITH MICROFABRICATED HORIZONTAL ARRAYS AND VERTICAL PROTRUSIONS FOR POWER GENERATION ENHANCEMENT**

K. Ono, N. Sato, T. Shimamura, M. Ugajin, T. Sakata, S. Mutoh, and Y. Sato

NTT Microsystem Integration Laboratories, NTT Corporation, Atsugi, Kanagawa, Japan

-1863

ORAL SESSIONS

10:30 – 12:15

SESSION VI(1) –Materials for Nanodevices

- W2A.001 STRUCTURAL AND THERMOELECTRIC CHARACTERIZATION OF INDIVIDUAL SINGLE CRYSTALLINE NANOWIRES**
 Z. Wang¹, M. Kroener¹, and P. Woias¹
¹Laboratory for Design of Microsystems, Department of Microsystems Engineering – IMTEK, University of Freiburg, Germany
-1867
- W2A.002 IMPLEMENTATION OF INDUCTIVE PROXIMITY SENSOR USING NANOPOROUS ANODIC ALUMINUM OXIDE LAYER**
 Pei-Hsuan Lo¹, Chitsung Hong¹, Sung-Cheng Lo², and Weileun Fang^{1,2}
¹Institute of NanoEngineering and MicroSystems,
²Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan
-1871

- W2A.003 NANOCRYSTALLINE SiC METAL-SEMICONDUCTOR-METAL PHOTODETECTOR WITH ZnO NANOROD ARRAYS FOR HIGH-TEMPERATURE APPLICATIONS**
Wei-Cheng Lien^{1,2,4}, Dung-Sheng Tsai⁴, Shu-Hsien Chiu⁴, Debbie G. Senesky^{2,3}, Roya Maboudian², Albert P. Pisano^{1,2,3}, Jr-Hau He⁴
¹Applied Science and Technology Program, University of California, Berkeley, CA 94709, USA
²Berkeley Sensor and Actuator, University of California, Berkeley, CA 94709, USA
³Department of Mechanical Engineering, University of California, Berkeley, CA 94709, USA
⁴Institute of Photonics and Optoelectronics and Department of Electrical Engineering, National Taiwan University, Taipei 10617, Taiwan
.....1875
- W2A.004 GRAPHITIZATION OF N-TYPE POLYCRYSTALLINE SILICON CARBIDE AND ITS APPLICATION FOR MICRO- SUPERCAPACITORS**
F. Liu^{1,a,*}, A. Gutes¹, C. Carraro¹, J. Chu² and R. Maboudian¹
¹Berkeley Sensor & Actuator Center and Department of Chemical and Biomolecular Engineering University of California, Berkeley, CA 94720, USA
²Department of Precision Machinery and Precision Instrumentation, University of Science and Technology of China, Hefei, Anhui 230027, China
.....1879
- W2A.005 A GRAPHENE-BASED MICROELECTRODE FOR RECORDING NEURAL SIGNALS**
C.H. Chen¹, C.T. Lin², J.J. Chen¹, W.L. Hsu¹, Y.C. Chang¹, S.R. Yeh¹, L.J. Li², and D.J. Yao^{1,*}
¹National Tsing Hua University, Hsinchu, TAIWAN
²Academia Sinica, Taipei, TAIWAN
.....1883
- W2A.006 REDUCING STICTION IN MICROELECTROMECHANICAL SYSTEMS BY NANOMETER-SCALE FILMS GROWN BY ATOMIC LAYER DEPOSITION**
R.L. Puurunen¹, A. Häärälä¹, H. Ritala¹, J. Dekker¹, M. Kainlahti¹, H. Pohjonen¹, T. Suni¹, J. Kiihamäki¹, E. Santala², M. Leskelä², and H. Kattelus¹
¹VTT Technical Research Centre of Finland, Espoo, FINLAND
²University of Helsinki, Laboratory of Inorganic Chemistry, Helsinki, FINLAND
.....1887
- W2A.007 NANO-ELECTROMECHANICAL SWITCHES BASED ON DIAMOND-ON-DIAMOND**
M.Y. Liao, S. Hishita, and Y. Koide
Sensor Materials Center, National Institute for Materials Science, Namiki 1-1, Tsukuba, Japan
.....1891

- W2B.001 “MEMSEYE” FOR OPTICAL 3D TRACKING AND IMAGING APPLICATIONS**
V. Milanović¹, A. Kasturil, N. Siu¹, M. Radojčić², and Y. Su²
¹Mirrorcle Technologies, Inc., Berkeley, California, United States
²Adriatic Research Institute, Berkeley, California, United States
.....1895
- W2B.002 HIGHLY EFFICIENT LED LENS BIOLOGICALLY INSPIRED FROM CUTICLE NANOSTRUCTURES OF FIREFLY LIGHT ORGANS**
J.J. Kim, Y.S. Lee, and K.H. Jeong
Department of Bio and Brain Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea
.....1899
- W2B.003 OPTICAL MEASUREMENT OF STRAIN USING SCATTERING FROM NANOPARTICLE PAIRS ON ELASTOMER**
T. Kan, K. Matsumoto, and I. Shimoyama
The University of Tokyo, Tokyo, JAPAN
.....1903
- W2B.004 MICROFABRICATION AND PACKAGING OF A RUBIDIUM VAPOR CELL AS A PLASMA LIGHT SOURCE FOR MEMS ATOMIC CLOCKS**
V. Venkatraman, Y. Petremand, C. Affolderbach, G. Mileti, N. de Rooij, H. Shea
LMTS, Ecole Polytechnique Federale de Lausanne, Switzerland; LTF, University of Neuchatel, Switzerland; SAMLAB, Ecole Polytechnique Federale de Lausanne, Switzerland
.....1907
- W2B.005 ON-CHIP OPTICAL POWER MEASUREMENT BY OPTICAL FORCE**
J. F. Tao^{1, 2, 3}, H. Cai³, A. B. Yu³, W. M. Zhu¹, Q. X. Zhang³, J. Wu², K. Xu², J. T. Lin², G. Q. Lo³, D. L. Kwong³ and A. Q. Liu¹
¹School of Electrical & Electronic Engineering, Nanyang Technological University, Singapore 639798
²Beijing University of Posts and Telecommunications, Beijing 100876, China
³Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), 11 Science Park Road, Singapore Science Park II, Singapore 117685
.....1911
- W2B.006 SPR PHOTO DIODE DETECTOR USING TRANSPORTATION PHENOMENON OF PHOTON AND ELECTRON COUPLING**
Yoshiharu Ajiki¹, Tetsuo Kan², Kiyoshi Matsumoto², and Isao Shimoyama²
¹Future Creation Laboratory, Olympus Corporation, Tokyo, JAPAN
²Graduate School of Information Science and Technology, the University of Tokyo, Tokyo, JAPAN
.....1915
- W2B.007 DEVELOPMENT OF A “FLIP GLASS SUBSTRATE” LED PACKAGE TECHNOLOGY FOR COLOR BIN**

YIELD AND VIEW ANGLE ENHANCEMENT

Chien-Lin Chang-Chien¹, Yu-Che Huang¹,
Ming-Chuen Yip¹, and Weileun Fang^{1,2}

¹Power Mechanical Engineering, ²NEMS Inst., National
Tsing Hua University, Hsinchu, Taiwan

.....1919

SESSION VI(3) –Biomedical Microdevices

W2C.001 A MICROFLUIDIC BLOOD-CLOGGING VALVE FOR ON-CHIP BLOOD ANALYSIS

W. Shi, L.W. Guo, and YC. Tai

California Institute of Technology, Pasadena, CA, USA

.....1923

W2C.002 FULLY INTEGRAED DROPLET BASED POINT-OF-CARE PLATFORM FOR MOLECULAR DETECTION FROM CRUDE BIOSAMPLES

Yi Zhang^{1,2}, Seungkyung Park³, Samuel Yang
and Tza-Huei Wang^{1,2,4,5}

¹Department of Biomedical Engineering, ²Sidney
Kimmel Comprehensive Cancer Center, ³Department of
Emergency Medicine, ⁴Department of Mechanical
Engineering, ⁵Center of Cancer Nanotechnology
Excellence at Johns Hopkins, Johns Hopkins University

.....1927

W2C.003 ISOLATION OF TUMOR CELLS USING A NEW MICROFLUIDIC INCUBATOR WITH MOVING-WALL STRUCTURES

Ying-Hsin Chuang¹, Lien-Yu Hung², Keng-Fu
Hsu³, Cheng-Yang Chou³ and Gwo-Bin Lee^{2*}

¹Department of Engineering Science, National Cheng
Kung University, Tainan, Taiwan

²Department of Power Mechanical Engineering,
National Tsing Hua University, Hsinchu, Taiwan

³Department of Obstetrics and Gynecology, National
Cheng Kung University, Tainan, Taiwan

.....1931

W2C.004 TOWARDS QUANTIFICATION OF BIOCOMPATIBILITY: MONITORING INGROWTH BEHAVIOR OF BIOMATERIALS IN TISSUE WITH A MICROSENSOR IMPLANT

M. Kubon¹, M. Moschallski¹, T. Ensslen¹, G.
Link¹, S. Werner¹, C. Burkhardt¹, H. Hartmann¹,
B. Schlosshauer¹, G. Urban² and M. Stelzle¹

¹NMI Natural and Medical Institute at the University of
Tuebingen, Reutlingen, Germany

²University of Freiburg, IMTEK, Laboratory of Sensors,
Freiburg, Germany

.....1935

W2C.005 DISPOSABLE MICRO DEVICES FOR CLINICAL ICSI

X.P. Zhang, Z. Lu, and Y. Sun

Department of Mechanical and Industrial Engineering,
University of Toronto, Canada

.....1938

W2C.006 A PARYLENE-BASED FLEXIBLE ELECTROPORATION CHIP APPLICABLE FOR IN

VIVO GENE AND SIRNA DELIVERY

Zewen Wei^{1*}, Yuanyu Huang^{2*}, Deyao Zhao²,
Zicai Liang², and Zhihong Li¹

¹National Key Laboratory of Science and Technology
on Micro/Nano Fabrication, Institute of
Microelectronics, Peking University, China

²Institute of Molecular Medicine, Peking University,
China

.....1942

W2C.007 MICRO-AQUATIC-FARM: ON CHIP STIMULATION AND EVALUATION SYSTEM FOR MICROORGANISMS BY MAGNETICALLY DRIVEN MICROTOOLS

T. Kawahara¹, M. Sugita¹, M. Hagiwara¹, Y.
Yamanishi^{1,2}, F. Arai^{1,3}, H. Kawano⁴, I.
Shihira-Ishikawa⁴, and A. Miyawaki⁴

¹Nagoya University, Japan

²JST PRESTO, Japan

³Seoul National University, Korea

⁴RIKEN Brain Science Institute, Japan

.....1946

SESSION VI(4) –Chemical Sensors II

W2D.001 TEMPERATURE DEPENDENCE OF VACUUM ENCAPSULATED RESONATORS FOR HUMIDITY MEASUREMENT

R.G. Hennessy, M. M. Shulaker, M. W. Messana,
A.B. Graham, N. Klejwa, J. Provine, T.W. Kenny,
and R. T. Howe

Stanford University, Stanford, CA, USA

.....1950

W2D.002 ENHANCED PERFORMANCE OF A CMOS INTERDIGITAL CAPACITIVE HUMIDITY SENSOR BY GRAPHENE OXIDE

Cheng-Long Zhao, Ming Qin, Wei-Hua Li, and
Qing-An Huang*

Key Laboratory of MEMS of the Ministry of Education,
Southeast University, Nanjing 210096, China

.....1954

W2D.003 MEMS-BASED AC DIFFERENTIAL SCANNING CALORIMETRY

B. Wang and Q. Lin

Department of Mechanical Engineering, Columbia
University, New York, NY 10027, USA

.....1958

W2D.004 ENHANCEMENT OF SENSITIVITY OF COULOMETRIC DETECTION USING A ONE-ELECTRODE SYSTEM

K. Ikemoto, K. Kojima, F. Sassa, M. Yokokawa,
and H. Suzuki

Graduate School of Pure and Applied Sciences,
University of Tsukuba, Tsukuba, JAPAN

