

MEMS 2011 PROGRAM SCHEDULE

Sunday, January 23, 2010

18:00 - **Registration**
21:00

18:30 - **Welcome Reception**
20:30

Monday, January 24, 2011

08:00 **Welcome Address**
K. Böhringer, *University of Washington, USA*
L. Lin, *University of California, Berkeley, USA*

PLENARY SPEAKER I

Session Chairs:
K. Böhringer, *University of Washington, USA*
L. Lin, *University of California, Berkeley, USA*

08:20 **3D PHOTONIC METAMATERIALS AND INVISIBILITY CLOAKS: THE MAKING OF**
M. Wegener
Karlsruhe Institute of Technology, GERMANY

SESSION I - OPTICAL MEMS

Session Chairs:
J. Kim, *Yonsei University, SOUTH KOREA*
H. Zappe, *University of Freiburg – IMTEK, GERMANY*

09:00 **AN OPTOFLUIDIC PRISM WITH LARGE DEVIATION ANGLE BY TWO FLOW STREAMS**
S. Xiong¹, L.K. Chin¹, Y. Yang¹, Y.H. Fu¹, Y. Chen², and A.Q. Liu¹
¹*Nanyang Technological University, SINGAPORE and*
²*Agency for Science, Technology and Research (A*STAR), SINGAPORE*

09:20 **MECHANO-OPTICAL SWITCHING IN A MEMS INTEGRATED PHOTONIC CRYSTAL SLAB WAVEGUIDE**
S.M.C. Abdulla, L.J. Kauppinen, M. Dijkstra, E. Berenschot, M.J. De Boer, R.M. de Ridder, and G.J.M. Krijnen
University of Twente, THE NETHERLANDS

09:40 **ULTRA-HIGH COUPLING EFFICIENCY OF MEMS TUNABLE LASER VIA 3-DIMENSIONAL MICRO-OPTICAL COUPLING SYSTEM**
J.F. Tao^{1,2}, A.B. Yu³, H. Cai³, W.M. Zhu¹, Q.X. Zhang³, J. Wu², K. Xu², J.T. Lin², and A. Q. Liu¹
¹*Nanyang Technological University, SINGAPORE,*
²*Beijing University of Posts and Telecommunications, CHINA, and*
³*Institute of Microelectronics, SINGAPORE*

10:00 **Break & Exhibit Inspection**

SESSION II - MEDICAL MEMS

Session Chairs:

T. Tsuchiya, *Kyoto University, JAPAN*

D. Young, *University of Utah, USA*

- 10:30 **PNEUMATICALLY DEPLOYED NET SYSTEM FOR ENDOSCOPIC REMOVAL OF FOREIGN OBJECT**
W. Choi¹, V. Rubtsov², and C.-J. Kim¹
¹*University of California, Los Angeles, USA* and ²*Intelligent Optical Systems, Inc. (IOS), USA*
- 10:50 **AN ACTIVE TISSUE-CONTRAST SENSING MICROSYSTEM FOR BIOPSY NEEDLES: INITIAL RESULTS**
T. Li and Y.B. Gianchandani
University of Michigan, USA
- 11:10 **A DUAL MICROSCALE GLUCOSE SENSOR ON A CONTACT LENS, TESTED IN CONDITIONS MIMICKING THE EYE**
H. Yao, A. Afanasiev, I. Lähdesmäki, and B.A. Parviz
University of Washington, USA
- 11:30 **MULTIFUNCTIONAL OPTICALLY DRIVEN MICROROBOT FOR REALTIME 3D BIO-MANIPULATION AND IMAGING**
M. Ikeuchi^{1,2}, K. Isozaki³, K. Kyue³, H. Sunabe³, N. Shimada³, H. Sasago⁴, and K. Ikuta¹
¹*University of Tokyo, JAPAN*, ²*Japan Science and Technology Agency (JST), JAPAN*, ³*Nagoya University, JAPAN*, ⁴*Sasago Inc., JAPAN*
- 11:50 **A 2.8-MM IMAGING PROBE BASED ON A HIGH-FILL-FACTOR MEMS MIRROR AND WIRE-BONDING-FREE PACKAGING FOR ENDOSCOPIC OPTICAL COHERENCE TOMOGRAPHY**
L. Wu^{1,2}, S.R. Samuelson², J. Sun², W. Lau^{1,2}, S. Choe², B.S. Sorg², K. Jia², and H. Xie^{1,2}
¹*WiOptix, Inc., USA* and ²*University of Florida, USA*
- 12:10 **Lunch & Exhibit Inspection**
- 13:10 **Poster/Oral Session I**
Session Chairs:
F. Laermer, *Robert Bosch GmbH, GERMANY*
M. Wong, *Hong Kong University of Science and Technology, HONG KONG*

SESSION III - 3D FABRICATION & ASSEMBLY

Session Chairs:

R. Baskaran, *Intel Corporation, USA*

J. Oberhammer, *KTH - Royal Institute of Technology, SWEDEN*

- 15:10 **FABRICATION OF HIGH ASPECT RATIO THROUGH SILICON VIAS (TSVs) BY MAGNETIC ASSEMBLY OF NICKEL WIRES**
A.C. Fischer, N. Roxhed, T. Haraldsson, N. Heinig, G. Stemme, and F. Niklaus
Royal Institute of Technology (KTH), SWEDEN
- 15:30 **SELECTIVE SELF-ASSEMBLY OF NANOPARTICLES ON TRENCH SIDEWALLS AND ITS RELATIONSHIP WITH SCALLOP NANOSTRUCTURE**
M. Abasaki^{1,2}, S. Souma², M. Takeda¹, N. Moronuki^{1,3}, and M. Sugiyama^{1,4}
¹*BEANS (Bio Electromechanical Autonomous Nano Systems), JAPAN,*
²*Fuji Electric Systems, Co., Ltd, JAPAN,* ³*Tokyo Metropolitan University, JAPAN,* and
⁴*University of Tokyo, JAPAN*
- 15:50 **3D-SOULE: A FABRICATION PROCESS FOR LARGE SCALE INTEGRATION AND MICROMACHINING OF SPHERICAL STRUCTURES**
K. Visvanathan, T. Li, Y.B. Gianchandani
University of Michigan, USA
- 16:10 **LOW TEMPERATURE CONFORMAL SILICON DIOXIDE DEPOSITION USING SUPERCRITICAL FLUID FOR POLYMER-BASED MEMS**
H. Yamada¹, T. Momose^{1,2}, Y. Kitamura³, Y. Hattori³, Y. Shimogaki^{1,2}, and M. Sugiyama^{1,2}
¹*BEANS (Bio Electromechanical Autonomous Nano Systems), JAPAN,* ²*University of Tokyo, JAPAN,* and
³*DENSO Corporation, JAPAN*
- 16:30 **OPTOELECTRONIC RECONFIGURABLE MICROCHANNELS**
G. Haulot, A.J. Benahmed, and C.M. Ho
University of California, Los Angeles, USA
- 16:50 **Adjourn for the Day**

Tuesday, January 25, 2011

PLENARY SPEAKER II

Session Chairs:

K. Böhringer, *University of Washington, USA*

L. Lin, *University of California, Berkeley, USA*

08:00 **VIDEO IMAGING OF BIOMOLECULAR PROCESSES BY HIGH-SPEED AFM**

T. Ando

Kanazawa University, JAPAN

SESSION IV - DIAGNOSTICS & LAB-ON-A-CHIP

Session Chairs:

J. Duce, *Dublin City University, IRELAND*

M. Seki, *Chiba University, JAPAN*

08:40 **OPEN-ACCESS PHOTOTRANSISTOR-BASED OPTOELECTRONIC TWEEZERS FOR LONG-TERM SINGLE CELL HETEROGENEITY STUDY**

H.-Y. Hsu, A. Jamshidi, S. Shekarchian, W. Lam, J.K. Valley, S.N. Pei, and M.C. Wu

University of California, Berkeley, USA

09:00 **INTEGRATED MEMS PLATFORM WITH SILICON NANOTWEEZERS AND OPEN MICROFLUIDIC DEVICE FOR MOLECULAR AND CELLULAR BIOMECHANICAL ASSAYS**

M. Kumemura¹, D. Collard¹, R. Tourvielle², N. Lafitte¹, K. Montagne¹, S. Yoshizawa³, D. Fourmy³, C. Yamahata², L. Jalabert¹, Y. Sakai¹, S. Takeuchi¹, T. Fujii¹, and H. Fujita¹

¹*University of Tokyo, JAPAN*, ²*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*, and ³*CNRS-CGM, FRANCE*

09:20 **PAIRING SINGLE ADHERENT CELLS IN THE DYNAMIC MICROARRAY**

T. Teshima¹, H. Onoe^{1,2}, K. Kuribayashi-Shigetomi^{1,2}, and S. Takeuchi^{1,2}

¹*University of Tokyo, JAPAN* and ²*Japan Science and Technology Agency (JST)*

09:40 **A PORTABLE MICROFLUIDIC PAPER-BASED DEVICE FOR ELISA**

X.Y. Liu, C.M. Cheng, A.W. Martinez, K.A. Mirica, X.J. Li, S.T. Phillips, M. Mascareñas, and G.M. Whitesides

Harvard University, USA

10:00 **Break & Exhibit Inspection**

SESSION V - NEMS/CNTE

Session Chairs:

W. King, *University of Illinois Urbana-Champaign, USA*

X. Li, *Chinese Academy of Sciences, CHINA*

- 10:30 **A SHIELDED CANTILEVER-TIP MICROWAVE PROBE FOR MICRO/NANO SURFACE IMAGING OF CONDUCTIVE PROPERTIES**
Y.L. Yang¹, K. Lai², Q.C. Tang¹, W. Kundhikanjana², M. Kelly², Z.X. Shen², and X. Li¹
¹*Chinese Academy of Sciences, CHINA* and ²*Stanford University, USA*
- 10:50 **PLATFORM FOR STRAINABLE, TEM-COMPATIBLE, MEMS-EMBEDDED CARBON NANOTUBE TRANSISTORS**
M. Muoth, S.-W. Lee, and C. Hierold
ETH Zurich, SWITZERLAND
- 11:10 **MICROSWITCH WITH SELF-ASSEMBLED CARBON NANOTUBE ARRAYS FOR HIGH CURRENT DENSITY AND RELIABLE CONTACT**
J. Choi, J.-I. Lee, Y. Eun, M.-O. Kim, and J. Kim
Yonsei University, SOUTH KOREA
- 11:30 **MONOLITHICALLY INTEGRATED JUNCTION FETS AND NEMS**
K. Amponsah and A. Lal
Cornell University, USA
- 11:50 **A SINGLE LITHOGRAPHY VERTICAL NEMS SWITCH**
J. Rubin, R. Sundararaman, M.K. Kim, and S. Tiwari
Cornell University, USA
- 12:10 **MEMS 2012 Announcement**
- 12:20 **Lunch & Exhibit Inspection**
- 13:20 **Poster/Oral Session II**
Session Chairs:
F. Ayazi, *Georgia Tech, USA*
Y. Suzuki, *University of Tokyo, JAPAN*

SESSION VI - MEMS ON FLEXIBLE SUBSTRATE

Session Chairs:

G. Krijnen, *University of Twente, THE NETHERLANDS*

S. Sedky, *American University, Cairo, EGYPT*

- 15:20 **DIRECT PHYSICAL EXFOLIATION AND TRANSFER OF GRAPHENE GROWN VIA ETHANOL CHEMICAL VAPOR DEPOSITION**
K. Yoo, Y. Takei, B. Hou, S. Chiashi, S. Maruyama, K. Matsumoto, and I. Shimoyama
University of Tokyo, JAPAN
- 15:40 **UNIFORMLY-SIZED GIANT LIPOSOME FORMATION WITH GENTLE HYDRATION**
T. Osaki¹, K. Kuribayashi-Shigetomi², R. Kawano¹, H. Sasaki¹, and S. Takeuchi^{1,2}
¹*Kanagawa Academy of Science and Technology (KAST), JAPAN* and ²*University of Tokyo, JAPAN*
- 16:00 **NANOPOROUS ANODIC ALUMINUM OXIDE (NP-AAO) ALIGNMENT LAYER ON PET/ITO SUBSTRATE FOR FLEXIBLE LIQUID CRYSTAL DISPLAY APPLICATION**
C. Hong¹, T.T. Tang², R.P. Pan², and W. Fang¹
¹*National Tsing Hua University, TAIWAN* and ²*National Chiao Tung University, TAIWAN*
- 16:20 **POROUS PARYLENE AND EFFECTS OF LIQUID ON PARYLENE FILMS DEPOSITED ON LIQUID**
N. Binh-Khiem, K. Matsumoto, and I. Shimoyama
University of Tokyo, JAPAN
- 16:40 **Adjourn for the Day**

