The 17th International Conference
on Solid-State Sensors,
Actuators and Microsystems

Preliminary Program

Executive Committee reserves the right to amend the program if necessary.

Sunday 16 June 2013

17:00 - 19:45 **Registration**

18:30 - 19:45 **Welcome Reception**

Monday 17 June 2013

08:00 - 18:00 **Registration**

08:45 - 09:00 **Welcome Address**
J.R. Morante, General Chair

09:00 - 09:15 **Technical Program Introduction**
Christofer Hierold, Technical Program Chair

09:15 - 09:55 **Plenary I**
Session Chairs: C. Hierold, *ETH Zürich, SWITZERLAND and* R. Zengerle, *University of Freiburg - IMTEK, GERMANY*

M1G.001 **MEMS TECHNOLOGIES IN LIFE SCIENCES**
H.P. Lang, F. Huber, J. Zhang and **Christoph Gerber**
University of Basel, SWITZERLAND

09:55 - 10:35 **Plenary II**
Session Chairs: J. Morante, *University of Barcelona, SPAIN* and O. Tabata, *Kyoto University, JAPAN*

M1G.002 **INTELLIGENT SURFACES FOR CELL SHEET TISSUE ENGINEERING**
Teruo Okano
Tokyo Women's Medical University, JAPAN

10:35 - 11:15 **Break**

11:15 - 11:55 **Plenary III**
Session Chairs: V. Bright, *University of Colorado, Boulder, USA* and C. Hierold, *ETH Zürich, SWITZERLAND*

M2G.001 **HYBRID ORGANIC-INORGANIC FILMS FABRICATED USING ATOMIC AND MOLECULAR LAYER DEPOSITION**
Steven M. George, B.H. Lee, B. Yoon, and S.H. Jen
University of Colorado, USA

11:55 - 12:35 **EUROSENSORS 2012 Fellowship Award Winner**
Session Chairs: I. Barsony, *Hungarian Academy of Sciences, HUNGARY* and M. Fleischer, *Siemens AG, GERMANY*

M2G.002 **METAL OXIDE NANOWIRES CHEMICAL SENSOR: PRESENT STATUS AND FUTURE CHALLENGES**
Elisabetta Comini
University of Brescia, ITALY

12:35 - 12:40 **Eurosensors 2014**
Giorgia Sberveglieri, Conference Chair

12:40 -12:50 **Transducers 2015 Announcement**
Thomas W. Kenny, General Chair & Victor M. Bright, Technical Program Chair

12:50 - 14:15 **Lunch on Own**

14:15 - 16:30 **Poster Session M3P**

Mechanical/Physical Sensors and Microsystems

Accelerometer

M3P.001 **A HIGH ASPECT RATIO MEMS PROCESS WITH SURFACE MICROMACHINED POLYSILICON FOR HIGH ACCURACY INERTIAL SENSING**
A. Geisberger, S. Schroeder, J. Dixon, Y. Suzuki, J. Makwana, and S. Qureshi
Freescale Semiconductor, Inc., USA

M3P.002 **AN ARRAYED MEMS ACCELEROMETER WITH A WIDE RANGE OF DETECTION**
D. Yamane[1], T. Konishi[2], T. Matsushima[2], G. Motohashi[1], K. Kagaya[3], H. Ito[1], N. Ishihara[1], H. Toshiyoshi[3], K. Machida[2], and K. Masu[1]
[1]*Tokyo Institute of Technology, JAPAN,* [2]*NTT Advanced Technology Corporation, JAPAN,* and [3]*University of Tokyo, JAPAN*

M3P.003 **DEVELOPMENT OF ULTRA LOW POWER WIRELESS SENSOR NODE WITH PIEZOELECTRIC ACCELEROMETER FOR HEALTH MONITORING**
H. Okada[1], H. Nogami[1], T. Kobayashi[1], T. Masuda[2], and T. Itoh[1]
[1]*National Institute of Advanced Industrial Science and Technology (AIST), JAPAN* and [2]*University of Tokyo, JAPAN*

M3P.004 **INTEGRATED SENSOR CROSS-SENSITIVITY ANALYSIS**
C.L. Roozeboom[1], J.F. Salgado[2], M.A. Hopcroft[3], and B.L. Pruitt[1]
[1]*Stanford University, USA,* [2]*Cañada College, USA,* and [3]*Hewlett-Packard Labs, USA*

M3P.005 **PIEZOELECTRIC ACCELEROMETER BASED ON MICRO INJECTION MOLDED POLYMERS**
R. Schulze[1], M. Heinrich[1], M. Wegener[2], R. Forke[3], D. Billep[3], and T. Gessner[1,3]
[1]*Chemnitz University of Technology, GERMANY,* [2]*Fraunhofer Institute for Applied Polymer Research (IAP), GERMANY, and* [3]*Fraunhofer Institute for Electronic Nano Systems (ENAS), GERMANY*

Acoustic Sensors

M3P.006 **PIEZOELECTRIC PARYLENE-C MEMS MICROPHONE**
J.Y.-H. Kim[1], Y. Liu[2], N. Scianmarello[2], and Y.C. Tai[2]
[1]*Samsung Electronics Company, SOUTH KOREA* and [2]*California Institute of Technology, USA*