.....1962

W2D.005 MULTIMODAL BIO – IMAGE SENSOR FOR REAL – TIME PROTON AND FLUORESCENCE IMAGING

H. Nakazawa^{1,2}, M. Ishida^{1,3}, and K. Sawada^{1,3,4}

¹*Integrated Circuit and Sensor System Group,
Toyohashi University of Technology, Aichi 441-8580
Japan*

²*Research Fellow of the Japan Society for the
Promotion of Science, Tokyo 102-8472 Japan*

³*Electronics-Inspired Interdisciplinary Research
Institute, TUT, Aichi 441-8580 Japan*

⁴*Core Research Evolutional Science and Technology,
JST, Tokyo 102-8666, Japan*

.....1966

**W2D.006 MICROFLUIDIC SURFACE-ENHANCED RAMAN
SCATTERING SENSORS FOR ONLINE
MONITORING TRACE CHEMICAL MIXING AND
REACTION**

H.Y. Mao, P.P. Lv and W.G. Wu*

*National Key Laboratory of Science and Technology
on Micro/Nano Fabrication, Institute of
Microelectronics, Peking University, Beijing 100871,
P. R. China*

.....1970

**W2D.007 NANOPARTICLE SELF-ASSEMBLY BASED
TRIPETALOID ARRAYED STRUCTURES AS
SURFACE-ENHANCED RAMAN SCATTERING
SUBSTRATES**

C. Qian, W.X. Yu, W.G. Wu*, Y.F. Wang, and H.Y.
Mao

*National Key Laboratory of Science and Technology on
Micro/Nano Fabrication, Institute of Microelectronics,
Peking University, Beijing 100871, P. R. China*

.....1974

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POSTER SESSION III

13:15 – 16:15

Mechanical/Physical Sensors and Microsystems

- W3P.001 LIGHTWEIGHT BIOCOMPATIBLE PHYSICAL FILM-BASED SENSORS: POLYMERS “SELF-METALLIZED” WITH ORGANIC MOLECULAR CONDUCTORS**
 Elena Laukhina,^{1,2*} Victor Lebedev,² Vladimir Laukhin,^{1,2,3} Gerard Oncins,⁴ Raphael Pfattner²
 Concepcio Rovira,^{1,2} Jaume Veciana^{1,2}
¹CIBER de Bioingeniería, Biomateriales y Nanomedicina (CIBER-BBN), Spain
²Institut de Ciencia de Materials de Barcelona (ICMAB-CSIC), Campus UAB, Bellaterra, Spain
³Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain
⁴CCiTUB, Nanometric Techniques Unit, University of Barcelona, Spain
1978
- W3P.002 POSFET TOUCH SENSOR WITH ON-CHIP ELECTRONIC MODULE FOR SIGNAL CONDITIONING**
 A. Adami¹, R. S. Dahiya¹, C. Collini¹, D. Cattin², and L. Lorenzelli¹
¹Bio-MEMS, Fondazione Bruno Kessler, Trento, ITALY
²University of Padova, Vicenza, ITALY
1982
- W3P.003 A NOVEL MEMS TUNABLE IONIZATION SENSOR BASED ON PATTERNED FREESTANDING NICKEL NANOWIRES AND MOVING ELECTRODE**
 T. Walewyns and L. A. Francis
 Electrical Engineering Department, Institute of Information and Communication Technologies, Electronics and Applied Mathematics, Université catholique de Louvain, Louvain-la-Neuve, Belgium
1986
- W3P.004 CONTROL OF MEMS ON THE EDGE OF INSTABILITY**
 C.B.Burgner, W.S.Snyders, and K.L.Turner
 University of California, Santa Barbara, California, USA
1990
- W3P.005 HIGH TEMPERATURE COMPATIBLE ALUMINUM NITRIDE RESONATING STRAIN SENSOR**
 F.T. Goericke^{1,*}, M.W. Chan¹, G. Vigevani¹, I. Izyumi^{h2}, B.E. Boser², and A.P. Pisano¹
¹Department of Mechanical Engineering, University of California, Berkeley, USA
²Department of Electrical Engineering, University of California, Berkeley, USA

-1994
- W3P.006 FABRICATION AND TESTING OF AN IONIC ELECTROSPRAY PROPULSION SYSTEM DEVICE WITH A POROUS NI TIP ARRAY**
 H.Q. Li, D.G. Courtney, P. Diaz Gomez Maqueo and P. Lozano
 Massachusetts Institute of Technology, Cambridge, MA, USA
1998
- W3P.007 ELECTRICAL COUPLING SUPPRESSING FOR A MICROGYROSCOPE USING ASCENDING FREQUENCY DRIVE WITH 2-DOF PID CONTROLLER**
 J.Cui, Z.Y. Guo, Z.Yang, Y.L. Hao, G.Z. Yan
 Institute of Microelectronics, Peking University, Beijing, China
 National Key Laboratory of Science and Technology on Micro/Nano Fabrication
2002
- W3P.008 ANALYSIS OF ACCELERATION SENSITIVITY IN MEMS TUNING FORK GYROSCOPE**
 Thakur Praveen Singh, Koji Sugano, Toshiyuki Tsuchiya and Osamu Tabata
 Department of Micro Engineering, Kyoto University, Kyoto, Japan
2006
- W3P.009 ULTRASENSITIVE MASS SENSOR USING THE OUT-OF-PHASE VIBRATION EIGENSTATE OF INTERCOUPLED DUAL-MICROCANTILEVERS**
 J. Wang, B. Feng, C. Li, F.Q. Zhang, K. Ding and W.G. Wu^{*}
 National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, Beijing 100871, P. R. China
2010
- W3P.010 WIRELESS PASSIVE SENSING APPLICATION USING A CAVITY LOADED EVANESCENT MODE HALF MODE SUBSTRATE INTEGRATED WAVEGUIDE RESONATOR**
 D. E. Senior^{1,2}, X. Cheng¹, P. Jao¹, C. Kim¹, J.K. Kim¹, and YK Yoon¹
¹Department of Electrical Engineering, University of Florida, Gainesville, USA
²Department of Electrical and Electronic Engineering, Universidad Tecnológica de Bolivar, Colombia
2014
- W3P.011 A MONOLITHICALLY INTEGRATED 3-AXIS THERMAL-CONVECTIVE ACCELEROMETER WITH A PNEUMATICALLY CURVED THERMOPILE-CANTILEVER FOR Z-AXIS SENSING**
 Quan Wang^{1,2}, Xinxin Li¹
¹State Key Lab of Transducer Technology, Shanghai Institute of Microsystem and Information Technology,

Chinese Academy of Sciences, Shanghai 200050,
CHINA

²School of Mechanical Engineering, Jiangsu University,
Zhenjiang 212013, CHINA

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**W3P.012 DIFFERENTIAL PRESSURE DISTRIBUTION
MEASUREMENT OF A FREE-FLYING BUTTERFLY
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H. Takahashi, K. Matsumoto and I. Shimoyama
The University of Tokyo, Tokyo, Japan

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**W3P.013 SILICON CARBIDE PRESSURE SENSOR FOR
HIGH TEMPERATURE AND HIGH PRESSURE
APPLICATIONS: INFLUENCE OF SUBSTRATE
MATERIAL ON PERFORMANCE**

Sheng Jin¹, Srihari Rajgopal², Mehran
Mehregany²

¹Materials Science and Engineering

²Electrical Engineering and Computer Science
Case Western Reserve University, Cleveland, OH, USA

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MOVABLE GATE ELECTRODE:
ELECTROPLATING THICK NICKEL PROOF MASS
ON FLEXIBLE PARYLENE BEAM FOR
ENHANCING SENSITIVITY**

S. Aoyagi¹, M. Suzuki¹, J. Kogure¹, T. Kong¹, R.
Taguchi¹, T. Takahashi¹, S. Yokoyama², and H.
Tokunaga³

¹Kansai University, Osaka, Japan

²Hiroshima University, Hiroshima, Japan

³M. T. C. Corp., Kanagawa, Japan

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T. Takahashi¹, M. Suzuki¹, S. Iwamoto¹, and S.
Aoyagi¹

¹Kansai University, Osaka, Japan

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H. Droogendijk*, C. M. Bruinink, R. G. P. Sanders
and G. J. M. Krijnen

MESA⁺ Research Institute, University of Twente, THE
NETHERLANDS

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R.A. Brookhuis¹, T.S.J. Lammerink¹, R.J.
Wiegerink¹, M.J. de Boer¹ and M.C.
Elwenspoek^{1,2}

¹Transducers Science and Technology Group, MESA+
Research Institute, University of Twente, P.O. Box 217,
7500 AE Enschede, the Netherlands

²Fellow, FRIAS, Albert-Ludwigs University, Albertstr.
19, 79104 Freiburg, Germany

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L. Wen¹, B. Guo², L. Haspeslagh², S. Severi², A.
Witvrouw², R. Puers¹

¹ESAT-MICAS, K.U.Leuven, Kasteelpark Arenberg 10,
Leuven B-3001, Belgium

²IMEC, Kapeldreef 75, Leuven B-3001, Belgium

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A. Isozaki^{1,2}, K. Kuwana^{1,2}, Y. Tomimatsu^{1,3} and T.
Itoh^{1,4}

¹BEANS Laboratory, Tsukuba, Japan

²The University of Tokyo, Tokyo, Japan

³Seiko Instruments Inc., Chiba, Japan

⁴AIST, Tsukuba, Japan

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PIEZORESISTIVE FORCE SENSORS**

Ji-Eun Han¹, Dongil Kim² and Kwang-Seok Yun²

¹Samsung Electronics, Giheung, Korea

²Department of Electronic Engineering, Sogang
University, Seoul, Korea

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J. Oiler¹, X. Qiu¹, J. Zhu¹, R. Tang¹, S.J. Chen², H.
Huang¹, K. Holbert¹, H. Barnaby¹, and H. Yu¹

¹Arizona State University, Tempe, Arizona, USA

²University of Southern California, Los Angeles,
California, USA

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A. Guedes^{1*}, S. Shelton¹, R. Przybyla², I.
Izyumin², B. Boser² and D.A. Horsley¹

¹Berkeley Sensor & Actuator Center, University of
California, Davis, CA, USA

²Berkeley Sensor & Actuator Center, University of
California, Berkeley, CA, USA

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V. Rajaraman¹, B.S. Hau¹, L.A. Rocha², R.A.
Dias², K.A.A. Makinwa¹ and R. Dekker¹

¹Dept. of Microelectronics, Fac. EEMCS, Delft
University of Technology (TU Delft), The Netherlands

²I3N/IPC, School of Engineering, University of Minho,
Guimarães, Portugal

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Richard Przybyla^{1*}, Anita Flynn¹, Vipul Jain¹,
Stefon Shelton², André Guedes², Igor Izyumin¹,
David Horsley², and Bernhard Boser¹
Berkeley Sensor and Actuator Center

¹University of California, Berkeley, CA, USA

²University of California, Davis, CA, USA

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B.C. Kaanta¹, H. Chen², and X. Zhang^{1*}

¹Boston University, Boston, MA, USA

²Schlumberger Doll Research, Cambridge, MA, USA

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L. Sainiemi^{1,2*}, T. Nissilä^{2,3}, R. Kostianen², R. A. Ketola³ and S. Franssila¹

¹Department of Materials Science and Engineering,
Aalto University School of Science and Technology,
Helsinki, Finland

²Division of Pharmaceutical Chemistry, University of
Helsinki, Helsinki, Finland

³Centre for Drug Research, University of Helsinki,
Helsinki, Finland

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E. T. Zellers^{1,2,3}, G. Serrano^{1,2}, H. Chang^{1,2} and L.K. Amos^{1,3}

¹Center for Wireless Integrated MicroSystems (WIMS),

²Departments of Environmental Health Sciences ,

³Chemistry, University of Michigan, Ann Arbor,
Michigan, USA

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M.-L. Bauersfeld¹, M. Bücking², J. Bruckert², J. Wöllenstein¹

¹Fraunhofer Institute for Physical Measurement
Technique IPM, Freiburg, Germany

²Fraunhofer Institute for Molecular Biology and
Applied Ecology IME, Schmallingenberg-Grafschaft,
Germany

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Kinda Nacheff^{1,2}, Frédéric Marty¹, Kamran Danaie², Bertrand Bourlon², Eric Donzier² and Tarik Bourouina¹

¹ESIEE-Université Paris Est, Noisy-le-Grand, FRANCE

²Schlumberger MEMS, Elancourt, FRANCE

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W.-C. Tian^{1*}, H.-J. Shheen², T. -H. Wu², C. -J. Lu³, W. -R. Chen³ and T.-Y. Wei²

¹Department of Electrical Engineering, National
Taiwan University, Taipei, Taiwan

²Institute of Applied Mechanics, National Taiwan
University, Taipei, Taiwan ³Department of Chemistry,
National Taiwan Normal University, Taipei, Taiwan

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Krishna Jayant, Mark R. Hartman, Joshua B. Phelps, Philip H. Gordon, Dan Luo, Lois Pollack and Edwin C. Kan

¹Electrical and Computer Engineering,

²Applied and Engineering Physics, ³Biological
Engineering, Cornell University, Ithaca, NY, USA 14850

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Jung-Hoon Yang¹, Hyun Tae Kim¹, Jung Woo Park², and Hanseup Kim¹

¹Electrical and Computer Engineering,

²Mechanical Engineering, University of Utah, Salt Lake
City, UT 84112-9206

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O. Ordeig¹, P. Ortiz¹, X. Muñoz-Berbel¹, S. Demming², S. Büttgenbach², C.