Wednesday, January 26, 2011

PLENARY SPEAKER III

Session Chairs:

K. Böhringer, *University of Washington, USA*
L. Lin, *University of California, Berkeley, USA*

08:00 **NANOGENERATORS FOR SELF-POWERING NANOSYSTEMS AND
PIEZOTRONICS FOR SMART MEMS/NEMS**

Z.L. Wang

Georgia Institute of Technology, USA

SESSION VII - POWER & PIEZOS

Session Chairs:

A. Holmes, *Imperial College London, UK*
S. Tanaka, *Tohoku University, JAPAN*

08:40 **A COMPLETE POWER SOURCE OF MICRO PEM FUEL CELL WITH
NABH₄ MICROREACTOR**

T. Kim¹ and J. Lee²

¹*Chosun University, SOUTH KOREA* and ²*Samsung Electronics, SOUTH KOREA*

09:00 **MEMS-BASED THICK FILM PZT VIBRATIONAL ENERGY HARVESTER**

A. Lei¹, R. Xu¹, A. Thyssen¹, A.C. Stoot¹, T.L. Christiansen¹, K. Hansen², R. Lou-Møller²,
E.V. Thomsen¹, and K. Birkelund¹

¹*Technical University of Denmark, DENMARK* and ²*Meggitt A/S, DENMARK*

09:20 **TEMPERATURE SENSITIVE MICROWIRE ARRAYS FOR ARTIFICIAL
WHISKER ELECTRONICS**

A. Ikedo, M. Ishida, and T. Kawano

Toyohashi University of Technology, JAPAN

09:40 **PAPER-BASED PIEZORESISTIVE MEMS FORCE SENSORS**

X.Y. Liu, M. O'Brien, M. Mwangi, X.J. Li, and G.M. Whitesides

Harvard University, USA

10:00 **Break & Exhibit Inspection**

SESSION VIII - NOVEL ACTUATION

Session Chairs:

J. Brugger, *Ecole Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*

K. Takahata, *University of British Columbia, CANADA*

- 10:30 **INTEGRATED ALL-ELECTRIC HIGH ENERGY ION BEAM GUIDANCE ON CHIP:
TOWARDS MINIATURE PARTICLE ACCELERATOR**
Y. Shi and A. Lal
Cornell University, USA
- 10:50 **POLYMER MEMBRANE-BASED THERMO-PNEUMATIC ACTUATION FOR
DISTRIBUTED AIR-JET PLANAR MICROMANIPULATOR**
Y.-A. Chapuis^{1,2}, L. Jalabert¹, E. Sarajlic¹, R. Vermeer³, D. Collard¹, and H. Fujita¹
¹*University of Tokyo, JAPAN*, ²*University of Strasbourg, FRANCE*, and
³*MESA+, University of Twente, THE NETHERLANDS*
- 11:10 **LONG-TERM AND ROOM TEMPERATURE OPERABLE BIO-MICROBOT
POWERED BY INSECT HEART TISSUE**
Y. Akiyama, K. Odaira, K. Iwabuchi, and K. Morishima
Tokyo University of Agriculture and Technology, JAPAN
- 11:30 **A LIGHT-REGULATED BIO-MICRO-ACTUATOR POWERED BY TRANSGENIC
DROSOPHILA MELANOGASTER MUSCLE TISSUE**
K. Suzumura, K. Funakoshi, T. Hoshino, H. Tsujimura, K. Iwabuchi, Y. Akiyama, and K. Morishima
Tokyo University of Agriculture and Technology, JAPAN
- 11:50 **ADVANCED EWOD-BASED DIGITAL MICROFLUIDIC SYSTEM FOR
MULTIPLEXED ANALYSIS OF BIOMOLECULAR INTERACTIONS**
D. Brassard, L. Malic, C. Miville-Godin, F. Normandin, and T. Veres
National Research Council, CANADA
- 12:10 **Lunch & Exhibit Inspection**
- 13:10 **Poster/Oral Session III**
Session Chairs:
C.-J. Kim, *University of California, Los Angeles, USA*
H. Zappe, *University of Freiburg - IMTEK, GERMANY*

SESSION IX - RF MEMS & RESONATORS

Session Chairs:

C.-W. Baek, *Chung-Ang University, SOUTH KOREA*

G. Piazza, *University of Pennsylvania, USA*

- 15:10 **SUSPENDED NANOCANNEL IN MEMS PLATE RESONATOR FOR MASS SENSING IN LIQUID**
V. Agache, G. Blanco-Gomez, M. Cochet, and P. Caillat
CEA-LETI/Minatoc, FRANCE
- 15:30 **FOUCAULT PENDULUM ON A CHIP: ANGLE MEASURING SILICON MEMS GYROSCOPE**
I.P. Prikhodko, S.A. Zotov, A.A. Trusov, and A.M. Shkel
University of California, Irvine, USA
- 15:50 **MULTI-POSITION LARGE TUNING-RANGE DIGITALLY TUNEABLE CAPACITORS EMBEDDED IN 3D MICROMACHINED TRANSMISSION LINES**
U. Shah, M. Sterner, G. Stemme, and J. Oberhammer
Royal Institute of Technology (KTH), SWEDEN
- 16:10 **COMBINED CAPACITIVE AND PIEZOELECTRIC TRANSDUCTION FOR HIGH PERFORMANCE SILICON MICRORESONATORS**
A.K. Samarao and F. Ayazi
Georgia Institute of Technology, USA
- 16:30 **CAPACITIVE-PIEZOELECTRIC AIN RESONATORS WITH $Q > 12,000$**
L.-W. Hung and C.T.-C. Nguyen
University of California, Berkeley, USA
- 16:50 **SWITCH-LESS DUAL-FREQUENCY RECONFIGURABLE CMOS OSCILLATOR USING ONE SINGLE PIEZOELECTRIC ALN MEMS RESONATOR WITH CO-EXISTING S₀ AND S₁ LAMB-WAVE MODES**
C. Zuo, J. Van der Spiegel, and G. Piazza
University of Pennsylvania, USA
- 17:10 **Adjourn for the Day**

Thursday, January 27, 2011

08:00 **Poster/Oral Session IV**

Session Chairs:

L. Buchaillet, *IEMN, FRANCE*

G.-B. Lee, *National Cheng Kung University, TAIWAN*

10:00 **Break & Exhibit Inspection**

SESSION X - CELLS & MOLECULES

Session Chairs:

E. Meng, *University of Southern California, USA*

F.-G. Tseng, *National Tsing Hua University, TAIWAN*

10:30 **GENE DELIVERY IN MICE USING AN IMPLANTED PNEUMATICALLY-ACTUATED MICROSYSTEM**

K. Shimizu^{1,2}, Y. Mori², K. Hayashi¹, A. Shunori², S. Kawakami¹, M. Hashida¹, and S. Konishi^{1,2}

¹*Kyoto University, JAPAN* and ²*Ritsumeikan University, JAPAN*

10:50 **AN INTEGRATED MICROFLUIDIC SYSTEM FOR RAPID SCREENING OF ALFA-FETOPROTEIN APTAMERS**

C.-J. Huang, H.-I. Lin, S.-C. Shiesh, and G.-B. Lee

National Cheng Kung University, TAIWAN

11:10 **ON-CHIP DUAL-ARM MICROROBOT DRIVEN BY PERMANENT MAGNETS FOR HIGH SPEED CELL ENUCLEATION**

M. Hagiwara¹, T. Kawahara¹, L. Feng², Y. Yamanishi³, and F. Arai¹

¹*Nagoya University, JAPAN*, ²*Tohoku University, JAPAN*, and

³*Japan Science and Technology Agency (JST), JAPAN*

11:30 **A NEW MICROFLUID SYSTEM FOR MITOCHONDRIAL DNA EXTRACTION AND ANALYSIS**

C.-M. Chang, L.-F. Chiou, C.-C. Lin, D.-B. Shieh, and G.-B. Lee

National Cheng Kung University, TAIWAN

11:50 **MICROFLUIDIC WESTERN BLOTTING: CATIONIC SURFACTANT BASED PROTEIN SIZING INTEGRATED WITH ELECTROSTATIC IMMOBILIZATION**

D. Kim¹, S.Q. Tia², M. He¹, and A.E. Herr^{1,2}

¹*University of California, Berkeley, USA* and ²*University of California, San Francisco, USA*

12:10 **Conference Adjourns**

POSTER/ORAL PRESENTATIONS

M – Monday, 13:10 – 16:10

T – Tuesday, 13:10 – 16:10

W – Wednesday, 13:10 – 15:10

Th – Thursday, 08:00 – 10:00

FABRICATION TECHNOLOGIES

- 1-M A MUSHROOM-SHAPED CONVEX POLY-SI STRUCTURE FOR PREVENTING Z-DIRECTIONAL STICTION OF AN SOI-MEMS DEVICE**
T. Akashi, H. Funabashi, and Y. Nonomura
Toyota Central R&D Labs., Inc., JAPAN
- 2-T A SIMPLE METHOD FOR EFFECTIVELY RESTRAINING ELECTROCHEMICAL CORROSION OF POLYCRYSTALLINE SILICON BY HF-BASED SOLUTIONS**
J. Xie^{1,2}, Y.F. Liu^{1,2}, M.L. Zhang¹, J.L. Yang^{1,2}, and F.H. Yang¹
¹*Chinese Academy of Sciences, CHINA* and ²*State Key Laboratory of Transducer Technology, CHINA*
- 3-W ASSEMBLING TECHNIQUE OF THREE DIMENSIONAL MICROSTRUCTURES USING CLIP MECHANISM OF MICROSPRING**
K. Kotani, Y. Kawai, C.-Y. Shao, and T. Ono
Tohoku University, JAPAN
- 4-Th CHARACTERIZATION OF KMPR[®]1025 AS A MASKING LAYER FOR DEEP REACTIVE ION ETCHING OF FUSED SILICA**
T. Ray, H. Zhu, I.S. Elango, and D.R. Meldrum
Arizona State University, USA
- 5-M CRYSTAL ORIENTATION DEPENDENT ETCHING IN RIE AND ITS APPLICATION**
S. Tanaka¹, K. Sonoda^{1,2}, K. Kasai², K. Kanda^{1,2}, T. Fujita^{1,2}, K. Higuchi², and K. Maenaka^{1,2}
¹*University of Hyogo, JAPAN* and ²*Japan Science and Technology Agency (JST), JAPAN*
- 6-T CRYSTALLINE ANISOTROPIC DRY ETCHING FOR SINGLE CRYSTAL SILICON**
T. Mishima, K. Terao, H. Takao, F. Shimokawa, F. Oohira, and T. Suzuki
Kagawa University, JAPAN
- 7-W CURVED SU-8 STRUCTURE FABRICATION BASED ON THE ACID-DIFFUSION EFFECT**
Q. Chen, G. Li, and J. Zhao
Chinese Academy of Sciences, CHINA
- 8-Th DESIGN AND IMPLEMENTATION OF A MINIATURE POLYMER BALL BEARING SLIDE TABLE**
C.-C. Lee, W.-H. Hsiao, and W. Fang
National Tsing Hua University, TAIWAN
- 9-M DIRECT IMMOBILIZATION OF ENZYMES ON COMMON PHOTORESISTS**
N. Thomas, I. Lähdesmäki, and B. Parviz
University of Washington, USA
- 10-T DRY ETCHING OF SINGLE CRYSTAL PMN-PT PIEZOELECTRIC MATERIAL**
J. Agnus, I.A. Ivan, and S. Queste
FEMTO-ST, FRANCE
- 11-W ELECTRON BEAM DIRECT DRAWING ON LIVING CELL**
T. Hoshino and K. Morishima
Tokyo University of Agriculture and Technology, JAPAN