Fernández-Sánchez¹ and A. Llobera¹

¹Instituto de Microelectronica de Barcelona (IMB-CNM,
CSIC), Bellaterra, Spain

²Institut für Mikrotechnik, Braunschweig, Germany

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Jer-Chyi Wang^{1,2}, Chia-Ming Yang³, Dorota G.
Pijanswska⁴ and Chao-Sung Lai^{1,2,*}

¹Department of Electronic Engineering, Chang Gung
University, Tao-Yuan, Taiwan

²Biosensor Group, Biomedical Engineering Center,
Chang Gung University, Tao-Yuan, Taiwan

³Inotera Memories, Inc., Tao-Yuan, Taiwan

⁴Nalecz Institute of Biocybernetics and Biomedical
Engineering, Polish Academy of Sciences, Warsaw,
Poland

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W. Cai, H.X. Zhao, D.Ha, H.S. Guo, W. Zhang, and P. Wang

Department of Biomedical Engineering, Zhejiang University, Hangzhou, Zhejiang, China
Biosensor National Special Laboratory, Key Laboratory of Biomedical Engineering of Ministry of Education

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¹*Department of Electronic Engineering, Chang Gung University, Taoyuan, Taiwan*

²*Biosensor Group, Biomedical Engineering Center, Chang Gung University, Taoyuan, Taiwan*

³*Nalecz Institute of Biocybernetics and Biomedical Engineering, Polish Academy of Sciences, Warsaw, Poland*

⁴*Institute of NanoEngineering and MicroSystems, National Tsing Hua University, Hsinchu, Taiwan*

⁵*Inotera Memories, Inc., Taoyuan, Taiwan*

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J. Wang, H. Yu, H. Cai, L.P. Du, Q.J. Liu, and P. Wang

Biosensor National Special Laboratory, Key Lab of Biomedical Engineering of Education Ministry, Department of Biomedical Engineering, Zhejiang University, Hangzhou, 310027, P. R. China

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Q. Liu, Z.-M. Qi*, Z. Zhang, and D.-F. Lu
State Key Laboratory of Transducer Technology, Institute of Electronics, Chinese Academy of Sciences, Beijing 100190, China

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K. Miyamoto¹, T. Wagner¹, M. J. Schöning^{2,3}, and T. Yoshinobu^{1,4}

¹*Department of Electronic Engineering, Tohoku University, JAPAN*

²*Institute of Nano- and Biotechnologies, Aachen University of Applied Sciences, GERMANY*

³*Institute of Bio- and Nanosystems (IBN-2), Research*

Centre Jülich, GERMANY

⁴*Department of Biomedical Engineering, Tohoku University, JAPAN*

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T. Wagner¹, K. Miyamoto¹, C.F. Werner², M.J. Schöning² and T. Yoshinobu^{1,3}

¹*Department of Electronic Engineering, Tohoku University, Sendai, MIYAGI, JAPAN*

²*Institute of Nano- and Biotechnology, Aachen University of Applied Sciences, Jülich, NRW, GERMANY*

³*Department of Biomedical Engineering, Tohoku University, Sendai, MIYAGI, JAPAN*

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S. Lenci¹, F. Pieri², L. Haspeslagh¹, J. De Coster¹, S. Decoutere¹, A. Maestre Caro^{1,3}, S. Armini¹ and A. Witvrouw¹

¹*Imec, Leuven, Belgium*

²*University of Pisa, Pisa, Italy*

³*KULeuven, Leuven, Belgium*

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Y. J. Heo^{1,2}, H. Shibata^{2,3}, T. Okitsu^{2,4}, T. Kawanishi^{2,3}, and S. Takeuchi^{1,2}

¹*Institute of Industrial Science, The University of Tokyo, Tokyo, Japan*

²*Life BEANS Center, BEANS Project, Tokyo, Japan*

³*TERUMO Co. Headquarters, Kanagawa, Japan*

⁴*Kyoto University Hospital, Kyoto, Japan*

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C.H. Chen, L.H. Chen, H.C. Su, S.C. Chuang, S.R. Yeh, T.R. Yew, Y.C. Chang and D.J. Yao*

National Tsing Hua University, Hsinchu, TAIWAN

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H. Wang¹, J. Kim², A. Jayaraman^{2,3}, M. Cypert⁴, J. Hua⁴, M. Bittner⁴, and A. Han^{1,3*}

¹*Department of Electrical and Computer Engineering, Texas A&M University, College Station, TX, USA*

²*Department of Chemical Engineering, Texas A&M University, College Station, TX, USA*

³*Department of Biomedical Engineering, Texas A&M*

University, College Station, TX, USA

⁴Translational Genomics Research Institute, Phoenix, AZ, USA

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X. Wang¹, S.W. Anderson², and X. Zhang¹

¹Department of Mechanical Engineering, Boston University, Boston, MA, USA

²Department of Radiology, Boston Medical Center, Boston, MA, USA

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Y. Liu¹, M. Chen², M. Mohebbi¹, M.L. Wang³, and M. R. Dokmeci¹

¹ECE, Northeastern University, Boston, MA, USA

²Point Loma Nazarene University, San Diego, CA, USA

³CEE, Northeastern University, Boston, MA, USA

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K. Zrelli¹, E. Cavatore², T. Barilero¹, H. Berthoumieux^{1,3}, V. Croquette², T. Le Saux¹, L. Jullien¹, A. Lemarchand³, and C. Gosse⁴

¹Département de Chimie, École Normale Supérieure – CNRS, Paris, France

²Laboratoire de Physique Statistique, École Normale Supérieure – CNRS, France

³Laboratoire de Physique Théorique de la Matière Condensée, Université Paris 6 – CNRS, France

⁴Laboratoire de Photonique et de Nanostructures, LPN-CNRS, Marcoussis, France

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Y.-S. Yoon¹, J. Kim¹, K. Lee¹, H. Song^{1,2}, K. Yoo^{1,3}, G. Lee¹ and J.-B. Lee¹

¹Department of Electrical Engineering, The University of Texas at Dallas, TX, USA

²Inje University, Gimhae, Korea

³Hanbat national University, Daejeon, Korea

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Z. Rácz¹, M. Cole¹, J.W. Gardner¹, S. Pathak¹, M.D. Jordan², and R.A.J. Challiss²

¹Sensors Research Laboratory, University of Warwick, Coventry, UK

²Department of Cell Physiology and Pharmacology, University of Leicester, Leicester, UK

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Y. Zhao, M.S. Nandra, Y.C. Tai

California Institute of Technology, Pasadena, CA, USA

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C.W. Chang¹, Y.J. Chen¹, S.H. Hung¹ and J.C. Chiou^{1,2}

¹ National Chiao-Tung University, Hsinchu, Taiwan.

² China Medical University, Taichung, Taiwan

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Kuei-Shu Li¹, Tzu-Yuan Chao¹, Y. T. Cheng¹, Jing-Kuang Chen² and Yih-Sharnng Chen³

¹Department of Electronics Engineering, National Chiao Tung University, Hsinchu, Taiwan

²Department of Electrical and Computer Engineering, University of New Mexico, USA

³Department of Cardiovascular Surgery, National Taiwan University Hospital, Taipei, Taiwan

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B. Liang¹, L. Fang¹, C.L. Tu¹, C.C. Zhou¹, X.J. Wang¹, Q. Wang¹, P. Wang¹, X.S. Ye^{1*}

¹Biomedical Sensors National Special Laboratory, College of Biomedical Engineering& Instrument Science, Zhejiang University, Hangzhou, China

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M. Wang¹, J. Chen¹, Y.-H. Wang², and P.-C. Li², R. Bhandari¹, S. Negi¹, and F. Solzbacher^{1,2}

¹Blackrock Microsystems, Salt Lake City, Utah, USA

²University of Utah, Salt Lake City, Utah, USA

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D. Subbaiyan¹, L.S. Pakula¹, P.J. French¹, J.F. Lange², J. Jeekel², G.J. Kleinrensink², H.J.C. Sterenborg², D.J. Robinson², F. van Zaane², J.G. Kaptein¹, K. Tang¹, G. Pandraud¹, J. van Veen³, M. Draaijer⁴ & K.A. Vakalopoulos²

¹TU Delft, Delft, The Netherlands

²Erasmus Medical Center, Rotterdam, The Netherlands,

³TNO, Delft, The Netherlands,

⁴Fyttagoras, Leiden, The Netherlands

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R. Bhandari¹, S. Negi¹, and F. Solzbacher^{1,2}
¹Blackrock Microsystems, Salt Lake City, Utah, USA
²University of Utah, Salt Lake City, Utah, USA
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Cell Bench Research Center, Daejeon, Republic of Korea
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¹Department of Mechanical Engineering, Sogang University, Seoul, Korea
²Interdisciplinary Program of Integrated Biotechnology, Sogang University, Seoul, Korea
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Lehigh University, Bethlehem, PA, USA
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Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental University
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J.M. Karlsson¹, T. Haraldsson¹, S. Laakso², A. Virtanen², M. Mäki², G. Ronan³, and W. van der Wijngaart¹
¹Microsystem Technology Lab, KTH Royal Institute of Technology, Stockholm, SWEDEN
²Mobidiag OY, Helsinki, FINLAND
³Farfield Group, Manchester, UNITED KINGDOM
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Dongjin Lee and Tianhong Cui*
Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN 55455, U.S.A.
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S. Choi, A. Lajevardi-khosh, and J. Chae
School of Electrical, Computer and Energy Engineering, Arizona State University, Tempe, Arizona, USA
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Department of Engineering and System Science
National Tsing Hua University, Hsinchu, Taiwan
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T. Song¹, S.Y. Song², H.C. Yoon² and K. Lee¹
¹Department of Electrical and Computer Engineering, Ajou University, Suwon, S. Korea
²Department of Molecular Science and Technology, Ajou University, Suwon, S. Korea
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Haifeng Yang¹, Madan K. Bhattacharyya,² and Liang Dong^{1,*}
¹Department of Electrical and Computer Engineering, Iowa State University, Ames, Iowa, USA
²Department of Agronomy, Iowa State University, Ames, Iowa, USA
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K. P. Liao¹, K.B. Sung¹, and W. -C. Tian^{1,*}
¹Department of Electrical Engineering, National Taiwan University, Taipei, Taiwan
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Xiaoyu Zheng, and Xin Zhang
Laboratory for Microsystems Technology, Department of Mechanical Engineering,
Boston University, Boston, MA 02215, USA
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Vaishnavi Srinivasaraghavan, Jeannine Strobl, Masoud Agah
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Tushar H. Punde^{*1}, Wen-Hao Wu^{*2}, Po-Chen Shih², Chien-Yu Fu³, Tsung-Pao Wang³, Long Hsu⁴, Hawn-You Chang³, Cheng-Hsien Liu²

¹Institute of NanoEngineering and Microsystems,

²Department of Power Mechanical Engineering,

³Institute of Molecular Medicine, National Tsing Hua University,

⁴Department of Electrophysics, National Chiao Tung University, Hsinchu, Taiwan, R.O.C.