- 12-Th ENHANCED GOLD SERS SIGNALS ON HSR SURFACE EXTRUSIONS GENERATED ON CARBOXYL-RICH POLYSTYRENE BEADS**
H.-Y. Hsieh¹, P.-C. Wang¹, J.-L. Xiao^{2,3}, C.-H. Lee^{2,3}, and F.-G. Tseng^{1,2}
¹National Tsing Hua University, TAIWAN, ²Academia Sinica, TAIWAN, and ³National Yang-Ming University, TAIWAN
- 13-M FABRICATION AND CHARACTERIZATION OF HIGH CURRENT FIELD EMITTERS WITH SILICON BALL-TIP PINS**
B.H. Kim, J.W. Kwon, E.A. Baxter, and S.D. Kovaleski
University of Missouri, USA
- 14-T FABRICATION AND PROPERTIES OF 3D FLEXIBLE PARYLENE-BASED MICROELECTRODE ARRAY WITH SILICON TIPS**
R. Wang, W. Zhao, W. Wang, and Z. Li
Peking University, CHINA
- 15-W FABRICATION OF NANOPOROUS MEMBRANE AND ITS NON LITHOGRAPHIC PATTERNING USING ELECTROSPINNING AND STAMP-THRU-MOLD (ESTM)**
P.F. Jao¹, M. Machado², X. Cheng¹, D.E. Senior¹, G.J. Kim¹, D. Ding², W. Sun², and Y.-K. Yoon^{1,2}
¹University of Florida, USA and ²University at Buffalo, USA
- 16-Th FABRICATION OF SINGLE-CRYSTAL SILICON CARBIDE MEMS/NEMS FOR BIO-SENSING AND HARSH ENVIRONMENTS**
F. Zhao and M.M. Islam
University of South Carolina, USA
- 17-M GROWING A PATTERNED ARRAY OF DOUBLE-ANCHORED ELASTOMERIC MICROWIRES USING LOST-WAX CASTING**
J. Lee and J. Kim
Iowa State University, USA
- 18-T HETEROGENEOUS INTEGRATION TECHNOLOGY FOR COMBINATION OF DIFFERENT WAFER SIZES USING AN EXPANDABLE HANDLE SUBSTRATE**
F. Forsberg, N. Roxhed, G. Stemme, and F. Niklaus
Royal Institute of Technology (KTH), SWEDEN
- 19-W HIGH-ASPECT-RATIO, 3-D MICROMACHINING OF CARBON-NANOTUBE FORESTS BY MICRO-ELECTRO-DISCHARGE MACHINING IN AIR**
M. Dahmardeh¹, W. Khalid², M.S. Mohamed Ali^{1,3}, Y. Choi^{1,4}, P. Yaghoobi¹, A. Nojeh¹, and K. Takahata¹
¹University of British Columbia, CANADA, ²Chalmers University of Technology, SWEDEN, ³Universiti Teknologi Malaysia, MALAYSIA, and ⁴Jungwon University, KOREA
- 20-Th LOW THERMAL-BUDGET SILICON SEALED-CAVITY MICROENCAPSULATION PROCESS**
S. Sedky¹, H. Tawfik¹, A. Abdel Aziz¹, S. ElSaegh¹, A.B. Graham², J. Provine², and R. Howe²
¹American University, Cairo, EGYPT and ²Stanford University, USA
- 21-M MASKLESS FABRICATION OF HIGH ASPECT RATIO STRUCTURES BY COMBINATION OF MICROMOLDING AND DIRECT DRAWING**
J. Kim, S.-J. Paik, P-C Wang, S.-H. Kim, and M.G. Allen
Georgia Institute of Technology, USA
- 22-T MICRO SUCTION CUP ARRAY FOR WET/DRY ADHESION**
N. Thanh-Vinh, H. Takahashi, T. Kan, K. Noda, K. Matsumoto, and I. Shimoyama
University of Tokyo, JAPAN

- 23-W MICRO-ASSEMBLY OF A THREE-DIMENSIONAL TETRAHEDRA BY CAPILLARY FORCES**
J.W. van Honschoten¹, A. Legrain¹, J.W. Berenschot¹, L. Abelmann¹, and N.R. Tas¹
¹University of Twente, THE NETHERLANDS and ²Université de Caen Basse-Normandie, FRANCE
- 24-Th MICRO-CONTACT PRINTED MEMS**
A. Murarka¹, C. Packard², F. Yaul¹, J. Lang¹, and V. Bulovic¹
¹Massachusetts Institute of Technology, USA and ²Colorado School of Mines, USA
- 25-M NOVEL CONDUCTIVE POLYMER MICRO-SPRING CONTACT ARRAY FOR LARGE AREA WOVEN ELECTRONIC TEXTILE**
S. Khumpuang¹, A. Ohtomo¹, N. Shibayama¹, K. Miyake², and T. Itoh²
¹BEANS (Bio Electromechanical Autonomous Nano Systems), JAPAN and ²National Institute of Advanced Industrial Science and Technology, JAPAN
- 26-T PATTERNED CRACKS IN THE BURIED OXIDE LAYER IMPROVE YIELD IN DEVICE RELEASE FROM SOI WAFERS**
G.C. Hill¹, J.I. Padovani¹, B.W. Chui², H.J. Mamin³, D. Rugar³, N. Harjee¹, J.C. Doll¹, and B.L. Pruitt¹
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- 27-W PDMS THROUGH-HOLE FABRICATION BY SOFT LITHOGRAPHY USING CH₄/HE ATMOSPHERIC RF PLASMA SURFACE TREATMENT**
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Z. Dai, X. Yu, H. Zhang, T. Kim, P.V. Braun, and W.P. King
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- 29-M RAPID AND LOW COST GRAYSCALE MASK FABRICATED WITH A MONOCHROME PHOTOGRAPHY PROCESS**
Y.T. Luo, S.M. Kuo, and C.H. Lin
National Sun Yat-Sen University, TAIWAN
- 30-T ROBUST MICROMACHINING OF COMPLIANT MECHANISMS BY NICKEL SILICIDE**
K. Khosraviani, J. Bahari, and A.M. Leung
Simon Fraser University, CANADA
- 31-W SILANE-FREE ATMOSPHERIC-PLASMA SILICON DEPOSITION FOR MEMS DEVICES**
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- 32-Th SIMPLE REMOVAL TECHNOLOGY USING OZONE SOLUTION FOR CHEMICALLY-STABLE POLYMER USED FOR MEMS**
H. Yanagida, S. Yoshida, M. Esashi, and S. Tanaka
Tohoku University, JAPAN
- 33-M FABRICATION OF SHARP TIPS WITH HIGH ASPECT RATIO BY SURFACTANT-MODIFIED WET ETCHING FOR THE AFM PROBE**
B. Tang, K. Sato, H. Tanaka, and M.A. Gosálvez
Nagoya University, JAPAN

- 34-T SOFT POLYMER MEMS**
A.P. Gerratt, M. Tellers, and S. Bergbreiter
University of Maryland, USA
- 35-W STEREOMASK LITHOGRAPHY FOR MULTI-OBJECT BIO-PATTERNING**
S. Zhao, A. Chen, A. Revzin, and T. Pan
University of California, Davis, USA
- 36-Th ULTRA-FINE NANOFABRICATION BY HYBRID OF ENERGETIC ION INDUCED FLUIDIZATION AND STRESS**
C. Li, K. Ding, W.G. Wu, and J. Xu
Peking University, CHINA
- 37-M WAFER-LEVEL CHIP SCALE FLEXIBLE WIRELESS MICROSYSTEM FABRICATION**
T.-Y. Chao and Y.T. Cheng
National Chiao Tung University, TAIWAN
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A.C. Fischer, H. Gradin, S. Braun, S. Schröder, G. Stemme, and F. Niklaus
Royal Institute of Technology (KTH), SWEDEN

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B. Guo¹, L. Wen², P. Helin¹, G. Claes¹, A. Verbist¹, R. Van Hoof¹, B. Du Bois¹, J. De Coster¹, I. De Wolf¹, A. Hadi Shahar¹, Y. Li¹, H. Cui¹, M. Lux¹, G. Vereecke¹, H.A.C. Tilman¹, L. Haspeslagh¹, S. Decoutere¹, H. Osman¹, R. Puers², S. Severi¹, and A. Witvrouw¹
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M. Antelius, A.C. Fischer, F. Niklaus, G. Stemme, and N. Roxhed
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- 43-W SACRIFICIAL MICROCHANNEL SEALING BY GLASS-FRIT REFLOW FOR CHIP SCALE ATOMIC MAGNETOMETER**
K. Tsujimoto, Y. Hirai, K. Sugano, T. Tsuchiya, and O. Tabata
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44-Th UNIVERSAL ADHESIVE-FREE FIT-TO-FLOW MICROFLUIDIC CONNECTIONS

A. Chen and T. Pan
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M. Ito, T. Kuwamura, J. Komoda, and S. Konishi
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51-W CORROSION RESISTANCE CONSOLIDATION OF A DIAPHRAGM TYPE VACUUM SENSOR

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J.-Y. Wang¹, C.-F. Hu¹, C. Hong¹, W.-S. Su², and W. Fang^{1,2}
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A. Garg, V. Ayyaswamy, A. Kovacs, A. Alexeenko, and D. Peroulis
Purdue University, USA
- 55-W ELECTROPLATING PROCESS OF NI-CNTS NANOCOMPOSITE FOR MEMS RESONATOR FABRICATION**
Y.-C. Lee, Y.T. Cheng, and W. Hsu
National Chiao Tung University, TAIWAN
- 56-Th ELECTROSTATIC OSCILLATION OF CNT BUNDLES**
P. Wang^{1,2}, X. Yan³, Y. Jiang¹, W. Li², and L. Lin¹
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E. Hwang and S.A. Bhawe
Cornell University, USA
- 58-T FE-B-NB-ND MAGNETIC METALLIC GLASS THIN FILM FOR MEMS/NEMS STRUCTURE**
T.A. Phan, S.M. Lee, A. Makino, H. Oguchi, and H. Kuwano
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- 59-W FINITE FATIGUE LIFETIME OF SILICON UNDER INERT ENVIRONMENT**
S. Kamiya¹, Y. Ikeda¹, M. Ishikawa¹, H. Izumi¹, J. Gaspar², and O. Paul²
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- 60-Th FRACTURE TOUGHNESS OF SI THIN FILM AT VERY LOW TEMPERATURES BY TENSILE TEST**
T. Ando¹, T. Takumi², S. Nozue², K. Sato²
¹Ritsumeikan University, JAPAN and ²Nagoya University, JAPAN
- 61-M FRICTION, ADHESION, AND WEAR PROPERTIES OF PDMS COATINGS IN MEMS DEVICES**
I. Penskiy, A.P. Gerratt, and S. Bergbreiter
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L. Wang, J. Tang, J. Song, and Q.-A. Huang
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- 63-W LOCAL STRESS ANALYSIS OF SINGLE CRYSTALLINE SILICON RESONATOR USING MICRO RAMAN SPECTROSCOPY**
A. Taniyama¹, Y. Hirai¹, K. Sugano¹, O. Tabata¹, T. Ikehara², and T. Tsuchiya¹
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- 65-M MICROMECHANICAL SENSORS FOR THE MEASUREMENT OF BIOPOLYMER DEGRADATION**
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- 67-W NEAR-CONTACT DAMPING MODEL AND DYNAMIC RESPONSE OF μ -BEAMS UNDER HIGH-G LOADS**
D. Parkos¹, N. Raghunathan², V. Ayyaswamy², A. Alexeenko¹, and D. Peroulis²
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- 68-Th NONLINEAR PIEZORESISTANCE OF SILICON AT LARGE STRESSES**
J. Gaspar, J. Gutmann, B. Lemke, and O. Paul
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- 69-M PARYLENE-C AS A PIEZOELECTRIC MATERIAL**
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- 70-T POLYSILICON-FILLED CARBON NANOTUBE GRASS STRUCTURAL MATERIAL FOR MICROMECHANICAL RESONATORS**
W.-C. Li, Y. Jiang, R.A. Schneider, H.G. Barrow, L. Lin, and C.T.-C. Nguyen
University of California, Berkeley, USA
- 71-W QUALITY FACTOR IMPROVEMENT OF SILICON NITRIDE MICRO STRING RESONATORS**
S. Schmid, B. Malm, and A. Boisen
Technical University of Denmark, DENMARK
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Y. Linzon¹, D. Joe¹, R.A. Barton¹, R.B. Ilic¹, S. Krylov², J.M. Parpia¹, and H.G. Craighead¹
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- 73-M SIMULTANEOUS DUAL-MODE EXCITATION OF PIEZO-ON-SILICON MICROMECHANICAL OSCILLATOR FOR SELF-TEMPERATURE SENSING**
M.J. Dalal, J.L. Fu, and F. Ayazi
Georgia Institute of Technology, USA
- 74-T STRAIN RATE DEPENDENCE OF MECHANICAL PROPERTIES FOR SUB 100 NM-THICK AU FILM USING ELECTROSTATICALLY ACTUATED NANO TENSILE TESTING DEVICE**
H.-J. Oh¹, I. Hanasaki¹, Y. Isono¹, S.-W. Han², and H.-J. Lee²
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- 75-W TUNABLE MECHANICAL PROPERTIES OF SELF-ASSEMBLED SWNT/POLYMER NANOCOMPOSITE FILMS FOR MEMS**
D. Zhang and T. Cui
University of Minnesota, USA

- 76-Th STUDY ON THE RELIABILITY OF THE MECHANICAL SHUTTER UTILIZING ROLL ACTUATORS**
C.-H. Kim and S. Hong
Samsung Electronics Co., Ltd., SOUTH KOREA
- 77-M ULTRATHIN PARYLENE-C SEMIPERMEABLE MEMBRANES FOR BIOMEDICAL APPLICATIONS**
B. Lu, Z. Liu, and Y.-C. Tai
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- 78-T ZR-BASED METALLIC GLASS AS A NOVEL MEMS BONDING MATERIAL**
Y.-C. Lin¹, J. Froemel^{2,3}, P. Sharma¹, A. Inoue¹, M. Esashi¹, and T. Gessner^{1,3}
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IEMN CNRS, FRANCE
- 81-M 6.4 GHZ ACOUSTIC SENSOR FOR IN-SITU MONITORING OF AFM TIP WEAR**
T.J. Cheng¹, J.H. Han², M. Ziwicki², C.H. Lee², and S.A. Bhav¹
¹*Cornell University, USA* and ²*Marquette University, USA*
- 82-T A GAS SENSOR BASED ON VISCOSITY CHANGE OF IONIC LIQUID**
K. Ohsawa, H. Takahashi, K. Noda, T. Kan, K. Matsumoto, and I. Shimoyama
University of Tokyo, JAPAN
- 83-W A NEW BIAxIAL SILICON RESONANT MICRO ACCELEROMETER**
C. Comi¹, A. Corigliano¹, G. Langfelder¹, A. Longoni¹, A. Tocchio¹, and B. Simoni²
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- 84-Th A NOVEL ACCELEROMETER BASED ON CONTACT RESISTANCE OF INTEGRATED CARBON NANOTUBES**
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- 85-M A NOVEL ELECTROSTATICALLY ACTUATED AFM PROBE FOR VIBRO-FLEXURAL MODE OPERATION**
E. Sarajlic¹, M.H. Siekman², H. Fujita³, L. Abelmann², and N. Tas²
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³*University of Tokyo, JAPAN*
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Y.M. Chen, Y.T. Lai, and Y.J. Yang
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- 87-W A RESONANT TUNING FORK FORCE SENSOR WITH UNPRECEDENTED COMBINATION OF RESOLUTION AND RANGE**
K. Azgin¹, C. Ro¹, A. Torrents¹, T. Akin², and L. Valdevit¹
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- 88-Th A SUBNANOWATT MICROBUBBLE PRESSURE SENSOR BASED ON ELECTROCHEMICAL IMPEDANCE TRANSDUCTION IN A FLEXIBLE ALL-PARYLENE PACKAGE**
C.A. Gutierrez and E. Meng
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- 89-M A TACTILE SENSING ARRAY WITH TUNABLE SENSING RANGES USING LIQUID CRYSTAL AND CARBON NANOTUBES COMPOSITES**
Y.-T. Lai¹, W.-C. Kuo², and Y.-J. Yang¹
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- 90-T AN ULTRA-HIGH SENSITIVITY, CAPACITIVE PRESSURE SENSOR USING IONIC LIQUID**
J. Yan and T. Pan
University of California, Davis, USA
- 91-W DETECTING INTERNAL DEFECT OF NON-CERAMIC INSULATORS USING A NOVEL MICROMACHINED ELECTRIC FIELD SENSOR**
C. Peng, P. Yang, S. Liu, H. Zhang, K. Feng, and S. Xia
Chinese Academy of Sciences, CHINA
- 92-Th DEVELOPMENT OF PASSIVE SURFACE ACOUSTIC WAVE GYROSCOPE WITH STANDING WAVE MODE**
H.K. Oh, S.S. Yang, and K. Lee
Ajou University, SOUTH KOREA
- 93-M EFFECT OF QUADRATURE ERROR ON THE PERFORMANCE OF A FULLY-DECOUPLED MEMS GYROSCOPE**
E. Tatar, S.E. Alper, and T. Akin
Middle East Technical University, TURKEY
- 94-T FLEXIBLE DISTRIBUTED CAPACITIVE SENSOR WITH ENCAPSULATED FERROELECTRIC LIQUID**
Y. Hotta¹, Y. Zhang¹, and N. Miki^{1,2}
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- 95-W FREQUENCY MODULATION BASED ANGULAR RATE SENSOR**
S.A. Zotov, I.P. Prihodko, A.A. Trusov, and A.M. Shkel
University of California, Irvine, USA
- 96-Th GALLIUM NITRIDE APPROACH FOR MEMS RESONATORS WITH HIGHLY TUNABLE PIEZO-AMPLIFIED TRANSDUCERS**
M. Faucher¹, Y. Cordier², F. Semond², V. Brandli¹, B. Grimbert¹, A. Ben Amar¹, M. Werquin³,
C. Boyaval¹, C. Gaquière¹, D. Théron¹, L. Buchaillot¹
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- 97-M HEWLETT PACKARD'S SEISMIC GRADE MEMS ACCELEROMETER**
B. Homeijer, D. Lazaroff, D. Milligan, R. Alley, J. Wu, M. Szepesi, B. Bicknell, Z. Zhang,
R.G. Walmsley, and P.G. Hartwell
Hewlett Packard, USA

- 98-T IMPLEMENTATION OF FULLY-DIFFERENTIAL CAPACITANCE SENSING ACCELEROMETER USING GLASS PROOF-MASS WITH SI-VIAS**
Y.-C. Hsu¹, C.-W. Lin¹, C.-M. Sun², C.-P. Hsu¹, Y.-T. Lee¹, M.-H. Tsai¹, Y.-C. Liu¹, and W. Fang¹
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- 99-W LOW POWER 3-AXIS LORENTZ FORCE NAVIGATION MAGNETOMETER**
M.J. Thompson, M. Li, and D.A. Horsley
University of California, Davis, USA
- 100-Th MICROSHUTTERS FOR MEMS-BASED TIME-OF-FLIGHT MEASUREMENTS IN SPACE**
K. Brinkfeldt¹, P. Enoksson², M. Wieser³, S. Barabash³, and M. Emanuelsson³
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- 101-M MODELING AND CHARACTERIZATION OF A CMOS SENSOR WITH SURFACE TRENCHES FOR HIGH-PRESSURE APPLICATIONS**
M. Baumann, P. Ruther, and O. Paul
University of Freiburg - IMTEK, GERMANY
- 102-T NOVEL CONCEPT FOR A MEMS MICROPHONE WITH DUAL CHANNELS FOR AN ULTRAWIDE DYNAMIC RANGE**
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- 103-W OPTIMAL T-SUPPORT ANCHORING FOR BAR-TYPE BAW RESONATORS**
R. Jansen¹, S. Stoffels^{1,2}, X. Rottenberg¹, Y. Zhang³, J. De Coster¹, S. Donnay¹, S. Severi¹, J. Borremans¹, M. Lofrano¹, G. van der Plas¹, P. Verheyen¹, W. de Raedt¹, and H.A.C. Tilmans¹
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Y. Yoshida, Y. Kawai, and T. Ono
Tohoku University, JAPAN
- 105-M PARAMETRIC AMPLIFICATION/DAMPING IN MEMS GYROSCOPES**
M. Sharma, E.H. Sarraf, and E. Cretu
University of British Columbia, CANADA
- 106-T PHOTONIC CRYSTAL BASED ALL-OPTICAL PRESSURE SENSOR**
Y. Lu and A. Lal
Cornell University, USA
- 107-W PIEZORESISTIVITY CHARACTERIZATION OF SILICON NANOWIRES USING A MEMS DEVICE**
Y. Zhang¹, X. Liu^{1,2}, C. Ru^{1,3}, Y. Zhang¹, L. Dong⁴, P. Woo⁵, M. Nakamura⁵, D. Hoyle⁵, I. Cotton⁵, and Y. Sun¹
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- 108-Th SELF-SUSTAINED MICROMECHANICAL RESONANT PARTICULATE MICROBALANCE/COUNTERS**
A. Hajjam, J.C. Wilson, A. Rahafrooz, and S. Pourkamali
University of Denver, USA

- 109-M SI ACOUSTIC DELAY LINES AND THE EFFECT OF CURRENT ON ACOUSTIC WAVE ATTENUATION AND SPEED**
L. Chen and M. Tabib-Azar
University of Utah, USA
- 110-T SILICON-INTEGRATED PHONONIC BANDGAP CRYSTAL PLATFORM FOR SENSORS AND SIGNAL PROCESSING ELEMENTS: THEORY AND EXPERIMENT**
R.C. Norris, J.S. Hamel, and P. Nieva
University of Waterloo, CANADA
- 111-W STOCHASTIC STRAIN SENSOR USING PULL-IN PROBABILITY UNDER WHITE-NOISE-APPLIED BISTABLE STATE WITH RELIABLE PULL-IN RELEASE MECHANISM**
Y. Hatakeyama, M. Esashi, and S. Tanaka
Tohoku University, JAPAN
- 112-Th A THIN FILM PIEZOELECTRIC PVDF-TrFE BASED IMPLANTABLE PRESSURE SENSOR USING LITHOGRAPHIC PATTERNING**
S.-S. Je¹, T. Sharma¹, Y. Lee¹, B. Gill², and J.X. Zhang¹
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- 113-M TOWARDS HIGH-RESOLUTION FLOW CAMERAS MADE OF ARTIFICIAL HAIR FLOW-SENSORS FOR FLOW PATTERN RECOGNITION**
A.M.K. Dagamseh, T.S.J. Lammerink, R. Sanders, R.J. Wiegerink, and G.J.M. Krijnen
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- 114-T UNRAVELING THE VISCOSITY-MEDIATED COUPLING EFFECT IN BIOMIMETIC HAIR SENSOR ARRAYS**
R.K. Jaganatharaja, H. Droogendijk, S. Vats, B. Hagedoorn, C.M. Bruinink, and G.J.M. Krijnen
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- 115-W VERY HIGH STABILITY ACHIEVEMENT IN MEMS BASED AC VOLTAGE REFERENCES**
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- 116-Th WIRELESS TEMPERATURE MICROSENSORS INTEGRATED ON BEARINGS FOR HEALTH MONITORING APPLICATIONS**
S. Scott, A. Kovacs, L. Gupta, J. Katz, F. Sadeghi, and D. Peroulis
Purdue University, USA

PHYSICAL MEMS (OPTICAL, MAGNETO)

- 117-M A MEMS-SOI 3D-MAGNETIC FIELD SENSOR**
H.V. Estrada
CENAM, MEXICO
- 118-T A MICRODISCHARGE-BASED RADIATION DETECTOR UTILIZING STACKED ELECTRODE ARRAYS IN A TO-5 PACKAGE**
C.K. Eun and Y.B. Gianchandani
University of Michigan, USA
- 119-W A THZ DUAL MODE SWITCH USING MEMS SWITCHABLE METAMATERIAL**
W. Zhang¹, W.M. Zhu¹, Y.H. Fu¹, J.F. Tao¹, D.P. Tsai², G.Q. Lo³, D.L. Kwong³, and A.W. Liu¹
¹*Nanyang Technological University, SINGAPORE,* ²*National Taiwan University, TAIWAN,* and ³*Institute of Microelectronics, SINGAPORE*