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D. E. Eroglu¹, E. Bayraktar¹, and H. Kulah^{1,2}

¹Department of Electrical & Electronics Engineering, METU, Ankara, TURKEY

²METU-MEMS Research & Applications Center, Ankara, TURKEY

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Amir Heidari^{1,2}, Yong-Jin Yoon², Mi Kyoung Park¹, Woo-Tae Park¹ and Julius Tsai Ming Lin¹

¹Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), Singapore, 117685, Singapore,

²Department of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore, 639798, Singapore

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T. Leichlé^{1,2*}, and C.F. Chou^{3**}

¹CNRS; LAAS, Toulouse, France

²Université de Toulouse; UPS, INSA, INP, ISAE; LAAS, Toulouse, France

³Institute of Physics, Academia Sinica, Taipei, Taiwan

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M.H. Nguyen¹, W.C. Chiu², M.C. Lee², and F.G. Tseng¹

¹Department of Engineering and System Science, National TsingHua University, Hsinchu, Taiwan, China

²Department of Electrical Engineering, National TsingHua University, Hsinchu, Taiwan, China Nuclear Science, National TsingHua University, Hsinchu, Taiwan, China

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A.R. Gao^{1,2}, N. Lu³, X.L. Gao¹, P.F. Dai^{1,2}, T. Li¹, Y.B. Gong¹, C.H. Fan³ and Y.L. Wang¹

¹State Key Laboratories of Transducer Technology, Science and Technology on Micro-system Laboratory, Shanghai Institute of Microsystem and Information Technology, CAS, Shanghai, China

²Graduate School of Chinese Academy of Sciences, Beijing, China

³Shanghai Institute of Applied Physics, Chinese Academy of Sciences, Shanghai, China

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F. Khademolhosseini and M. Chiao

Dept. of Mechanical Engineering, University of British Columbia, Vancouver r, B.C., Canada

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Y. Li^{1,2}, J.Z. Sun¹, C. Bian¹, J.H. Tong¹ and S.H. Xia¹

¹State Key Laboratory of Transducer Technology, Institute of Electronics, Chinese Academy of Sciences, Beijing, China

²Graduate University of Chinese Academy of Sciences, Beijing, China

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C.S. Song and P.S. Wang

Department of Electrical & Computer Engineering, Clemson University, Clemson, SC 29634, USA

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Graduate School of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Ibaraki, JAPAN

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X. L. Qiu¹, F. Sassa², D. Itoh², T. Satake¹, and H. Suzuki²

¹Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki, JAPAN

²Graduate School of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Ibaraki, JAPAN

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University of Southern California, Department of
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¹The University of Michigan, Ann Arbor, MI, USA
²Georgia Institute of Technology, Atlanta, GA, USA
³Qualtré Inc., Marlborough, MA, USA
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Ming-Huei Liu⁴, Long Hsuland Cheng-Hsien
Liu²
¹Department of Electrophysics, National Chiao-Tung
University, Hsinchu, Taiwan
²Department of Power Mechanical Engineering,
National Tsing-Hua University, Hsinchu, Taiwan
³Institute of molecular medicine, National Tsing Hua
University, Hsinchu, Taiwan
⁴Sinonar Corp., Hsinchu, Taiwan
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¹School of Physics and Engineering, Sun Yat-sen
University, CHINA
²ERATO, JST, JAPAN
³Graduate School of Information Science and
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⁴Graduate School of Frontier Biosciences, Osaka
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¹Institute of Micromachine and Microfabrication
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¹Department of Chemical and Biomolecular
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USA
²Department of Electrical Engineering, Stanford
University, Stanford, CA, USA
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Microsystem Materials Laboratory, Department of
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A. Akazawa¹, Y. Furuno¹, H. Saiki², E. Ozeki²
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¹Department of Micro System Technology, Ritsumeikan
University, Shiga, Japan
²Technology Research Laboratory, Shimadzu
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Hidetoshi Miyashita², Chuanyu Shao¹, Mamoru
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¹Department of Mechanical Systems and Design,
Tohoku University, Sendai, Miyagi, Japan
²Microsystem Integration Center, Tohoku University,
Sendai, Miyagi, Japan
³Fracture and Reliability Research Institute, Tohoku
University, Sendai, Miyagi, Japan
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Y.-C. Wang, Y.-C. Tsai, W.-P. Shih

Department of Mechanical Engineering, National Taiwan University, Taipei, Taiwan

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D.B. Xiao¹, X. Zhang¹, Z.Q. Hou¹, X.Z. Wu¹, Z.H. Chen¹, Y. Pan², X.D. Wu²

¹National University of Defense Technology, Changsha, Hunan, China

²Suzhou Delphi Laser Co., Suzhou, Jiangsu, China

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B. Kim, H. Borteh, H. Zeng and Y. Zhao

Laboratory for Biomedical Microsystems, Department of Biomedical Engineering

The Ohio State University, Columbus, Ohio, USA

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H. Gensler, R. Sheybani, and E. Meng

University of Southern California, Los Angeles, California, USA

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Y.-C. Lin¹, W.-S. Wang², L.Y. Chen¹, M.W. Chen¹, T. Gessner^{1,3-4} and M. Esashi¹⁻²

¹WPI Advanced Institute for Materials Research, Tohoku University, Sendai, JAPAN

²Micro System Integration Center, Tohoku University, Sendai, JAPAN

³Fraunhofer ENAS, Chemnitz, GERMANY

⁴Chemnitz University of Technology, Chemnitz, GERMANY

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Dongil Kim¹, Ji-Eun Han², Hyunjin Park³ and Kwang-Seok Yun¹

¹Department of Electronic Engineering, Sogang University, Seoul, Korea

²Samsung Electronics, Giheung, Korea

³Hanool Robotics, Bucheon, Korea

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Zongliang Cao, and Dean M. Aslam

Micro and Nano Technology Lab, Department of

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S.Negi¹, R. Bhandari¹, and F. Solzbacher²

¹Blackrock Microsystems, Salt Lake City, UT, USA

²Department of Electrical and Computer Engineering, University of Utah, Salt Lake City, UT, USA

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Hsin-Yu Huang¹, Tsung-Lin Tang¹, Wei-Lun Sung¹, Hung-Yi Lin³, and Weileun Fang^{1,2}

¹Dept. of Power Mechanical Engineering,

²Inst. of NanoEngineering and MicroSystems, National Tsing Hua University, Hsinchu, Taiwan

³Touch Micro-system Technology Corporation, Taoyuan, Taiwan

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J. Zhu¹, S. J. Chen², C. Y. Lin³, J. Oiler¹, H. Wang¹, Y. C. Chen³ and H. Yu¹

¹Arizona State University, Tempe, USA

²University of Southern California, Los Angeles, USA

³National Central University, Zhongli, R.O.China

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J. Pu^{1,2}, R. Sochol², Y. Jiang¹ and L. Lin²

¹University of Electronic Science and Technology of China, Chengdu, Sichuan, China

²University of California at Berkeley, Berkeley, California, United States

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¹imec, Leuven, Belgium

²Dept Metallurgy and Materials Engineering, KULeuven, Leuven, Belgium

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D. Galayko¹, R. Guillemet², A. Dudka¹, P. Basset²

¹LIP6, UPMC Universit  Paris Sorbonne, Paris, France

²Unversit  Paris-Est, ESYCOM, ESIEE Paris, Noisy-le-Grand, France

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L.J. Yang¹, C.W. Hsu¹, and Y.C. Ou^{2,3}
¹Department of Mechanical & Electromechanical Engineering, Tamkang University, Tamsui, Taiwan
²Instrument Technology Research Center, National Applied Research Laboratories, Hsinchu, Taiwan
³Biomedical Tech and Product Research Center, National Applied Research Laboratories, Hsinchu, Taiwan
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¹Hiroshima University, Hiroshima, JAPAN
²JST, CREST, JAPAN
³Hitachi Plant technologies, Ltd., Tokyo, JAPAN
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Center for Wireless Integrated Microsystems (WIMS)
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Sensors, Microsystems and Actuators Laboratory of Louvain (SMALL), Electrical Engineering Department (ELEN), Institute of Information and Communication Technologies, Electronics and Applied Mathematics (ICTEAM), Université catholique de Louvain, Belgium
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Congzhong Guo¹, Kahini M. Shah¹ and Gary K. Fedder^{1,2,3}
¹Department of Electrical and Computer Engineering,
²Institute for Complex Engineered Systems,
³The Robotics Institute Carnegie Mellon University, Pittsburgh, Pennsylvania, USA
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¹College of Engineering, China Agricultural University, Beijing, P. R. China
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Integrated Multi-Transducer Systems Lab (IMuTS Lab), Simon Fraser University, Canada
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¹Department of Chemical and Biomolecular Engineering, University of California, Berkeley, California, USA
²School of Materials Science and Engineering, Hefei University of Technology, Hefei, Anhui 230009, China
³College of Water Conservancy and Hydropower Engineering, Hohai University, Nanjing, Jiangsu 210098, China
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Eunhyup Doh¹ and Hyungkew Lee², Joonah Park², and Kwang-Seok Yun¹
¹Department of Electronic Engineering, Sogang University, Seoul, Korea
²Samsung Advanced Institute of Technology, Yongin, Korea
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Department of Mechanical Engineering and the Institute for Systems Research
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¹Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental University, Tokyo, Japan
²Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, Tokyo, Japan
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Chi-Wei Lo¹, Difeng Zhu², and Hongrui Jiang^{1,2,3*}

¹Materials Science Program, University of Wisconsin-Madison, WI 53706 USA.

²Department of Electrical and Computer Engineering, University of Wisconsin-Madison, WI 53706 USA

³Eye Research Institute, University of Wisconsin - Madison, Madison, WI 53706, USA

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C.W. Chang¹ and R.S. Okojie²

¹ASRC Aerospace Corporation, Cleveland, OH, USA

²NASA Glenn Research Center, Cleveland, OH, USA

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Ivan Penskiy¹, Aaron P. Gerratt¹, and Sarah Bergbreiter^{1,2,*}

¹Mechanical Engineering, University of Maryland, College Park, Maryland, USA

²Institute for Systems Research, University of Maryland, College Park, Maryland, USA

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Tokyo University of Agriculture and Technology, Tokyo, Japan

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Y. Zhang¹, J. Wang¹, S. Santhanam¹, and G. K. Fedder^{1,2,3}

¹Department of Electrical and Computer Engineering

²The Institute for Complex Engineered Systems

³The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, USA

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S. Piratla and A. Lal

SonicMEMS Laboratory, Cornell University, Ithaca, USA

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Hyun Tae Kim¹, Jung Woo Park², and Hanseup Kim¹

¹Electrical and Computer Engineering,

²Mechanical Engineering, University of Utah, Salt Lake

City, UT 84112-9206, USA

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S. Forouzanfar¹, R. R. Mansour¹, and E. M. Abdel-Rahman²

¹Electrical & Computer Eng. and ²Systems Design Eng. Departments of University of Waterloo, Canada

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J. Xie^{1,2}, Y. F. Liu^{1,2}, H. Zhao^{1,2}, J. L. Yang^{1,2,*}, and F. H. Yang¹

¹Institute of Semiconductors, Chinese Academy of Sciences, Beijing, China

²State Key Laboratory of Transducer Technology, Shanghai, China

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Etsuji Ogawa¹, Kei Masunishi², Tamio Ikehashi¹, Tomohiro Saito¹, Hiroaki Yamazaki¹, Yasushi Tomizawa², and Yoshiaki Sugizaki¹

¹Device Process Development Center, Corporate Research & Development Center, Toshiba Corporation, Yokohama, Japan

²Mechanical Systems Laboratory, Corporate Research & Development Center, Toshiba Corporation, Kawasaki, Japan

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X.J. He^{1,2}, Z.Q. Lv¹, B. Liu¹, and Z.H. Li¹

¹National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, Beijing, China

²Department of Electronic Science and Technology, School of Applied Sciences, Harbin University of Science and Technology, Harbin, China

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Y. Xu^{1,2} and J. E.-Y. Lee^{1,2}

¹Department of Electronic Engineering, City University of Hong Kong, Kowloon, Hong Kong, China