- 120-Th ALD-METAL UNCOOLED BOLOMETER**
S. Yoneoka¹, M. Liger², G. Yama², R. Schuster², F. Purkl², J. Provine¹, F.B. Prinz¹,
R.T. Howe¹, and T.W. Kenny¹
¹Stanford University, USA and ²Robert Bosch LLC Research and Technology Center, USA
- 121-M BROADBAND TUNABLE 3D METAMATERIALS AT TERAHERTZ FREQUENCIES**
K. Fan, A.C. Strikwerda, H. Tao, R.D. Averitt, and X. Zhang
Boston University, USA
- 122-T FABRICATION AND CHARACTERIZATION OF 3D INTEGRATED
2 DOF MICROMIRROR ARRAYS FOR EXCESSIVE THERMAL LOADS**
Ç. Ataman, S. Lani, W. Noell, F. Jutzi, D. Bayat, and N. de Rooij
Ecole Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND
- 123-W FABRICATION AND CHARACTERIZATION OF SILICON
MICRO MIRROR WITH CNT HINGE**
B.T. Tung¹, V.T. Dau¹, D.V. Dao¹, T. Yamada², K. Hata^{2,3}, and S. Sugiyama¹
¹Ritsumeikan University, JAPAN, ²National Institute of Advanced Industrial Science and Technology (AIST),
JAPAN, and ³Japan Science and Technology Agency (JST), JAPAN
- 124-Th FLUIDIC ZOOM LENS SYSTEM USING TWO SINGLE CHAMBER
ADAPTIVE LENSES WITH INTEGRATED ACTUATION**
J. Draheim, T. Burger, F. Schneider, and U. Wallrabe
University of Freiburg - IMTEK, GERMANY
- 125-M HIDDEN-HINGE MICRO-MIRROR ARRAYS MADE BY HETEROGENEOUS
INTEGRATION OF TWO MONO-CRYSTALLINE SILICON LAYERS**
M.A. Lapisa¹, F. Zimmer², A. Gehner², G. Stemme¹, and F. Niklaus¹
¹Royal Institute of Technology (KTH), SWEDEN and
²Fraunhofer Institute for Photonic Microsystems (IPMS), GERMANY
- 126-T MEMS-BASED WEARABLE LINE-OF-SIGHT DETECTION SYSTEM USING
MICRO-PATTERNED TRANSPARENT OPTICAL SENSORS ON EYEGASSES**
A. Oikawa¹, T. Muro¹, and N. Miki^{1,2}
¹Keio University, JAPAN and ²Japan Science and Technology Agency (JST), JAPAN
- 127-W MEMS-ENABLED MECHANICALLY-TUNABLE 2D PHOTONIC CRYSTAL LENS**
Y. Cui^{1,2}, V.A. Tamma², W. Park², and J.-B. Lee¹
¹University of Texas, Dallas, USA and ²University of Colorado, Boulder, USA
- 128-Th MICRO MIRROR ARRAYS FOR IMPROVED SENSITIVITY
OF THERMOPILE INFRARED SENSORS**
M. Ohira¹, Y. Koyama¹, F. Aita¹, S. Sasaki¹, M. Oba¹, T. Takahata², I. Shimoyama², and M. Kimata³
¹OMRON Corporation, JAPAN, ²University of Tokyo, JAPAN, and ³Ritsumeikan University, JAPAN
- 129-M MICROFABRICATION AND THERMAL BEHAVIOR OF MINIATURE
CESIUM-VAPOR CELLS FOR ATOMIC CLOCK OPERATIONS**
M. Hasegawa¹, R.K. Chutani¹, C. Gorecki¹, R. Boudot¹, P. Dziuban¹, S. Galliou¹, N. Passilly¹,
V. Giordano¹, and A. Jornod²
¹FEMTO-ST, FRANCE and ²Swatch Group Research and Development Ltd, SWITZERLAND
- 130-T MINIATURE WISHBONE INTERFEROMETER USING ROTARY COMB
DRIVE ACTUATOR FOR ENVIRONMENT GAS MONITORING**
Y.M. Lee, M. Toda, M. Esashi, and T. Ono
Tohoku University, JAPAN

- 131-W STABLE, HIGH-Q FABRY-PEROT RESONATORS WITH LONG CAVITY BASED ON CURVED, ALL-SILICON, HIGH REFLECTANCE MIRRORS**
M. Malak¹, N. Pavy¹, F. Marty¹, Y.-A. Peter², A.Q. Liu³, and T. Bourouina¹
¹Université Paris-Est, FRANCE, ²Ecole Polytechnique de Montréal, CANADA, and ³Nanyang Technological University, Singapore, Singapore
- 132-Th THERMOPILE IR DETECTOR WITH FILTER COINTEGRATED BY WAFER BONDING TECHNIQUE**
D.H. Xu, B. Xiong, E.R. Jing, G.Q. Wu, and Y.L. Wang
Chinese Academy of Sciences, CHINA
- 133-M TUNABLE ALL-SILICONE MULTI-CHAMBER ACHROMATIC MICROLENS**
P. Waibel, D. Mader, P. Liebetraut, H. Zappe, and A. Seifert
University of Freiburg - IMTEK, GERMANY
- 134-T ULTRA-COMPACT MICRO-MIRROR WITH POLYMERIC HARD MAGNET FOR USE IN ENDOSCOPIC IMAGING**
N. Weber, D. Hertkorn, H. Zappe, and A. Seifert
University of Freiburg - IMTEK, GERMANY
- 135-W VERY LARGE SCALE HETEROGENEOUS SYSTEM INTEGRATION FOR 1-MEGAPIXEL MONO-CRYSTALLINE SILICON MICRO-MIRROR ARRAY ON CMOS DRIVING ELECTRONICS**
F. Zimmer¹, M. Lapisa², T. Bakke³, M. Bring¹, G. Stemme², and F. Niklaus²
¹Fraunhofer Institute for Photonic Microsystems, GERMANY, ²Royal Institute of Technology (KTH), SWEDEN, and ³SINTEF, NORWAY

RF MEMS

- 136-Th 1 GHZ PHONONIC BAND GAP STRUCTURE IN AIR/ALUMINUM NITRIDE FOR SYMMETRIC LAMB WAVES**
N.-K. Kuo and G. Piazza
University of Pennsylvania, USA
- 137-M 50Ω-TERMINATED 900MHZ MONOLITHIC LATERAL-EXTENSIONAL PIEZOELECTRIC FILTERS ON ULTRANANOCRYSTALLINE DIAMOND**
H. Fatemi¹, B.P. Harrington¹, H. Zeng², J. Carlisle², and R. Abdolvand¹
¹Oklahoma State University, USA and ²Advanced Diamond Technologies, Inc., USA
- 138-T A 4-BIT RF MEMS PHASE SHIFTER MONOLITHICALLY INTEGRATED WITH CONVENTIONAL CMOS**
J. Reinke, L. Wang, G.K. Fedder, and T. Mukherjee
Carnegie Mellon University, USA
- 139-W A HIGH-PERFORMANCE, TEMPERATURE-STABLE, CONTINUOUSLY TUNED MEMS CAPACITOR**
Y. Shim, Z. Wu, and M. Rais-Zadeh
University of Michigan, USA
- 140-Th A NOVEL SI-BASED ANTENNA WITH SUSPENDING AND ELECTROMAGNETIC BAND-GAP STRUCTURES**
I.Y. Huang, K.H. Lin, C.H. Sun, and K.Y. Hsu
National Sun Yat-Sen University, TAIWAN

- 141-M ACTIVE SELF-Q-ENHANCEMENT IN HIGH FREQUENCY THERMALLY ACTUATED M/NEMS RESONATORS**
A. Rahafrooz and S. Pourkamali
University of Denver, USA
- 142-T A ROBUST HIGH POWER-HANDLING (>10 W) RF MEMS SWITCHED CAPACITOR**
I.C. Reines and G.M. Rebeiz
University of California, San Diego, USA
- 143-W IMPROVEMENT IN TEMPERATURE CHARACTERISTICS OF PLATE WAVE RESONATOR USING ROTATED Y-CUT LITAO₃ / SIN STRUCTURE**
H. Kando, M. Watanabe, S. Kido, T. Iwamoto, K. Ito, N. Hayakawa, K. Araki, I. Hatsuda, T. Takano, Y. Nagao, T. Nakao, T. Toi, and Y. Yoshii
Murata Manufacturing, JAPAN
- 144-Th MEMS VARIABLE CAPACITOR WITH SUPERIOR LINEARITY AND LARGE TUNING RATIO BY MOVING THE PLATE TO THE INCREASING-GAP DIRECTION**
C.-H. Han, D.-H. Choi, S.-J. Choi, and J.-B. Yoon
Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA
- 145-M METAL FOIL RF MICRO-RELAY WITH INTEGRATED HEAT SINK FOR HIGH POWER APPLICATIONS**
F.M. Ozkeskin, S. Choi, K. Sarabandi, and Y.B. Gianchandani
University of Michigan, USA
- 146-T PHASE NOISE SHAPING VIA FORCED NONLINEARITY IN PIEZOELECTRICALLY ACTUATED SILICON MICROMECHANICAL OSCILLATORS**
M. Pardo^{1,3}, L. Sorenson¹, W. Pan², and F. Ayazi¹
¹*Georgia Institute of Technology, USA*, ²*Integrated Device Technology, USA*, and ³*Fundación Universidad del Norte, COLOMBIA*
- 147-W QUASI-LINEAR FREQUENCY TUNING FOR CMOS-MEMS RESONATORS**
W.-C. Chen, W. Fang, and S.-S. Li
National Tsing Hua University, TAIWAN
- 148-Th SILICON CARBIDE LATERAL OVERTONE BULK ACOUSTIC RESONATOR WITH ULTRAHIGH QUALITY FACTOR**
M. Ziaei-Moayyed, S.D. Habermehl, D.W. Branch, P.J. Clews, and R.H. Olsson III
Sandia National Laboratories, USA
- 149-M SMALL, LOW-OHMIC RF MEMS SWITCHES WITH THIN-FILM PACKAGE**
O. Wunnicke, H. Kwinten, L. van Leuken-Peters, M. in 't Zandt, K. Reimann, V. Aravindh, H.M.R. Suy, M.J. Goossens, R.A.M Wolters, W.F.A. Besling, J.T.M. van Beek, P.G. Steeneken
NXP Semiconductors, THE NETHERLANDS
- 150-T SYSTEM-LEVEL CHARACTERIZATION OF BIAS NOISE EFFECTS ON ELECTROSTATIC RF MEMS TUNABLE FILTERS**
X. Liu¹, K. Chen¹, L.P.B. Katehi², W.J. Chappell¹, and D. Peroulis¹
¹*Purdue University, USA* and ²*University of California, Davis, USA*
- 151-W TEMPERATURE COMPENSATED SINGLE-DEVICE ELECTROMECHANICAL OSCILLATORS**
A. Hajjam, A. Rahafrooz, and S. Pourkamali
University of Denver, USA

152-Th TUNABLE CAPACITOR SERIES/SHUNT DESIGN FOR INTEGRATED TUNABLE WIRELESS FRONT END APPLICATIONS

D.R. DeReus, S. Natarajan, S.J. Cunningham, and A.S. Morris
Wispry, Inc., USA

BIO AND CHEMICAL MICRO SENSORS AND SYSTEMS

153-M 3D SOLENOIDAL MICROCOIL ARRAYS WITH CMOS INTEGRATED AMPLIFIERS FOR PARALLEL MR IMAGING AND SPECTROSCOPY

V. Badilita¹, K. Kratt¹, N. Baxan², J. Anders³, D. Elverfeld², G. Boero³, J. Hennig², J.G. Korvink¹, and U. Wallrabe¹

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154-T A LOW-MASS HIGH-SPEED μ GC SEPARATION COLUMN WITH BUILT-IN FLUIDIC CHIP-TO-CHIP INTERCONNECTS

K.T.M. Beach, S.M. Reidy, R.J.M. Gordonker, and K.D. Wise
University of Michigan, USA

155-W A MEMS BASED GRAVIMETRIC RESONATOR FOR MASS SENSING APPLICATIONS

E. Bayraktar¹, D. Eroglu¹, A.T. Ciftlik², and H. Kulah¹

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156-Th A MEMS DIFFERENTIAL SCANNING CALORIMETER FOR THERMODYNAMIC CHARACTERIZATION OF BIOMOLECULES

B. Wang and Q. Lin
Columbia University, USA

157-M MICROFABRICATED INTEGRATED SAMPLER-INJECTOR (MISI) FOR MICRO GAS CHROMATOGRAPHY

J.H. Seo, S.K. Kim, E.T. Zellers, and K. Kurabayashi
University of Michigan, USA

158-T A STRETCHABLE MICRO-ELECTRODE ARRAY FOR *IN VITRO* ELECTROPHYSIOLOGY

S. Khoshfetrat Pakazad¹, A.M. Savov², A. van de Stolpe³, S. Braam⁴, B. van Meer¹, and R. Dekker¹
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159-W AN ELECTROCHEMICAL-CANTILEVER PLATFORM FOR HYBRID SENSING APPLICATIONS