²State Key Laboratory of Millimeter Waves, City University of Hong Kong, Hong Kong, China

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U. Zaghloul^{1,2,3*}, B. Bhushan³, P. Pons^{1,2}, G. Papaioannou^{1,2,4}, F. Coccetti^{1,2,5}, and R. Plana^{1,2}

¹CNRS; LAAS; 7 avenue du colonel Roche, F-31077 Toulouse, France

²Université de Toulouse; UPS, INSA, INP, ISAE ; LAAS ; F-31077 Toulouse, France

³NLBB Laboratory, The Ohio State University, Columbus, OH 43210, USA

⁴University of Athens, Solid State Physics, Panepistimiopolis Zografos, Athens, Greece

⁵Novamems, 10 avenue De l'Europe, F-31520 Toulouse, France

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Lk-Jae Hyeon, Woo-Young Park, Sungjoon Lim and Chang-Wook Back

School of Electrical and Electronics Engineering, Chung-Ang University(CAU), Seoul, Republic of Korea

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N. Kuo, S. Gong, and G. Piazza

University of Pennsylvania, Philadelphia, Pennsylvania, USA

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M.A. Rasouli and B. Bahreyni

Integrated Multi-Transducer Systems Lab, Simon Fraser University, Surrey, BC, CANADA

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Y. Sun, S. Thiele, P. Liebetraut, W. Mönch and H. Zappe

Department of Microsystems Engineering – IMTEK, University of Freiburg, Freiburg, GERMANY

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S. Park¹, K. Jin¹, J. Ye¹ and K.H. Jeong¹

¹Dept. of Bio and Brain Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea

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Linghan Li^{*}, Akio Higo¹, Ryo Takigawa¹, Eiji Higurashi¹, Masakazu Sugiyama² and Yoshiaki Nakano¹

¹Research Center for Advanced Science and Technology, The University of Tokyo, Japan

²Institute of Engineering Innovation, The University of Tokyo, Japan

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A. Purniawan¹, G. Pandraud², P. J. French¹ and P.M. Sarro²

¹Electronic Instrumentation Laboratory (EI) – DIMES – TU Delft, THE NETHERLANDS

²Electronic Component, Technology and Materials (ECTM) – DIMES – TU Delft, THE NETHERLANDS

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W3P.135 INCORPORATION OF POLYMER REFRACTIVE MICROLENS ARRAY FOR EFFICIENCY IMPROVEMENT OF CUIINS2 QUANTUM DOT-BASED HYBRID PHOTOVOLTAIC CELLS

M. Nam¹, J. Park², S. Kim², and K. Lee¹

¹Department of Electrical and Computer Engineering, Ajou University, Suwon 443-749, Republic of Korea

²Department of Molecular Science and Technology, Ajou University, Suwon 443-749, Republic of Korea

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W3P.136 SWITCHABLE PHOTONIC CRYSTALS BASED ON THE PHOTONIC DEFORMATIONS OF THE AZOBENZENE CONTAINING LIQUID CRYSTAL POLYMER

Z. Yan¹, Y.L. Yu¹, and X.M. Ji^{*2}

¹Department of Materials Science, Fudan University, Shanghai, China

²The State Key Laboratory of ASIC & System, Department of Microelectronics, Fudan University, Shanghai, China

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W3P.137 A COMPACT PROJECTION SYSTEM ENABLING TOPOGRAPHICAL MEASUREMENTS FOR A MINIATURIZED SUBMERSIBLE EXPLORER

J. Jonsson, M. Berglund, H. Kratz, H. Nguyen, and G. Thornell

Ångström Space Technology Centre, Department of Engineering Sciences, Uppsala University, SWEDEN

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W3P.138 MEMS MIRRORS BASED ON CURVED CONCENTRIC ELECTROTHERMAL ACTUATORS WITH VERY SMALL LATERAL SHIFT AND TILT

Lin Liu, Sagnik Pal, and Huikai Xie^{*}

Department of Electrical & Computer Engineering, University of Florida, Gainesville, FL, USA

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W3P.139 A WIRELESS PAIRED EMITTER DETECTOR DIODE DEVICE AS AN OPTICAL SENSOR FOR

LAB-ON-A-DISC APPLICATIONS

R. Gorkin¹, M. Czugala², C. Rovira-Borras², J. Ducree¹,
D. Diamond² and F. Benito-Lopez^{2*}

¹School of Physical Sciences

²CLARITY: Centre for Sensor Web Technology, National
Centre for Sensor Research, Dublin City University,
Dublin 9, IRELAND

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W3P.140 ELECTROLUMINESCENCE FROM A FREESTANDING INTEGRABLE SINGLE ZNO QUANTUM DOT

Cheng Jiang¹; Norimasa Yoshimizu²; Jun Hyun Han¹,
Amit Lal²; Chung Hoon Lee²

¹Marquette University, Milwaukee, WI, USA

²Cornell University, Ithaca, NY, USA

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W3P.141 INTEGRATED SELF-ALIGNED TIPS FOR DISPERSION TUNING IN A PHOTONIC CRYSTAL MICRO-CAVITY

S.M.C. Abdulla^{1*}, L.J. Kauppinen², M. de Ridder² and
G.J.M. Krijnen¹

¹Transducers Science and Technology Group and
²Integrated Optical Microsystems Group,
MESA⁺ Research Institute, University of Twente, The
Netherlands

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W3P.142 DUAL-BAND MEMS FABRY-PÉROT FILTER WITH TWO MOVABLE REFLECTORS FOR MID- AND LONG-WAVE INFRARED MICROSPECTROMETERS

M. Meinig^{*1}, M. Ebermann², N. Neumann², S. Kurth¹,
K. Hiller³, T. Gessner^{1,3}

¹Fraunhofer ENAS, Chemnitz, Germany

²InfraTec GmbH, Dresden, Germany

³Chemnitz University of Technology, Chemnitz, Germany

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W3P.143 MEMS SCANNER BASED HANDHELD FLUORESCENT HYPERSPECTRAL IMAGING SYSTEM

Sheldon Bish, Youmin Wang, James W. Tunnell, and
Xiaoqing Zhang

Department of Biomedical Engineering

The University of Texas at Austin, Austin TX, USA

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W3P.144 A HIGH-SPEED ELECTROSTATIC DOUBLE-LAYERED VIBRATORY GRATING SCANNER WITH VERY HIGH OPTICAL RESOLUTION

Yu Du^{1,2}, Guangya Zhou^{1*}, Kelvin K.L. Cheo¹, Qingxin
Zhang², Hanhua Feng², and Fook Siong Chau¹

¹Micro and Nano System Initiative, Department of
Mechanical Engineering, National University of
Singapore, Singapore;

²Institute of Microelectronics, A*STAR (Agency for
Science, Technology and Research), Singapore

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W3P.145 DESIGN AND FABRICATION OF 2D FAST ELECTROTHERMAL MICROMIRRORS WITH LARGE SCAN RANGE AND SMALL CENTER SHIFT

Sagnik Pal and Huikai Xie

The Department of Electrical and Computer
Engineering, University of Florida, Gainesville, FL,
USA

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W3P.146 POLYMER-DISPERSED LIQUID CRYSTALS LIGHT SHUTTER DRIVEN BY SURFACE ACOUSTIC WAVE

Yan Jun Liu^a, Xiaoyun Ding^a, Sz-Chin Steven Lin^a,
Jinjie Shi^{a,b}, and Tony Jun Huang^{*a}

^aDepartment of Engineering Science and Mechanics,
The Pennsylvania State University, University Park, PA
16802, USA

^bThe DOW Chemical Company, Spring House
Technology Center, Spring House, PA 19477, USA

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W3P.147 ULTRA-COMPACT ELECTRO-THERMALLY TUNABLE PHOTONIC CRYSTAL PRISM FOR ON-CHIP OPTICAL ROUTER APPLICATION

K.-H. Choi, Y. Cui, K. Liu, D. MacFarlane, and J.-B.
Lee

The University of Texas at Dallas, Richardson, Texas,
U.S.A.

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Nanoscale Materials and Fabrication, Devices and Systems

W3P.148 AMBIPOLAR SI NANOWIRE FIELD EFFECT TRANSISTORS FOR LOW CURRENT AND TEMPERATURE SENSING

D. Sacchetto, G. De Micheli, and Y. Leblebici

EPFL - Ecole Polytechnique Fédérale, Lausanne, Vaud,
SWITZERLAND

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W3P.149 CARBON NANOTUBE BASED MULTI-SPECTRUM INFRARED DETECTOR ARRAY

H. Chen, N. Xi, L. Chen, and King W. C. Lai

Michigan State University, East Lansing, Michigan,
USA

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W3P.150 NANOGAP-CONTROLLABLE SELF-ASSEMBLY OF GOLD NANOPARTICLES USING NANOTRENCH TEMPLATE

K. Sugano¹, R. Hiraoka¹, T. Tsuchiya¹, O. Tabata¹, M.
Klaumünzer², M. Voigt² and W. Peukert²

¹Department of Micro Engineering, Kyoto University,
Kyoto, Japan

²Institute of Particle Technology, Friedrich-Alexander
University of Erlangen-Nürnberg, Erlangen, Germany

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W3P.151 AXIALLY STRETCHED NANO-THICK PIEZORESISTIVE SILICON CLAMPED-BEAMS TO SENSE SPECIFIC-REACTION-INDUCED DOUBLE-SIDE SURFACE-STRESS WITH MUCH HIGHER SENSITIVITY THAN CANTILEVERS

Ying Chen, Pengcheng Xu and Xinxin Li^{*}

State Key Lab of Transducer Technology, and, Science

	and Technology on Microsystem Lab, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China	2574
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W3P.156	AN ULTRA-SENSITIVE NANOCOMPOSITE PRESSURE SENSOR PATTERNED IN A PDMS DIAPHRAGM Chao-Xuan Liu ¹ and Jin-Woo Choi ^{1,2} ¹ Department of Electrical and Computer Engineering, Louisiana State University, Baton Rouge, LA 70803, USA ² Center for Advanced Microstructures and Devices, Louisiana State University, Baton Rouge, LA 70806, USA	2594
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⁴The University of Tokyo, Tokyo, JAPAN
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W3P.158	MULTI-SPACER TECHNIQUE FOR LOW-VOLTAGE, HIGH-ASPECT-RATIO LATERAL ELECTROSTATIC ACTUATORS D. LEE, S. Mitra, R. T. Howe, and H.-S. P. Wong Electrical Engineering Department, Stanford University, Stanford, CA, USA	2602
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W3P.160	CMOS-MEMS ATOMIC FORCE MICROSCOPE N. Sarkar ¹ , R. R. Mansour ¹ , O. Patange ¹ , K. Trainer ¹ ¹ University of Waterloo, Waterloo, Ontario, Canada	2610
W3P.161	SILICON CARBIDE (SiC) MEMBRANE NANOMECHANICAL RESONATORS WITH MULTIPLE VIBRATIONAL MODES A.C. Barnes ¹ , R.C. Roberts ¹ , N.C. Tien ¹ , C.A. Zorman ^{1*} , and Philip X.-L. Feng ^{1*} ¹ Electrical Engineering & Computer Science, Case Western Reserve University, Cleveland, OH 44106, USA	2614

Energy and Power MEMS

W3P.162	A NOVEL ASSEMBLY METHOD FOR MICRO DIRECT METHANOL FUEL CELLS USING MULTI-LAYER BONDING TECHNIQUE Y.M. Zhu, X.H. Wang, Y.A. Zhou, L.T. Liu Institute of Microelectronics, Tsinghua University, Beijing, China Tsinghua National Laboratory for Information Science and Technology, Beijing, China	2618
W3P.163	PIEZOELECTRIC PDMS FILMS FOR POWER MEMS J.J. Wang, J.M. Hsieh, R.W. Tsai, and Y.C. Su Department of Engineering and System Science National Tsing Hua University, Hsinchu, Taiwan	2622
W3P.164	AGING CHARACTERISTICS OF ELECTRET USED IN A VIBRATION-BASED ELECTROSTATIC INDUCTION ENERGY HARVESTER Y. Wada ¹ , Y. Hamate ¹ , S. Nagasawa ¹ , H. Kuвано ¹ ¹ Tohoku University, Sendai, Miyagi, JAPAN	2626
W3P.165	VIBRATION-DRIVEN MEMS ENERGY HARVESTER WITH VACUUM UV-CHARGED	