L.M. Fischer, S. Dohn, A. Boisen, and M. Tenje
Technical University of Denmark, DENMARK

160-Th AN ELECTRODYANMIC PRECONCENTRATOR-INTEGRATED THERMOELECTRIC BIOSENSOR CHIP FOR CONTINUOUS MONITORING

Y.-H. Choi, D.-H. Kang, S.-I. Yoon, M.-G. Kim, J. Sim, J. Kim, and Y.-J. Kim
Yonsei University, SOUTH KOREA

161-M AN INTEGRATED MICROFLUIDIC SYSTEM FOR DIAGNOSIS AND MULTIPLE SUBTYPING OF INFLUENZA VIRUS

C.-H. Wang, K.-Y. Lien, L.-Y. Hung, H.-Y. Lei, and G.-B. Lee
National Cheng Kung University, TAIWAN

- 162-T BIOFILMS IN HYDROGEL CORE-SHELL FIBERS**
K. Hirayama¹, D. Kiriya^{1,2}, H. Onoe^{1,2}, and S. Takeuchi^{1,2}
¹University of Tokyo, JAPAN and ²Japan Science and Technology Agency (JST), JAPAN
- 163-W DYNAMIC STATES OF ADHERING CANCER CELLS UNDER SHEAR FLOW IN AN ANTIBODY-FUNCTIONALIZED MICROCHANNEL**
X.J. Zheng, L.S.L. Cheung, L. Jiang, J.A. Schroeder, R.L. Heimark, J.C. Baygents, R. Guzman, and Y. Zohar
University of Arizona, USA
- 164-Th EFFECT OF POLYMER THICKNESS ON THE CHEMICAL SENSING BEHAVIOR OF POLYMER-COATED MASS-SENSITIVE DISK RESONATORS**
S. Truax¹, K.S. Demirel^{1,2}, L. Beardslee¹, Y. Luzinova³, B. Mizaikoff⁴, A. Hierlemann⁵, and O. Brand¹
¹Georgia Institute of Technology, USA, ²Texas Instruments, USA, ³Center for Disease Control and Prevention, USA, ⁴Ulm University, GERMANY, and ⁵ETH Zurich, SWITZERLAND
- 165-M ELECTROSTATIC SWITCHING BIOSENSOR – A NOVEL LABEL-FREE DNA DETECTION USING AN ELECTRODE CHARGING TECHNIQUE**
S.-U. Hwang, J.-M. Choi, H.-H. Yang, C.-H. Kim, C. Jung, H.G. Park, Y.-K. Choi, and J.-B. Yoon
Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA
- 166-T FABRICATION OF BIOPROBE INTEGRATED WITH HOLLOW NANONEEDLE FOR CELLULAR FUNCTION ANALYSIS**
T. Shibata¹, N. Kato¹, S. Horiike¹, T. Kawashima¹, M. Nagai¹, T. Mineta², and E. Makino³
¹Toyohashi University of Technology, JAPAN, ²Yamagata University, JAPAN, and ³Hirosaki University, JAPAN
- 167-W FAST PCR UTILIZING BUOYANT CONVECTION IN A DISPOSABLE CHIP**
K.H. Chung, Y.H. Choi, B.K. Kim, and G.Y. Sung
Electronics and Telecommunications Research Institute (ETRI), SOUTH KOREA
- 168-Th FORMATION OF SELF-ACTUATING LIPID TUBES USING MICROFABRICATED PICOLITER NOZZLE ARRAY**
M. Masubuchi¹, T. Toyota^{1,2}, M. Yamada¹, and M. Seki¹
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- 169-M FUNCTIONALIZED MESOPOROUS THIN-FILM DIRECTLY SELF-ASSEMBLED ON RESONANT-CANTILEVERS FOR BATCH-PRODUCIBLE CHEMICAL SENSORS**
H.T. Yu, P.C. Xu, T.G. Xu, and X. Li
Chinese Academy of Sciences, CHINA
- 170-T HIGH-THROUGHPUT AUTOMATED SYSTEM FOR STATISTICAL BIOSENSING EMPLOYING MICROCANTILEVER ARRAYS**
F.G. Bosco¹, C.H. Chen², E.T. Hwu², M. Bache¹, S. Keller¹, and A. Boisen¹
¹Technical University of Denmark, DENMARK and ²Academia Sinica, TAIWAN
- 171-W HIGH-THROUGHPUT SINGLE-CELL PATHOGEN DETECTION ON A DROPLET MICROFLUIDIC PLATFORM**
T.D. Rane¹, H. Zec¹, C. Puleo¹, A.P. Lee², and T.-H. Wang¹
¹Johns Hopkins University, USA and ²University of California, Irvine, USA
- 172-Th SIMPLE MOLDING FABRICATION FOR POLYACRYLAMIDE HYDROGEL**
H. Shibata^{1,3}, Y.J. Heo^{1,2}, and S. Takeuchi^{1,2}
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- 173-M HYDROGEN-BOND-BASED LATERAL INTER-MOLECULAR EFFECT ON SURFACE-STRESS GENERATION FOR CANTILEVER SENSORS**
T.T. Yang, Y. Chen, P.C. Xu, and X.X. Li
Chinese Academy of Sciences, CHINA
- 174-T AN INTEGRATED MECHANOSTIMULATION SYSTEM FOR PROBING ARCHITECTURE BASED CALCIUM SIGNALING IN HUVEC CELLS**
M. Junkin, Y. Lu, P. Deymier, and P.K. Wong
University of Arizona, USA
- 175-W INTEGRATED TOTAL-NO_x-EVALUATION-CHIP FOR SIMULTANEOUS CONVERSION AND DETECTION OF NO_x IN AIR**
S.-I. Yoon, H.-R. Ahn, J. Yoon, S. Song, and Y.-J. Kim
Yonsei University, SOUTH KOREA
- 176-Th LABEL FREE PIEZOELECTRIC DNA SENSOR ARRAY BY SELECTIVE IMMOBILIZATION VIA ELECTROCHEMICAL METHOD**
P. Kao, D. Allara, and S. Tadigadapa
Pennsylvania State University, USA
- 177-M LABEL-FREE ADHESION-BASED CELL SORTER USING OPTIMIZED OBLIQUE GROOVES FOR EARLY CANCER DETECTION**
N.H. Chen, U. Tomita, N. Kasagi, T. Nagamune, and Y. Suzuki
University of Tokyo, JAPAN
- 178-T LIVING CELL FABRIC**
H. Onoe^{1,2}, R. Gojo^{1,2}, Y. Matsunaga^{1,2}, D. Kiriya^{1,2}, M. Kato-Negishi¹, K. Kuribayashi-Shigetomi^{1,2}, Y. Shimoyama¹, and S. Takeuchi^{1,2}
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- 179-W LOW COST MICRO-PLATFORM FOR CULTURING AND STIMULATION OF CARDIOMYOCYTE TISSUE**
L. Oropeza-Ramos¹, A. Macías¹, S. Juárez², A. Falcón¹, A. Torres¹, M. Hautefeuille¹, and H. González¹
¹*Universidad Nacional Autónoma de México, MEXICO and* ²*Instituto Politécnico Nacional, MEXICO*
- 180-Th LOW PRESSURE DROP MICRO PRECONCENTRATORS WITH COBWEB TENAX-TA FILM FOR ANALYSIS OF HUMAN BREATH**
B. Alfeeli^{1,2}, H. Vereb¹, A. Dietrich¹, and M. Agah¹
¹*Virginia Tech, USA and* ²*Kuwait Institute for Scientific Research Scientific, KUWAIT*
- 181-M MEMS BIOSENSOR FOR PARALLEL AND HIGHLY SENSITIVE AND SPECIFIC DETECTION OF HEPATITIS**
H. Urey¹, E. Timurdogan^{1,2}, E. Ermek¹, I.H. Kavakli¹, and B.E. Alaca¹
¹*Koc University, TURKEY and* ²*Massachusetts Institute of Technology, USA*
- 182-T MEMS-ENABLED MULTI-UNIT NEURAL RECORDING FROM DROSOPHILA MELANOGASTER**
O.H. Paydar, A. Chung, D. Niknam, A.O. Fung, B. Matthews, J.W. Judy, M.A. Frye, and D. Markovic
University of California, Los Angeles, USA
- 183-W MICRO BEAD TYPE TEMPERATURE SENSOR WITH RATIOMETRIC FLUORESCENCE DYES ENCAPSULATED BY PARYLENE**
H. Aoki, T. Kan, N. Binh-Khiem, K. Matsumoto, and I. Shimoyama
University of Tokyo, JAPAN

- 184-Th MICROFLUIDIC ORIGAMI FOR POINT-OF-CARE EXTRACTION OF NUCLEIC ACIDS FROM VISCOUS SAMPLES**
A.V. Govindarajan, S. Ramachandran, G.D. Vigil, P. Yager, and K.F. Böhringer
University of Washington, USA
- 185-M MICROFLUIDIC PING PONG FOR CYTOKINE DETECTION**
R.D. Sochol¹, L. Lo¹, R. Ruelos¹, V. Chang¹, D. Bahri¹, K. Iwai¹, J.C. Lo², M. Dueck¹, L.P. Lee¹, and L. Lin¹
¹*University of California, Berkeley, USA* and ²*Sandia National Laboratories, USA*
- 186-T MONITORING IMPULSIONAL PH VARIATIONS IN MICROVOLUMES: A NEW APPROACH FOR THE ELECTROCHEMICAL DETECTION**
A.K. Diallo^{1,2}, L. Mazonq^{1,2}, L. Djeghlaf^{1,2}, J. Launay^{1,2}, W. Sant³, and P. Temple-Boyer^{1,2}
¹*CNRS-LAAS, FRANCE*, ²*Université de Toulouse, FRANCE*, and ³*HEMODIA Company, FRANCE*
- 187-W NANOFLUIDIC CARBON-DIOXIDE SENSOR USING NANOSCALE HYDRONIUM-DOMINATED ION TRANSPORT THEORY**
A.M. Crumrine¹, D. Shah¹, M.B. Andersen², H. Bruus², and S. Pennathur¹
¹*University of California, Santa Barbara, USA* and ²*Technical University of Denmark, DENMARK*
- 188-Th NOVEL TYPE OF MICROCANTILEVER BIOSENSOR RESONATING AT THE INTERFACE BETWEEN LIQUID AND AIR**
J. Park, S. Nishida, H. Kawakatsu, and H. Fujita
University of Tokyo, JAPAN
- 189-M POROUS MICROFLUIDICS: A UNIQUE PLATFORM FOR TRANSVASCULAR STUDY**
H. Borteh, B. Kim, and Y. Zhao
Ohio State University, USA
- 190-T REAL-TIME MONITORING OF CA²⁺ CONCENTRATION IN PANCREATIC BETA CELLS BY A MICROFLUIDIC DEVICE INTEGRATED WITH TOTAL INTERNAL REFLECTION (TIR)-BASED CHIP**
Y. Kitazawa^{1,2}, R. Yokokawa^{1,2}, K. Terao^{2,3}, A. Okonogi^{1,2}, D.V. Dao⁴, S. Sugiyama⁴, I. Kanno¹, and H. Kotera^{1,2}
¹*Kyoto University, JAPAN*, ²*Japan Science and Technology Agency (JST), JAPAN*, ³*Kagawa University, JAPAN*, and ⁴*Ritsumeikan University, JAPAN*
- 191-W REDUCED VISCOUS DAMPING IN HIGH FREQUENCY PIEZOELECTRIC RESONANT NANOCHANNELS FOR SENSING IN FLUIDS**
C. Zuniga, M. Rinaldi, and G. Piazza
University of Pennsylvania, USA
- 192-Th SELECTIVITY ENHANCEMENT STRATEGY FOR CANTILEVER-BASED GAS-PHASE VOC SENSORS THROUGH USE OF PEPTIDE-FUNCTIONALIZED CARBON NANOTUBES**
L.A. Beardslee¹, S. Truax¹, J.H. Lee¹, S. Pavlidis¹, P. Hesketh¹, K.M. Hansen², R. Kramer³, and O. Brand¹
¹*Georgia Institute of Technology, USA*, ²*University of Dayton, USA*, and ³*Wright Patterson Air Force Base, USA*
- 193-M SILICON NANOPILLAR-FOREST BASED MICROFLUIDIC SURFACE-ENHANCED RAMAN SCATTERING DEVICES**
H.Y. Mao, W.G. Wu, Y.L. Zhang, P.P. Lv, C. Qian, J. Xu, and H.X. Zhang
Peking University, CHINA
- 194-T SILICON ULTRASONIC MICROPROBES WITH COLLOCATED AND CONCURRENT STRAIN AND BIO-ELECTRICAL POTENTIAL WIRELESS TRANSMISSION**
C.J. Shen, R.F. Gilmour, Jr., and A. Lal
Cornell University, USA