VERTICAL ELECTRETS

K. Yamashita^{1,2*}, M. Honzumi^{1,2}, K. Hagiwara^{1,3},
Y. Iguchi³, and Y. Suzuki^{1,2}

¹Dept. of Mechanical Engineering, The University of
Tokyo,

²G Device Center, BEANS Project,

³NHK Science & Technology Research Laboratories

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W3P.166 ELECTRET BASED ENERGY HARVESTER USING A SHARED SI ELECTRODE

K. Fujii¹, T. Toyonaga^{1,2}, T. Fujita^{1,2}, Y. G. Jiang²,
K. Higuchi² and K. Maenaka^{1,2}

¹University of Hyogo, Himeji, Hyogo, Japan

²JST ERATO Maenaka Human-Sensing Fusion Project,
Himeji, Hyogo, Japan

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W3P.167 INCREASED-BANDWIDTH, MEANDERING VIBRATION ENERGY HARVESTER

D. F. Berdy^{1,3}, B. Jung¹, J. F. Rhoads^{2,3}, and D.
Peroulis^{1,2,3}

¹School of Electrical and Computer Engineering,
Purdue University, West Lafayette, IN, 47907, USA

²School of Mechanical Engineering, Purdue University,
West Lafayette, IN, 47907, USA

³Birck Nanotechnology Center, Purdue University, West
Lafayette, IN, 47907, USA

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W3P.168 FABRICATION OF HIGHLY DIELECTRIC NANO-BATIO₃/EPOXY-RESIN COMPOSITE PLATE HAVING TRENCHES BY MOLD CASTING AND ITS APPLICATION TO CAPACITIVE ENERGY HARVESTING

M. Suzuki¹, N. Matsushita¹, T. Hirata¹, R.
Yoneya¹, J. Onishi¹, T. Wada¹, T. Takahashi¹, T.
Nishida², Y. Yoshikawa², and S. Aoyagi¹

¹Kansai University, Osaka, Japan

²ROHM Co., Ltd., Kyoto, Japan

.....2642

W3P.169 EFFICIENT ENERGY HARVESTING FROM HUMAN MOTION USING WEARABLE PIEZOELECTRIC SHELL STRUCTURES

Boram Yang and Kwang-Seok Yun
Department of Electronic Engineering, Sogang
University, Seoul, Korea

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W3P.170 A VIBRATION-BASED ELECTROMAGNETIC ENERGY HARVESTER SYSTEM WITH HIGHLY EFFICIENT INTERFACE ELECTRONICS

Arian Rahimi^{1,2}, Özge Zorlu², Ali Muhtaroglu³,
and Haluk Kùlah^{1,2}

¹METU, Department of Electrical and Electronics
Engineering, Ankara, Turkey

²METU-MEMS Research and Application Center,
Ankara, Turkey

³METU-NCC, Department of Electrical and Electronics
Engineering, Güzelyurt, Mersin 10 Turkey

.....2650

W3P.171 ELECTROSTATICALLY-DRIVEN ACTIVE SPACE**RADIATOR USING NEAR-FIELD THERMAL RADIATION**

Ai Ueno¹ and Yuji Suzuki¹

¹Dept. of Mechanical Engineering, The University of
Tokyo Hongo, Bunkyo-ku, Tokyo 113-8656, Japan

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W3P.172 EFFECT OF ILLUMINATION ON THERMIONIC EMISSION FROM MICROFABRICATED SILICON CARBIDE STRUCTURES

J.-H.Lee¹, I. Bargatin¹, J. Provine¹, F. Liu², M.-K.
Seo¹, R. Maboudian², M.L. Brongersma¹, N.A.
Melosh¹, Z.X. Shen¹, R.T. Howe¹

¹Stanford University, Stanford, CA, USA; ²University of
California, Berkeley, CA, USA

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ORAL SESSIONS

16:15 - 18:00

SESSION VII(1) –Materials & Photonic Crystals**W4A.001 “BOTTOM-UP” THREE-DIMENSIONAL METAMATERIALS AT TERAHERTZ FREQUENCIES**

Kebin Fan, Andrew C. Strikwerda, Richard D.
Averitt, and Xin Zhang

Boston University, Boston, Massachusetts, USA

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W4A.002 3-D MICROCOILS AS A METAMATERIAL WITH ELECTRIC AND MAGNETIC RESPONSE

K. Kratt¹, S. Waselikowski², V. Badilita^{1,*}, U.
Wallrabe¹, M. Walther², J. G. Korvink^{1,3}

¹Department of Microsystems Engineering (IMTEK)

²Freiburg Materials Research Center (FMF)

³Freiburg Institute for Advanced Studies (FRIAS)

University of Freiburg, Germany

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W4A.003 A MICROMACHINED OPTICAL DELAY LINE BY SWITCHABLE METAMATERIALS

W. M. Zhu^{1,3}, J. F. Tao¹, J. H. Teng², X. H.
Zhang², H. Tanoto², H. C. Guo², Q. Y. Wu², T.
Bourouina³ and A. Q. Liu^{1†}

¹School of Electrical & Electronic Engineering,
Nanyang Technological University

SINGAPORE 639798

²Institute of Microelectronics, A*STAR (Agency for
Science, Technology and Research), 11 Science Park
Road, Singapore Science Park II, Singapore 117685

³School of Electrical & Electronic Engineering, ESIEE,
Université Paris-Est, Paris 93162, FRANCE

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W4A.004 ALL-OPTICAL PROGRAMMABLE PHOTONIC INTEGRATED CIRCUIT: AN OPTICAL ANALOGY TO ELECTRONIC FPGA

Depeng Mao, Peng Liu, and Liang Dong
Department of Electrical and Computer Engineering,
Iowa State University, Ames, Iowa, USA

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- W4A.005 ACOUSTIC SPEAKER BASED ON HIGH-EFFICIENCY BROADBAND NANO-PILLAR PHOTONIC CRYSTAL OPTO-THERMO-MECHANICAL MEMS EXCITATION**
Yuerui Lu^{*}, and Amit La¹
*SonicMEMS Laboratory, School of Electrical and Computer Engineering
Cornell University, Ithaca, NY*
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- W4A.006 REFLECTANCE-BASED TiO₂ PHOTONIC CRYSTAL SENSORS**
Y. Huang, G. Pandraud and P.M. Sarro
DIMES, Delft University of Technology, Delft, the Netherlands
.....2682

SESSION VII(2) –Materials & Characterization

- W4B.001 NIFE-AAO NANOCOMPOSITE FOR PERFORMANCE ENHANCEMENT OF ON-CHIP SPIRAL INDUCTORS**
Tzu-Yuan Chao, H. F. Hsu, K. M. Chen, and Y. T. Cheng
Microsystems Integration Laboratory, Department of Electronics Engineering & Institute of Electronics, National Chiao Tung University, Hsinchu, Taiwan
.....2686

- W4B.002 SPUTTERED MOLYBDENUM AS CONDUCTIVE MATERIAL FOR HIGH-TEMPERATURE MICROHOTPLATES**
L. Mele^{1*}, F. Santagata¹, E. Iervolino², M. Mihailovic¹, T. Rossi¹, A.T. Tran¹, H. Schellevis¹, J.F. Creemer¹, P.M. Sarro¹
¹*Delft University of Technology, DIMES, Feldmannweg 17, 2628CT, Delft, The Netherlands (NL)*
²*Xensor Integration, Distributieweg 28, 2645 EJ Delfgauw, The Netherlands (NL)*
.....2690

- W4B.003 PIEZORESISTIVE BIOCOMPATIBLE MEMBRANES FOR FLEXIBLE PRESSURE SENSORS**
Vladimir Laukhin,^{1,2,3} Victor Lebedev,² Elena Laukhina,^{2,3*} Concepció Rovira,^{2,3} Jaume Veciana^{2,3}
¹*Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain*
²*Institut de Ciència de Materials de Barcelona ICMA-B-CSIC, Campus UAB, Bellaterra, Spain*
³*CIBER de Bioingeniería, Biomateriales y Nanomedicina (CIBER-BBN), Spain*
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- W4B.004 CREEP OF PARYLENE-C FILM**
Jeffrey Chun-Hui Lin¹, Peigang Deng², Gilbert Lam³, Bo Lu¹, Yi-Kuen Lee², Yu-Chong Tai¹
¹*California Institute of Technology, Pasadena, CA, USA*
²*Hong Kong University of Science and Technology, Hong Kong*

³*University of California, San Diego, CA, USA*
.....2698

- W4B.005 ELECTROLYTIC HYDROGENATION TECHNIQUE: NEW APPROACH FOR THE MODIFICATION OF TI-FILM MECHANICAL PROPERTIES AND MEMS APPLICATIONS**
Chao-Lin Cheng¹, Wang-Shen Su², Yu-Tsung Tuan², Ming-Hao Shih³, Tair-I Wu³ and Weileun Fang^{1,2,4}
¹*Power Mechanical Eng. Dept., 4NEMS Inst., National Tsing Hua Univ., Hsinchu, Taiwan*
²*National Nano Device Laboratories, Hsinchu, Taiwan*
³*Department of Materials Engineering, Tatung University, Taipei, Taiwan*
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- W4B.006 NEGATIVE-PHOTORESIST MECHANICAL PROPERTY FOR NANO-FILTRATION MEMBRANE EMBEDDED IN MICROFLUIDICS**
Y. Hirai¹, A. Uesugi¹, Y. Makino¹, H. Yagyu², K. Sugano¹, T. Tsuchiya¹, and O. Tabata¹
¹*Department of Micro Engineering, Kyoto University, Kyoto, JAPAN*
²*Mitsuboshi Belting Ltd., Kobe, JAPAN*
.....2706

- W4B.007 OXYGEN PLASMA FUNCTIONALIZED PEDOT/PSS-SWCNTS THIN FILM DEPOSITED BY ELECTROPHORESIS FOR GAS SENSING**
J.M. Jian¹, X.S. Guo^{1*}, Q. Cai², and L.W. Lin³
¹*Biosensors National Special Laboratory, Department of Biosystems Engineering, Zhejiang University, Hangzhou, Zhejiang, China*
²*Institute of Ecology and Environment, Yangtze Delta Region Institute of Tsinghua University, Jiaxing, Zhejiang, China*
³*Berkeley Sensor and Actuator Center, University of California, Berkeley, California, U.S.A*
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SESSION VII(3) –Nanotubes & Nanowires

- W4C.001 “PICKUP AND PLACE” INTEGRATION METHOD OF BRIDGING CARBON NANOTUBES BY STAMPING TRANSFER**
Yusuke Takei, Kiyoshi Matsumoto, and Isao Shimoyama,
The University of Tokyo, Japan
.....2714

- W4C.002 PROGRAMMABLE TRANSFORMATION OF VERTICALLY ALIGNED CARBON NANOTUBES INTO 3D MICROSTRUCTURES**
M. De Volder^{1,2}, S. Tawfick¹, S.J. Park¹, D. Copic¹, A.J. Hart¹
¹*University of Michigan, Ann Arbor, MI – USA*
²*IMEC KULeuven, Heverlee, Belgium*
.....2718

- W4C.003 DENSELY PACKED CARBON NANOTUBE FOREST ON SILICON SUBSTRATE FOR MEMS SUPERCAPACITOR APPLICATIONS**

- Y. Jiang and L. Lin*
Mechanical Engineering Department, Berkeley
Sensor and Actuator Center
University of California at Berkeley, USA
.....2722
- W4C.004 AUTONOMOUS PASSIVE LIGHT TRACKING
UTILIZING SINGLE-WALL CARBON NANOTUBE
ENHANCED OPTO-THERMO-MECHANICAL
ELASTOMER ACTUATORS**
Ye Liu¹, Chensha Li¹, Chi-Wei Lo², and Hongrui
Jiang^{1,2}
¹Electrical and Computer Engineering Department,
University of Wisconsin - Madison, Madison, WI, USA
²Materials Science Program, University of Wisconsin -
Madison, Madison, WI, USA
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- W4C.005 SELF-ALIGNED DOUBLE-GATE
SUSPENDED-BODY CARBON NANOTUBE
FIELD-EFFECT TRANSISTORS FOR RF
APPLICATIONS**
Ji Cao, Adrian M. Ionescu
Nanoelectronic Devices Laboratory (Nanolab), Ecole
Polytechnique Fédérale de Lausanne, Switzerland
.....2730
- W4C.006 ULTRASENSITIVE PRESSURE SENSOR BASED ON
GATE-ALL-AROUND NANOWIRE FET**
Pushpapraj Singh^{1,2}, Jianmin Miao^{1,2}, Woo-Tae
Park², Dim-Lee Kwong²
¹School of mechanical and Aerospace Engineering,
Nanyang Technology University, Singapore
²Institute of Microelectronics, A*STAR (Agency for
Science, Technology and Research), Singapore
.....2734
- W4C.007 HIGHLY SENSITIVE BILAYER STRUCTURED
GRAPHENE SENSOR**
F.B. Rao, H. Almumen, L.X. Dong, and W. Li|
Electrical & Computer Engineering, Michigan State
University, East Lansing, MI 48824, USA
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SESSION VII(4) –Devices for Cells & Microorganisms

- W4D.001 MAGNETOPHORETIC LABELFREE CELL
SEPARATION USING PARAMAGNETIC
SOLUTION**
F. Shen, H. Hwang, Y.K. Hahn and J.-K. Park
Department of Bio and Brain Engineering, KAIST,
Daejeon, REPUBLIC OF KOREA
.....2742
- W4D.002 AMPLIFICATION OF CHEMOTACTIC
RESPONSES OF MOTILE BACTERIAL CELLS
FOR CHARACTERIZING PREFERENTIAL
CHEMOTAXIS TOWARD CARBON SOURCES**
M. Kim¹, S.H. Kim¹, S.K. Lee¹ and T. Kim¹
¹Ulsan National Institute of Science and Technology,
Ulsan, Korea
.....2746

- W4D.003 A GLUCOSE-RESPONSIVE INSULIN DELIVERY
MICRO DEVICE EMBEDDED
WITH NANOHYDROGEL PARTICLES AS “SMART
VALVES”**
Jian Chen^{1*}, Claudia R. Gordijo^{2*}, Michael
Chu², Xiao Yu Wu^{2**}, and Yu Sun^{1**}
¹Advanced Micro and Nanosystems Lab, University of
Toronto, Canada
²Department of Pharmaceutical Sciences, University
of Toronto, Canada
.....2750
- W4D.004 SI NANO-PILLARS FOR MEASURING TRACTION
FORCE EXERTED BY FILOPODIA**
Uijin Jung, Tetsuo Kan, Kenta Kuwana, Kiyoshi
Matsumoto and Isao Shimoyama
The University of Tokyo, Tokyo, JAPAN
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- W4D.005 GOLD NANOPARTICLE-BASED REDOX SIGNAL
ENHANCEMENT TOWARDS THE DETECTION OF
SINGLE BACTERIUM**
Jen-Kuei Wu¹, Hwan-You Chang² and Fan-Gang
Tseng^{1,3*}
¹Department of Engineering and System Science,
National Tsing Hua University, Taiwan (R.O.C.)
²Department of Life Science, National Tsing Hua
University (R.O.C.)
³Division of Mechanics, Research Center for Applied
Sciences, Taiwan (R.O.C.)
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- W4D.006 BIOFUEL CELLS WITH TREHALOSE LEADING
TO AN INSECT-IMPLANTED POWER SOURCE**
K. Shoji, M. Suzuki, Y. Akiyama, T. Hoshino, N.
Nakamura, H. Ohno and K. Morishima,
Tokyo University of Agriculture and Technology,
Tokyo, JAPAN
.....2762
- W4D.007 SEPARATION OF CAENORHABDITIS ELEGANS
BY ELECTROTAXIS IN A MICRODEVICE**
P. Rezai¹, S. Salam², P. R. Selvaganapathy^{1,*} and
B. P. Gupta²
¹Department of Mechanical Engineering, McMaster
University, Hamilton, ON, CANADA
²Department of Biology, McMaster University,
Hamilton, ON, CANADA
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THURSDAY, JUNE 9, 2011

ORAL SESSIONS 08:30 - 10:00

SESSION VIII(1) –Polymers in MEMS

- Th1A.001 Invited Speaker
ELASTOMERIC CAPACITIVE SENSORS**
S.P. Lacour¹, D.P.J. Cotton²

¹Ecole Polytechnique Fédérale de Lausanne,
Laboratory for Soft Bioelectronic Interfaces,
Lausanne, Switzerland
²University of Cambridge, Nanoscience Centre,
Cambridge, UK

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- Th1A.002 A DESIGN OF LONGITUDINALLY-DIVIDED
BALLOON STRUCTURE IN PDMS PNEUMATIC
BALLOON ACTUATOR BASED ON FEM
SIMULATIONS**
K. Morimoto, A. Utsumi and S. Konishi
Ritsumeikan University, Shiga, JAPAN
.....2774
- Th1A.003 ONE STEP INTEGRATION OF GOLD COATED
SENSORS WITH OSTEO POLYMER CARTRIDGES
BY LOW TEMPERATURE DRY BONDING**
N. Sandström, R. Z. Shafagh, C.F. Carlborg, T.
Haraldsson, G. Stemme and W. van der
Wijngaart
KTH Royal Institute of Technology, Microsystem
Technology Lab, Stockholm, Sweden
.....2778
- Th1A.004 SINGLE-STEP FABRICATION OF ORGANIC
NANOFIBROUS MEMBRANE FOR
PIEZOELECTRIC VIBRATION SENSOR**
G.F. Zheng¹, X. Wang¹, W.W. Li^{1,2}, T.P. Lei¹, W.
Tao¹, J. Du¹, Q.Y. Qiu¹, X.G. Chi¹, and D.H.
Sun^{1*}
¹Department of Mechanical and Electrical Engineering,
Xiamen University, Xiamen, Fujian, China
²Department of Mechanical Engineering, Xiamen
University of Technology, Xiamen, Fujian, China
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- Th1A.005 MECHANICAL REGULATION OF COLLECTIVE
CELL BEHAVIOR VIA MICROTOPOGRAPHIC
SUBSTRATES**
Adrienne T. Higa^{1*}, Ryan D. Sochol¹, Kosuke
Iwai¹, Song Li², and Liwei Lin¹
¹Berkeley Sensor and Actuator Center, University of
California, Berkeley, USA
²Department of Bioengineering, University of
California, Berkeley, USA
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SESSION VIII(2) –Wireless Systems & Components

- Th1B.001 Invited Speaker**
**Th1B.002 BATTERY-FREE WIRELESS TOUCH DRIVEN
TRANSMITTER WITH ON-CHIP ANTENNAS FOR
WIRELESS SENSOR SYSTEMS**
Makoto Niino¹, Tuan-Anh Nguyen¹,
Wang-Hoon Lee^{1,2}, Kazuaki Sawada^{1,2}, Makoto
Ishida^{1,2}
¹Toyohashi University of Technology, Toyohashi,
Japan
²JST-CREST Advance Integrated Sensing Technology,
Tokyo, Japan

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- Th1B.003 NOVEL FREQUENCY AGILE
ELECTROMAGNETIC DECOUPLING MEMS
DEVICE**
Yun-Ho Jang¹, Ignacio Llamas-Garro², Jung-Mu
Kim³, and Yong-Kweon Kim¹
¹Seoul National University, Seoul, KOREA
²Centre Tecnologic de Telecomunicacions de
Catalunya, Barcelona, SPAIN
³Chonbuk National University, Jeonju, KOREA
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- Th1B.004 INDUCTIVELY COUPLED WIREBONDED
MICROCOILS FOR WIRELESS ON-CHIP NMR**
V. Badilita^{1,*}, B. Fassbender², O. Gruschke³, K.
Kratt¹, R. Meier³, D. Sakellariou², J.G. Korvink^{3,4}
and U. Wallrabe¹
¹Lab. for Microactuators, Dept. of Microsystems
Engineering – IMTEK, University of Freiburg,
Germany
²CEA Saclay, IRAMIS, SIS2M, F-91191, Gif-sur-Yvette,
France
³Lab. for Simulation, Dept. of Microsystems
Engineering – IMTEK, University of Freiburg,
Germany
⁴Freiburg Institute for Advanced Studies – FRIAS,
University of Freiburg, Germany
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- Th1B.005 ON-CHIP RF INDUCTORS WITH MAGNETIC
NANO PARTICLES MEDIUM**
C. Yang¹, K. Koh¹, X. Zhu², and L. Lin¹
¹University of California, Berkeley, CA, USA
²Samsung Electronics, Dallas, TX, USA
.....2801

SESSION VIII(3) –MEMS Gyroscopes

- Th1C.001 Invited Speaker**
**MULTI-DOF INERTIAL MEMS: FROM GAMING TO
DEAD RECKONING**
Farrokh Ayazi
Georgia Institute of Technology, Atlanta, GA, USA
Qualtré Inc., Marlborough, MA, USA
.....2805
- Th1C.002 SUB-DEGREE-PER-HOUR SILICON MEMS RATE
SENSOR WITH 1 MILLION Q-FACTOR**
I.P. Prikhodko, S.A. Zotov, A.A. Trusov, and
A.M. Shkel
Microsystems Laboratory, University of California,
Irvine, CA, USA
.....2809
- Th1C.003 SINGLE-CRYSTAL-SILICON VIBRATORY
CYLINDRICAL RATE INTEGRATING
GYROSCOPE (CING)**
J. Cho, J.A. Gregory, and K. Najafi
Center for Wireless Integrated Microsystems (WIMS)
University of Michigan, USA
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- Th1C.004 EXPERIMENTAL EVALUATION OF ALTERNATIVE DRIVE-MODE CONTROL ELECTRONICS DEVELOPED FOR HIGH-PERFORMANCE MEMS GYROSCOPES**
E. Sahin¹, S. E. Alper¹, and T. Akin^{1,2}
¹Middle East Technical University, MEMS Research and Applications Center, Ankara, TURKEY
²Middle East Technical University, Department of Electrical and Electronics Eng., Ankara, TURKEY
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- Th1C.005 A MODE-MATCHED 0.9 MHZ SINGLE PROOF-MASS DUAL-AXIS GYROSCOPE**
W.K. Sung, M. Dalal and F. Ayazi
School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA 30308-0250, USA
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SESSION VIII(4) –Medical Devices & Systems

- Th1D.001 Invited Speaker RETINAL IMPLANTS TO RESTORE VISION IN BLIND PEOPLE**
Wilfried Mokwa
Institute of Materials in Electrical Engineering 1, RWTH Aachen University, Aachen, Germany
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- Th1D.002 DELIVERY OF AN ANTI-CANCER DRUG FROM A MAGNETICALLY CONTROLLED MEMS DEVICE SHOW CYTOTOXICITY IN PC3 AND HUVEC CELLS**
F. N. Pirmoradi¹, J. Jackson², H. Burt², and M. Chiao¹
¹Department of Mechanical Engineering, University of British Columbia, Vancouver, BC, Canada
²Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC, Canada
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- Th1D.003 CAPSULE MICROROBOT FOR TARGETTING IN MEDICAL DIAGNOSTIC TREATMENT**
H. KOGA, Y. SAKATA, S. HIROSE and S.KONISHI
Ritsumeikan University, Shiga, JAPAN
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- Th1D.004 ELECTROCHEMICALLY-BASED DOSE MEASUREMENT FOR CLOSED-LOOP DRUG DELIVERY APPLICATIONS**
Christian A. Gutierrez, Roya Sheybani and Ellis Meng
University of Southern California, Department of Biomedical Engineering, Los Angeles, CA, USA
.....2839
- Th1D.005 A MEDICAL TACTILE SENSOR FOR MEASURING TISSUE HARDNESS IN ROBOTIC SURGICAL TOOLS**
Shenshen Zhao, David Parks, and Chang Liu
MedX Lab, Northwestern University, Evanston, IL,
.....