- 195-W SS-DNA FUNCTIONALIZED ARRAY OF ALN CONTOUR-MODE NEMS RESONANT SENSORS WITH SINGLE CMOS MULTIPLEXED OSCILLATOR FOR SUB-PPB DETECTION OF VOLATILE ORGANIC CHEMICALS**
M. Rinaldi, C. Zuniga, and G. Piazza
University of Pennsylvania, USA
- 196-Th SYNTHESIS OF ¹⁸F-LABELED PROBES ON EWOD PLATFORM FOR POSITRON EMISSION TOMOGRAPHY (PET) PRECLINICAL IMAGING**
S. Chen, P.Y. Keng, R.M. van Dam, and C.-J. Kim
University of California, Los Angeles, USA
- 197-M TRACE EXPLOSIVES DETECTION BY MICRO DIFFERENTIAL THERMAL ANALYSIS**
J. Olsen¹, L. Senesac², T. Thundat³, and A. Boisen¹
¹*Technical University of Denmark, DENMARK*, ²*Oak Ridge National Laboratory, USA*, and ³*University of Alberta, CANADA*
- 198-T VERSATILE MICROFLUIDIC GENERATION OF CHEMICAL CONCENTRATION GRADIENTS IN A FLOW-FREE SETTING**
Y. Zhou and Q. Lin
Columbia University, USA
- 199-W WEIGHING NANOPARTICLES AND VIRUSES USING SUSPENDED NANOCHANNEL RESONATORS**
J. Lee¹, G. Chen², W. Shen³, K. Payer¹, T.P. Burg⁴, W. Rodriguez^{2,5}, M. Toner², and S.R. Manalis¹
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- 200-Th A 3D IMPLANTABLE MICROSYSTEM FOR INTRAOCULAR PRESSURE MONITORING USING A GLASS-IN-SILICON REFLOW PROCESS**
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H. Mansoor¹, H. Zeng², and M. Chiao¹
¹*University of British Columbia, CANADA* and ²*British Columbia Cancer Research Centre, CANADA*
- 202-T A NOVEL PLATINUM NANOWIRE-COATED NEURAL ELECTRODE AND ITS ELECTROCHEMICAL AND BIOLOGICAL CHARACTERIZATION**
Y.-H. Jin¹, P. Daubinger¹, B.L. Fiebich^{2,3}, and T. Stieglitz¹
¹*University of Freiburg - IMTEK, GERMANY*, ²*University of Freiburg Medical Center, GERMANY* and ³*VivaCell Biotechnology GmbH, GERMANY*
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M.S. Nandra¹, I.A. Lavrov², V.R. Edgerton², and Y.-C. Tai¹
¹*California Institute of Technology, USA* and ²*University of California, Los Angeles, USA*
- 204-Th A PENETRATING MICRO-SCALE DIAMETER PROBE ARRAY FOR IN VIVO NEURON SPIKE RECORDINGS**
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- 205-M A VERTICAL MICRO-SCALE LIGHT GUIDING SILICON DIOXIDE TUBE ARRAY FOR OPTICAL NEUROSTIMULATOR**
M. Sakata, A. Goryu, A. Ikedo, T. Harimoto, M. Ishida, and T. Kawano
Toyohashi University of Technology, JAPAN
- 206-T A WIRELESS IMPLANTABLE DRUG DELIVERY DEVICE WITH HYDROGEL MICROVALVES CONTROLLED BY FIELD-FREQUENCY TUNING**
S. Rahimi and K. Takahata
University of British Columbia, CANADA
- 207-W AN IMPLANTABLE BIPOLAR SPINE STIMULATION PROBE WITH BIO-INSPIRED ADHESIVE MICROTUBES**
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University of British Columbia, CANADA
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P. Ledochowitsch¹, R.J. Félus², R.R. Gibboni¹, A. Miyakawa¹, S. Bao¹, and M.M. Maharbiz¹
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- 211-W HYPODERMIC-NEEDLE-LIKE HOLLOW POLYMER MICRONEEDLE ARRAY USING UV LITHOGRAPHY INTO MICROMOLDS**
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Georgia Institute of Technology, USA
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National Tsing Hua University, TAIWAN
- 213-T MULTI-LAYER SIGNAL ENCODED TISSUE CULTURE DEVICE FORMED OF NANO-FIBROUS MICROCAPSULES**
R. Tane¹, M. Ikeuchi², and K. Ikuta²
¹*Nagoya University, JAPAN and* ²*University of Tokyo, JAPAN*
- 214-W NEURAL PROBES INTEGRATED WITH OPTICAL MIXER/SPLITTER WAVEGUIDES AND MULTIPLE STIMULATION SITES**
M. Im¹, I.-J. Cho^{1,2}, F. Wu¹, K.D. Wise¹, and E. Yoon¹
¹*University of Michigan, USA and* ²*Korea Institute of Science and Technology (KIST), SOUTH KOREA*
- 215-Th PHOTOTHERMAL NANOBLADE FOR SINGLE CELL SURGERY**
T.-H. Wu, T. Teslaa, M.A. Teitell, and P.-Y. Chiou
University of California, Los Angeles, USA
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A. Yusof, R. Zengerle, and P. Koltay
University of Freiburg - IMTEK, GERMANY

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Karlsruher Institute of Technology, GERMANY
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Nanyang Technological University, SINGAPORE
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X. Tan¹, H.-J. Yoon², J. Granneman¹, H.-P. Moore², and M.M.-C Cheng¹
¹Wayne State University, USA and ²Lawrence Technological University, USA
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L. Du and J. Zhe
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- 222-W A PERISTALTIC MICROPUMP USING TRAVELING WAVES OF POLYMER MEMBRANES DRIVEN BY A SINGLE ACTUATOR**
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T. Masuda¹, H. Maruyama¹, A. Honda², and F. Arai¹
¹Nagoya University, JAPAN and ²Hosei University, JAPAN
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J.F. Creemer¹, F. Santagata¹, B. Morana¹, L. Mele¹, T. Alan¹, E. Iervolino^{1,2}, G. Pandraud¹, and P.M. Sarro¹
¹Technical University Delft, THE NETHERLANDS and ²Xensor Integration BV, THE NETHERLANDS
- 228-M CENTRIFUGO-MAGNETOPHORETIC SEPARATION AND ROUTING OF PARTICLES**
J. Siegrist, L. Zavattoni, and J. Ducreé
Dublin City University, IRELAND

- 229-T DRIVING MULTILAYER PDMS BASED PERISTALTIC PUMP WITH LASER PULSES**
Y. Chen, T.-H. Wu, and P.-Y. Chiou
University of California, Los Angeles, USA
- 230-W ELECTRICAL CONTROL OF DROPLET DIRECTION WITH PHASE-VARIED FRESNEL LENS ON ACOUSTIC WAVE LIQUID EJECTOR**
L. Wang, Y. Choe, and E.S. Kim
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- 231-Th ELECTRODEFORMATION FOR SINGLE CELL MECHANICAL CHARACTERIZATION**
J. Chen, M. Abdelgawad, L. Yu, N. Shakiba, W.-Y. Chien, Z. Lu, W.B. Geddie, M.A.S. Jewett, and Y. Sun
University of Toronto, CANADA
- 232-M FABRICATION AND CHARACTERIZATION OF PARYLENE C-CAULKED PDMS FOR LOW-PERMEABLE MICROFLUIDICS**
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Peking University, CHINA
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Z.G. Li¹, C.D. Ohl¹, K. Ando¹, J.B. Zhang², and A.Q. Liu¹
¹*Nanyang Technological University, SINGAPORE and*
²*Agency for Science, Technology and Research (A*STAR), SINGAPORE*
- 234-W FINGER-POWERED, PRESSURE-DRIVEN MICROFLUIDIC PUMP**
K. Iwai, R.D. Sochol, and L. Lin
University of California, Berkeley, USA
- 235-Th FULLY INTEGRATED MICRO CORIOLIS MASS FLOW SENSOR OPERATING AT ATMOSPHERIC PRESSURE**
R.J. Wiegerink¹, T.S.J. Lammerink¹, J. Haneveld¹, T.A.G. Hageman¹, and J.C. Lötters^{1,2}
¹*University of Twente, THE NETHERLANDS and* ²*Bronkhorst High-Tech, THE NETHERLANDS*
- 236-M HIGH PRESSURE PUMP AS LAB ON CHIP COMPONENT FOR MICRO-FLUIDIC INTEGRATED SYSTEM**
M. Hiraoka^{1,2}, P. Fiorini², I. Yamashita¹, C. Van Hoof², and M. Op de Beek²
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- 237-T HIGHLY FLEXIBLE, TRANSPARENT AND PATTERNABLE PARYLENE-C SUPERHYDROPHOBIC FILMS WITH HIGH AND LOW ADHESION**
B. Lu¹, J.C.-H. Lin¹, Z. Liu¹, Y.-K. Lee², and Y.-C. Tai¹
¹*California Institute of Technology, USA, and* ²*Hong Kong University of Science and Technology, CHINA*
- 238-W INTEGRATION OF HIGH-EFFICIENCY CAPTURE AND MAGNETO-HYDRODYNAMIC RETRIEVAL OF PARTICLES ON A CENTRIFUGAL MICROFLUIDIC PLATFORM**
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Dublin City University, IRELAND
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T. Sugito, N. Inagaki, M. Shikida, M. Okochi, H. Honda, and K. Sato
Nagoya University, JAPAN
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H. Takao¹, M. Sugiura², M. Ishida², K. Terao¹, T. Suzuki¹, F. Shimokawa¹, and F. Oohira¹
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- 241-T MICROFABRICATED PRESSURE SENSING PARTICLES WITH INTEGRATED RETROREFLECTORS**
S. Chalasani^{1,2}, Y. Xie¹, and C. Mastrangelo¹
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S.R. Green and Y.B. Gianchandani
University of Michigan, USA
- 243-Th MOBILE MICRO SCREW PUMP WITH FLOW SENSING CAPABILITY FOR ON-SITE FLOW CONTROL IN MICROCHANNEL DEVICE**
S. Nakamoto¹, K. Kobayashi¹, M. Ikeuchi², and K. Ikuta²
¹Nagoya University, JAPAN and ²University of Tokyo, JAPAN
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R. Burger, P. Reith, P. Abgrall, G. Kijanka, and J. Ducr e
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K. Kojima and H. Suzuki
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- 246-W PROPELLING MICROOBJECTS USING A STATIONARY DC VOLTAGE**
M. Takinoue¹, H. Onoe¹, D. Kiriya¹, and S. Takeuchi^{1,2}
¹University of Tokyo, JAPAN and ²Japan Science and Technology Agency (JST), JAPAN
- 247-Th SEPARATION AND MANIPULATION OF MICRO-PARTICLES USING OPTICAL IMAGES ON FLEXIBLE POLYMER DEVICES**
S.-J. Lin¹, W. Wang¹, Y.-H. Lin², B.-C. Yeh¹, T.-F. Guo¹, and G.-B. Lee¹
¹National Cheng Kung University, TAIWAN and ²Chang Gung University, TAIWAN
- 248-M RESTORING UNDERWATER SUPERHYDROPHOBICITY WITH SELF-REGULATED GAS GENERATION**
C. Lee and C.-J. Kim
University of California, Los Angeles, USA
- 249-T SENSOR FOR GAS ANALYSIS BASED ON THERMAL CONDUCTIVITY, SPECIFIC HEAT CAPACITY AND THERMAL DIFFUSIVITY**
K. Kliche, S. Billat, F. Hedrich, C. Ziegler, and R. Zengerle
Institute for Micromachining and Information Technology (HSG-IMIT), GERMANY
- 250-W SIGNIFICANT BOILING ENHANCEMENT WITH SURFACES COMBINING SUPERHYDROPHILIC AND SUPERHYDROPHOBIC PATTERNS**
A.R. Betz¹, J.R. Jenkins², C.-J. Kim², and D. Attinger¹
¹Columbia University, USA and ²University of California, Los Angeles, USA
- 251-Th SIMPLE, HIGH-PRECISION, MICROLITER PER MINUTE, FLUID-FLOW SENSOR**
J.M. Lippmann¹ and A.P. Pisano²
¹State University of New York, Buffalo, USA and ²University of California, Berkeley, USA
- 252-M VOLUME CONTROLLED HIGH THROUGHPUT PICOLITER DROPLET GENERATION SYSTEM USING CASCADE MULTI-STAGE SEPARATION CHANNEL**
M. Fujii¹, K. Kawai², D.H. Yoon¹, and S. Shoji¹
¹Waseda University, JAPAN and ²Osaka University, JAPAN

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Y. Hashimoto, I. Hanasaki, and Y. Isono
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King Abdullah University of Science and Technology, SAUDI ARABIA
- 258-W DIRECTIONAL ACOUSTIC UNDERWATER THRUSTER**
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¹Arizona State University, USA and ²University of Southern California, USA
- 259-Th FAST AND ROBUST CANTILEVER SWITCH WITH SUPPRESSED BOUNCING FOR IC APPLICATIONS**
M.-W. Kim, Y.-H. Song, and J.-B. Yoon
Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA
- 260-M HIGH EFFICIENCY WIRELESS ELECTROCHEMICAL ACTUATORS: DESIGN, FABRICATION AND CHARACTERIZATION BY ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY**
R. Sheybani and E. Meng
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M.L. Chan¹, B. Yoxall¹, H. Park¹, Z. Kang², I. Izyumin², J. Chou², M.M. Megens², M.C. Wu², B.E. Boser², and D.A. Horsley¹
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- 262-Th LOW-POWER 3-BIT PIEZOELECTRIC MEMS ANALOG TO DIGITAL CONVERTER**
R. Proie^{1,2}, J.S. Pulskamp¹, R.G. Polcawich¹, T. Ivanov¹, and M. Zaghoul²
¹U.S. Army Research Laboratory, USA and ²George Washington University, USA
- 263-M MAGNETIC ACTUATOR USING INTERACTION BETWEEN MICRO MAGNETIC ELEMENTS**
F. Tsumori¹ and J. Brunne²
¹Kyushu University, JAPAN and ²University of Freiburg - IMTEK, GERMANY

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T.-L. Tang, R. Chen, and W. Fang
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M. Stranczl¹, E. Sarajlic², G.J.M. Krijnen³, H. Fujita⁴, M.A.M. Gijss¹, and C. Yamahata¹
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³*University of Twente, THE NETHERLANDS*, and ⁴*University of Tokyo, JAPAN*
- 267-M NOVEL ELECTROTHERMALLY ACTUATED MAGNETOSTATIC BISTABLE MICRORELAY FOR TELECOMMUNICATION APPLICATIONS**
M. Staab and H.F. Schlaak
Technische Universität Darmstadt, GERMANY
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M. Sato, I. Kanno, H. Kotera, and O. Tabata
Kyoto University, JAPAN
- 269-W SELECTIVE RF WIRELESS CONTROL OF INTEGRATED BULK-MICROMACHINED SHAPE-MEMORY-ALLOY ACTUATORS AND ITS MICROFLUIDIC APPLICATION**
M.S. Mohamed Ali^{1,2}, and K. Takahata¹
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- 270-Th SELF-ENGAGING AND DISENGAGING CONDUCTIVE CMOS-MEMS PROBES**
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- 271-M TELEOPERATED MUSCLE-POWERED MICRO GRIPPER CONTROLLED BY ELECTROMYOGRAM**
K. Kabumoto, K. Toyama, T. Hoshino, and K. Morishima
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- 272-T WAFER-LEVEL MECHANICAL AND ELECTRICAL INTEGRATION OF SMA WIRES TO SILICON MEMS USING ELECTROPLATING**
D. Clausi¹, H. Gradin², S. Braun², J. Peirs¹, D. Reynaerts¹, G. Stemme², and W. van der Wijngaart²
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- 274-Th A SERIES ARRAY OF MICROLITER-SIZED MICROBIAL FUEL CELL**
S. Choi and J. Chae
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- 275-M AN ENERGY-AUTONOMOUS SELF-TUNABLE PIEZOELECTRIC VIBRATOR ENERGY HARVESTING SYSTEM**
C. Eichhorn, R. Tchagsim, N. Wilhelm, G. Biancuzzi, and P. Woias
University of Freiburg - IMTEK, GERMANY
- 276-T CELL-TO-ELECTRODE CONTACT STRUCTURES FOR POWER DENSITY ENHANCEMENTS IN MICROBIAL FUEL CELLS**
S. Inoue^{1,2}, E.A. Parra², A. Higa², and L. Lin²
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- 277-W DESIGN AND FABRICATION OF A NONLINEAR RESONATOR FOR ULTRA WIDE-BANDWIDTH ENERGY HARVESTING APPLICATIONS**
A. Hajati¹, S.P. Bathurst², H.J. Lee², and S.G. Kim²
¹FUJIFILM Dimatix, USA and ²Massachusetts Institute of Technology, USA
- 278-Th ELECTRET ENERGY HARVESTING BASED ON FRINGE ELECTRICAL FIELD CHANGE INSIDE TRENCHED FERROELECTRIC**
T. Takahashi¹, M. Suzuki¹, T. Hirata¹, N. Matsushita¹, R. Yoneya¹, J. Onishi¹, T. Nishida², Y. Yoshikawa², and S. Aoyagi¹
¹Kansai University, JAPAN and ²ROHM Co., Ltd, JAPAN
- 279-M MEMS-COMPATIBLE HIGH-DENSITY TRENCH CAPACITOR WITH ULTRA-CONFORMAL Cu/SiO₂ LAYERS BY SUPERCRITICAL FLUID DEPOSITION**
T. Momose^{1,2}, H. Yamada², Y. Kitamura³, Y. Hattori³, Y. Shimogaki^{1,2}, and M. Sugiyama^{1,2}
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- 280-T NANOSTRUCTURED COPPER MICRO-POST WICKS FOR ADVANCED HEAT PIPES**
Y.S. Nam¹, S. Sharratt¹, and Y.S. Ju^{1,2}
¹University of California, Los Angeles, USA and ²California NanoSystems Institute (CNSI), USA
- 281-W OPTIMUM DESIGN OF A PIEZOELECTRIC MEMS GENERATOR FOR FLUID-ACTUATED ENERGY HARVESTING**
I. Kuehne¹, M. Schreiter¹, H. Seidel², and A. Frey¹
¹Siemens AG, GERMANY and ²University of Saarland, GERMANY
- 282-Th PASSIVE FUEL DELIVERY BASED ON HYDROPHOBIC POROUS SILICON FOR MICRO DIRECT METHANOL FUEL CELLS**
Y.A. Zhou, X.H. Wang, Z.L. Wu, X.M. Wu, and L.T. Liu
Tsinghua University, CHINA
- 283-M ROTATIONAL ENERGY HARVESTER FOR BODY MOTION**
E. Romero¹, M.R. Neuman², and R.O. Warrington^{2,3}
¹University of Turabo, USA, ²Michigan Technological University, USA, and ³University of Michigan, USA
- 284-T UNIFORM NAFION[®] COATED HRA ANODE FOR HIGH PERFORMANCE MICRO DMFC**
Y.-S. Wu¹, R.-G. Wu¹, T.-K. Yeh¹, C.-H. Tsai¹, and F.-G. Tseng^{1,2}
¹National Tsing Hua University, TAIWAN and ²Academia Sinica, TAIWAN

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- 285-W 25 SECOND COCAINE SENSING BY MEMBRANE PROTEIN CHANNEL INTEGRATED IN A MICROFLUIDIC DEVICE**
R. Kawano¹, T. Osaki¹, H. Sasaki¹, M. Takinoue², S. Yoshizawa², and S. Takeuchi^{1,2}
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- 286-Th A TRENCH-TYPE ANTI-WEAR MICROPROBE WITH NANO-SCALE ELECTRIC CONTACTS FOR AFM LAO LITHOGRAPHY**
Y.F. Li¹, Y. Tomizawa¹, A. Koga², G. Hashiguchi³, M. Sugiyama⁴, and H. Fujita⁴
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- 287-M AN UNRELEASED MM-WAVE RESONANT BODY TRANSISTOR**
W. Wang, L.C. Popa, R. Marathe, and D. Weinstein
Massachusetts Institute of Technology, USA
- 288-T CONTROLLED BATCH FABRICATION OF CRYSTALLINE SILICON NANOBEAM-BASED RESONANT STRUCTURES**
A. Rahafrooz and S. Pourkamali
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- 289-W DUAL Q-DOT TRANSPORT ON MICROTUBULE ARRAY WITH POLARITY DEFINED BY NANOTRACKS AND MICROTUBULE MOTILITY CONTROL**
M. Yokokawa^{1,2}, K. Fujimoto¹, M. Kitamura¹, R. Yokokawa^{1,3}, and H. Kotera¹
¹Kyoto University, JAPAN, ²Tsukuba University, JAPAN, and ³Japan Science and Technology Agency (JST), JAPAN
- 290-Th HIGH-PERFORMANCE AND LOW-COST ION SENSITIVE SENSOR ARRAY BASED ON SELF ASSEMBLED GRAPHENE**
B. Zhang and T. Cui
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- 291-M NANO-ELECTROMECHANICAL ZERO-DIMENSIONAL FREESTANDING NANOGAP ACTUATOR**
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- 292-T NANO-ELECTROMECHANICAL RELAYS WITH DECOUPLED ELECTRODE AND SUSPENSION**
R. Parsa¹, M. Shavezipur², W.S. Lee¹, S. Chong¹, D. Lee¹, H.-S.P. Wong¹, R. Maboudian², and R.T. Howe¹
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- 293-W NUMBER OF KINESIN MOLECULES INVOLVED IN A BEAD TRANSPORT MEASURED BY MICROFLUIDICS AND MECHANICAL MODELING**
R. Yokokawa^{1,2}, Y. Sakai¹, A. Okonogi¹, I. Kanno¹, and H. Kotera¹
¹Kyoto University, JAPAN and ²Japan Science and Technology Agency (JST), JAPAN
- 294-Th POLYANILINE NANOFIBER GAS SENSORS BY DIRECT-WRITE ELECTROSPINNING**
D. Chen^{1,2}, X. Guo^{1,2}, Z. Wang¹, P. Wang¹, Y. Chen², and L. Lin¹
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- 295-M SELECTIVE KINESIN AND DYNEIN IMMOBILIZATION AND ELECTRICAL MICROTUBULE MANIPULATION FOR BIDIRECTIONAL MICROTUBULE MOTILITY**
H. Kotake¹, R. Yokokawa^{1,2}, I. Kanno¹, and H. Kotera¹
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- 296-T SILICON CARBIDE PHONONIC CRYSTAL CAVITIES FOR MICROMECHANICAL RESONATORS**
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**297-W VERTICAL INTEGRATION OF ZNO NANOWIRES INTO ASYMMETRIC
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C.-Y.P. Yang and L. Lin
University of California, Berkeley, USA

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**298-Th DESIGN, DEVELOPMENT AND TESTING OF A LOW-COST, HIGH SENSITIVITY SYSTEM FOR
NEURODEGENERATIVE DISEASE DETECTION AND CHARACTERIZATION**

R. Bustamante-Bello, L. Aranzeta-Ojeda, C. Moreno-García, and E. López-Caudana
Tecnológico de Monterrey, MEXICO

299-M ELECTROSTATIC RF-MEMS SWITCH ACTUATION TESTING

J. Mireles, Jr.¹, M. Carreon¹, L. Rodriguez², J. Campbell³, P. Behrendsen³, R. Ambrosio¹, and A. Jimenez¹
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A. Allievi and A. Reyes Carvajal
Buenos Aires Institute of Technology, ARGENTINA

**301-W MULTIPLE THERMAL STIMULATIONS TO CHEMICAL VAPORS DETECTION AND DISTINCTION
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A.C. Gasparetti, R.C. Guido, and F.J. Ramirez Fernandez
University of São Paulo and São Paulo State University, BRAZIL

302-Th REINFORCEMENT OF MEMS R&D IN MEXICO

J. Mireles, Jr.¹, H. Estrada², L. Villa³, R. Murphy⁴, A. Torres⁴, P. Garcia⁵, and V. Castaño⁶
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⁵*Universidad Veracruzana, MEXICO*, and ⁶*Centro de Física Aplicada y Tecnología Avanzada, MEXICO*

303-M X-BAND MEMS CAPACITIVE SWITCH FABRICATED ON MICROWAVE FRIENDLY SUBSTRATE

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