60208, USA
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ORAL SESSIONS 10:30 - 12:15

SESSION IX(1) –Physical Sensors II

- Th2A.001 A MEMS MICRO-REED SWITCH DESIGNED FOR PORTABLE APPLICATIONS**
Min Tang¹, Yong Hean Lee¹, Rakesh Kumar¹, Ravi Shankar², Olivier Le Neel²
¹Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), Singapore
²ST Microelectronics Asia Pacific Pte Ltd, Singapore
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- Th2A.002 MICROMECHANICAL MAGNETOMETERS BASED ON CLAMPED-CLAMPED HIGH-Q NONLINEAR RESONATORS**
D. Antonio and D. López
Center for Nanoscale Materials, Argonne National Laboratory, Argonne, IL, USA
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- Th2A.003 NOVEL COUPLING CONCEPT FOR FIVE-CONTACT VERTICAL HALL DEVICES**
T. Kaufmann, F. Purkl, P. Ruther and O. Paul
Department of Microsystems Engineering (IMTEK), University of Freiburg, Germany
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- Th2A.004 LOCALIZED STRAIN SENSING USING HIGH SPATIAL RESOLUTION, HIGHLY-SENSITIVE MEMS RESONANT STRAIN GAUGES FOR FAILURE PREVENTION**
Matthew W. Chan, David R. Myers, Brian D. Sosnowchik, Liwei Lin, and Albert P. Pisano
University of California, Berkeley, Berkeley, CA, United States
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- Th2A.005 DETECTION SYSTEM OF INCIDENT SLIPPAGE AND FRICTION COEFFICIENT BASED ON A FLEXIBLE TACTILE SENSOR WITH STRUCTURAL ELECTRODES**
C.H. Chuang*, Y.R. Liou and C.W. Chen
Department of Mechanical Engineering, Southern Taiwan University, Tainan, TAIWAN
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- Th2A.006 IR THERMOCYCLER FOR CENTRIFUGAL MICROFLUIDIC PLATFORM WITH DIRECT ON-DISK WIRELESS TEMPERATURE MEASUREMENT SYSTEM**
J. Burger¹, André Gross¹, Daniel Mark³, Felix von Stetten^{1,3}, Roland Zengerle^{1,2,3} and Günter Roth^{1,2,3}
¹Laboratory for MEMS Applications, Department of Microsystems Engineering - IMTEK, University of Freiburg, Georges-Koehler-Allee 106, D-79110 Freiburg, Germany
²Centre for Biological Signalling Studies – BIOS,

University of Freiburg, Germany
³HSG-IMIT, Wilhelm-Schickard-Straße 10, D-78052
 Villingen-Schwenningen, Germany

- Th2A.007 A CONTOUR-MODE FILM BULK ACOUSTIC RESONATOR FOR MONITORING BLOOD COAGULATION IN REAL-TIME**
 W. Xu^{1*}, J. Appel², and J. Chae¹
¹Arizona State University, Tempe, Arizona, USA
²Auburn University, Auburn, Alabama, USA

SESSION IX(2) –Harsh Environmental Reliability

- Th2B.001 IMPROVED RELIABILITY OF SIC PRESSURE SENSORS FOR LONG TERM HIGH TEMPERATURE APPLICATIONS**
 R.S. Okojie¹, V. Nguyen², E. Savrun², and D. Lukco³
¹NASA Glenn Research Center, Cleveland, OH, USA
²Sienna Technologies, Inc. Woodingville, WA, USA
³ASRC Research Corp., NASA Glenn Research Center, Cleveland, OH, USA
- Th2B.002 VERY HIGH TEMPERATURE (800°C) OHMIC CONTACT OF AU/NI2SI ON N-TYPE POLYCRYSTALLINE SILICON CARBIDE AGED IN AIR**
 R. Larger and L. G. Fréchette
 Department of Mechanical Engineering, Université de Sherbrooke, Sherbrooke, CANADA
- Th2B.003 IMPACT OF ENCAPSULATION MATERIALS ON THE PERFORMANCE OF SILICON-BASED SOLID STATE HIGH PRESSURE SENSORS WITH SURFACE TRENCHES**
 M. Baumann, C. Sander, P. Ruther, and O. Paul
 Department of Microsystems Engineering (IMTEK), University of Freiburg, Germany
- Th2B.004 AN SOI THERMAL-DIFFUSIVITY-BASED TEMPERATURE SENSOR WITH ±0.6°C (3σ) UNTRIMMED INACCURACY FROM -70°C TO 170°C**
 C.P.L. van Vroonhoven and K.A.A. Makinwa
 Delft University of Technology, Delft, The Netherlands
- Th2B.005 DESIGN EVALUATION OF SHOCK INDUCED FAILURE MECHANISMS OF MEMS BY CORRELATION OF NUMERICAL AND EXPERIMENTAL RESULTS**
 M. Naumann¹, D. Lin², J. Mehner¹, A. McNeil² and T. F. Miller²
¹Chemnitz University of Technology, Department of Microsystems and Precision Engineering, Chemnitz, Germany
²Freescale Semiconductor Inc., Tempe, Arizona,

United States

- Th2B.006 EFM STUDY OF THE INFLUENCE OF HUMIDITY ON CHARGE INJECTION AND CHARGE RELAXATION IN SILICON NITRIDE USED IN ELECTROSTATICALLY ACTUATED MEMS**
 A. Nowodzinski¹, T. Toussaint¹, A. Koszewski¹, F. Souchon¹
¹CEA-Leti LCFM, Grenoble, France
- Th2B.007 TIME PREDICTIVE MODEL OF CHARGE ACCUMULATION IN BULK PECVD DIELECTRIC MATERIALS USED FOR ELECTROSTATIC RF MEMS SWITCHES**
 F. Souchon¹, A. Koszewski¹, C. Dieppedale¹ and T. Ouisse²
¹CEA-LETI-MINATEC-CAMPUS, Grenoble, FRANCE
²Grenoble INP and LMGP-UMRCNRS5628, Grenoble, FRANCE

SESSION IX(3) –Displays, Scanners and Modulators

- Th2C.001 LENS SCANNING BASED MEMS CATHETER FOR FORWARD ENDOSCOPIC OPTICAL COHERENCE TOMOGRAPHY**
 H. C. Park[†], C. Song[†], and K. H. Jeong^{*}
 Department of Bio and Brain Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea
- Th2C.002 FRONTSIDE-ONLY PROCESSING OF 2-D MEMS SCANNER FOR MINIATURE DUAL-AXIS CONFOCAL MICROENDOSCOPES**
 J.W. Jeong^{*}, S. Vaithilingam, and O. Solgaard
 E. L. Ginzton Laboratory, Department of Electrical Engineering, Stanford University, Stanford, CA, USA
- Th2C.003 DEVELOPMENT OF THE MICRO-MIRROR WITH LARGE SCANNING ANGLE USING FE-BASED METALLIC GLASS THIN FILM**
 Jae-Wung Lee¹, Yu-Ching Lin¹, Neelam Kaushik¹, Parmanand Sharma², Akihisa Inoue², Masayoshi Esashi¹ and Thomas Gessner^{3,4}
¹WPI Advanced Institute for Materials Research Tohoku University, Sendai, Tohoku, Japan
²Institute for Materials Research, Tohoku University, Sendai 980-8577, Japan
³Fraunhofer ENAS, Chemnitz 09126, Germany
⁴Chemnitz University of Technology, Chemnitz, Germany
- Th2C.004 INTERFEROMETRIC MODULATORS USING MECHANICALLY COUPLED MIRROR ACTUATORS FOR COLOR REPRODUCTION**
 W. Han and Y.-H. Cho
 Digital Nanolocomotion Center, Department of Bio

and Brain Engineering, KAIST, Korea
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Th2C.005 OPTO-ACOUSTIC OSCILLATOR USING SILICON MEMS OPTICAL MODULATOR
Suresh Sridaran and Sunil A. Bhawe
OxideMEMS Lab, Cornell University, Ithaca, NY, USA
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Th2C.006 ELECTROSTATIC TORSIONAL VERTICAL FLAPS FOR REFLECTIVE MEMS DISPLAY
F. Jutzi, W. Noell, N. F. de Rooij
*Ecole Polytechnique Fédérale de Lausanne (EPFL),
Institute of Microengineering (IMT), Sensors,
Actuators and Microsystems Laboratory (SAMLAB),
Neuchâtel, SWITZERLAND*
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Th2C.007 MONOLITHIC INTEGRATION OF NEMS TUNABLE COLOR FILTER AND LSI DRIVER CIRCUITS
H. Honma¹, H. Miyao¹, K. Takahashi^{1,2}, M. Futagawa¹, F. Dasai¹, M. Ishida^{1,2}, and K. Sawada^{1,2}
¹*Toyohashi University of Technology, Toyohashi, Aichi, JAPAN*
²*JST CREST, Tokyo, JAPAN*
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SESSION IX(4) –Microfluidics II

Th2D.001 HIGH PRESSURE EWOD DIGITAL MICROFLUIDICS
W. C. Nelson¹, M. Yen¹, P. Y. Keng^{2,3}, R. M. van Dam^{2,3} and C.-J. Kim¹
¹*Mechanical and Aerospace Engineering Department*
²*Department of Molecular and Medical Pharmacology*
³*Crumpp Institute for Molecular Imaging University of California, Los Angeles (UCLA), USA*
.....2932

Th2D.002 ENHANCED MICRO-DROPLET SPLITTING, CONCENTRATION, SENSING AND EJECTION BY INTEGRATING ELECTROWETTING-ON-DIELECTRICS AND SURFACE ACOUSTIC WAVE TECHNOLOGIES
Y. Li¹, Y.Q. Fu^{2,3}, S.D. Brodie², M. Alghane² and A.J. Walton¹
¹*Institute for Integrated Micro and Nano Systems, School of Engineering, Institute for Integrated Systems-Part of ERPem, University of Edinburgh, Edinburgh, EH9 3JF, UK*
²*Department of Mechanical Engineering, School of Engineering and Physical Sciences, Institute for Integrated Systems - Part of ERPem, Heriot-Watt University, Edinburgh, UK*
³*Thin Film Centre, Scottish Union of Physics Alliance*

(SUPA), University of West of Scotland, Paisley, PA1 2BE, Scotland
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Th2D.003 ON-CHIP SYNTHESIS OF SILICA NANOPARTICLE ASSEMBLIES WITH CONTROLLED SHAPE AND SIZE
J.B. Wacker, V.K. Parashar, and M.A.M. Gijs
Laboratory of Microsystems, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland
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Th2D.004 STAND-ALONE MICRO FLUIDIC SYSTEM USING PARTLY DISPOSABLE PDMS MICROWELL ARRAY FOR HIGH THROUGHPUT CELL ANALYSIS
Kasumi Miyamoto¹, Ryo Yamamoto¹, Kentaro Kawai², and Shuichi Shoji¹
¹*Major in Nano-Science and Nano-Engineering, Waseda University, Japan*
²*Department of Precision Science and Technology, Osaka University, Japan*
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Th2D.005 ON-CHIP INTEGRATION OF EIGHT DIRECTIONAL DROPLET EJECTORS FOR INKING A SPOT WITH EIGHT DROPLETS WITHOUT EJECTOR MOVEMENT
Youngki Choe, Lingtao Wang, and Eun Sok Kim
Department of EE-Electrophysics, University of Southern California, Los Angeles, CA, USA
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Th2D.006 FULLY INTEGRATED DILUTION SERIES GENERATION ON A LABORATORY CENTRIFUGE
O. Strohmeier^{1,*}, M. Rombach¹, D. Mark², R. Zengerle^{1,2,3}, G. Roth^{1,2,3} and F. von Stetten^{1,2}
¹*Laboratory for MEMS Applications, Department of Microsystems Engineering - IMTEK, University of Freiburg, Georges-Koehler-Allee 106, 79110 Freiburg, GERMANY*
²*HSG-IMIT, Wilhelm-Schickard-Straße 10, 78052 Villingen-Schwenningen, GERMANY*
³*Center for Biological Signalling Studies – BIOSS, University of Freiburg, GERMANY*
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Th2D.007 LEUKOCYTE 5-PART DIFFERENTIAL COUNT USING A MICROFLUIDIC CYTOMETER
W. Shi¹, L.W. Guo¹, H. Kasdan², A. Fridge², and YC. Tai¹
¹*California Institute of Technology, Pasadena, CA, USA*
²*IRIS Diagnostics Division, IRIS International Inc., Chatsworth, CA, USA*
.....2956