Actuators & Characterization Tools

M3P.007 **A DOUBLE PIEZO – SNAP THROUGH BUCKLING DEVICE FOR ENERGY HARVESTING**
B. Andò[1], S. Baglio[1], A.R. Bulsara[2], V. Marletta[1], I. Medico[1], and S. Medico[1]
[1]*University of Catania, ITALY* and [2]*Space and Naval Warfare Systems Center, USA*

M3P.008 **SILICON NANOTWEEZERS WITH DOUBLE ACTUATION AND EXTENDED STROKE FOR SINGLE CELL STUDIES**
H. Guillou, N. Lafitte, R. Léal, L. Jalabert, T. Fujii, H. Fujita, Y.T. Matsunaga, and D. Collard
University of Tokyo, JAPAN

Gyroscope

M3P.009 **A MICROMACHINED INTEGRATED GYROSCOPE AND ACCELEROMETER BASED ON GAS THERMAL EXPANSION**
S.L. Cai[1], R. Zhu[1], H.G. Ding[1], Y.J. Yang[2], and Y. Su[3]
[1]Tsinghua University, CHINA, [2]13th Research Institute of CETC, CHINA, and
[3]Nanjing University of Science & Technology, CHINA

M3P.010 **AN AUTOMATIC REAL-TIME MODE-MATCHING MEMS GYROSCOPE WITH FUZZY AND NEURAL NETWORK CONTROL**
C.H. He, Q.C. Zhao, D.C. Liu, L.G. Dong, Z.C. Yang, and G.Z. Yan
Peking University, CHINA

Infrared & Magnetic

M3P.011 **A NOVEL CUBIC X-RAY DETECTOR DIODE WITH ISOTROPIC RESPONSE FOR HIGH-ENERGY RADIATION DOSIMETRY**
P. Norlin[1], O. Öberg[1], S. Junique[1], W. Kaplan[1], J. Andersson[1], and G. Nilsson[2]
[1]Acreo Swedish ICT AB, SWEDEN and *[2]ScandiDos AB, SWEDEN*

M3P.012 **FABRICATION OF VANADIUM OXIDE MICROBOLOMETERS ON THIN POLYIMIDE FILMS**
D. De Bruyker and B. Xu
Palo Alto Research Center (PARC), USA

M3P.013 **MEMS LORENTZ FORCE MAGNETIC SENSOR BASED ON A BALANCED TORSIONAL RESONATOR**
M. Li, V.T. Rouf, G. Jaramillo, and D.A. Horsley
University of California, Davis, USA

Pressure & Flow

M3P.014 **A HYDROPHONE USING LIQUID TO BRIDGE THE GAP OF A PIEZO-RESISTIVE CANTILEVER**
N. Minh-Dung, P. Hoang-Phuong, K. Matsumoto, and I. Shimoyama
University of Tokyo, JAPAN

M3P.015 **EXPERIMENTAL CHARACTERIZATION OF A NOVEL SINGLE CHIP FLOW SENSOR WITH AUTOMATIC COMPENSATION OF PRESSURE EFFECTS**
M. Piotto[1], A.N. Longhitano[2], F. Del Cesta[2], and P. Bruschi[2]
[1]National Research Council (CNR), ITALY and *[2]University of Pisa, ITALY*

M3P.016 **INVESTIGATIONS ON PRESSURE SENSORS FOR MEDICAL APPLICATIONS BASED ON FIBER BRAGG GRATINGS**
S. Voigt[1], M. Rothhardt[2], M. Becker[2], and J. Mehner[1]
[1]Chemnitz University of Technology, GERMANY and *[2]Institute for Photonic Technology (IPHT), GERMANY*

Resonant Sensors

M3P.017 **A CMOS MEMS CAPACITIVE RESONANT SENSOR ARRAY UTILIZING A PLL-BASED OSCILLATOR LOOP**
G.-C. Wei and M.S.-C. Lu
National Tsing Hua University, TAIWAN

M3P.018 **HIGH SENSITIVE MASS DETECTION IN LIQUID USING PIEZOELECTRIC GAAS MEMBRANE**
A. Bienaimé, C. Elie-Caille, and T. Leblois
FEMTO-ST Institute, FRANCE

M3P.019 **U-SHAPED, WIRE-BASED OSCILLATORS FOR RHEOLOGICAL APPLICATIONS BRIDGING THE GAP BETWEEN 100 HZ AND 100 KHZ**
M. Heinisch, E.K. Reichel, T. Voglhuber-Brunnmaier, and B. Jakoby
Johannes Kepler University, AUSTRIA

M3P.020 **VISCO-MEMS: THE MEMS-BASED VISCOSITY SENSOR USING DUAL SPIRAL VIBRATING BEAMS**
Y. Yamamoto[1], S. Matsumoto[1], H. Yabuno[2], M. Kuroda[1], T. Yamamoto[1], and S. Choi[1]
[1]*National Institute of Advanced Industrial Science and Technology (AIST), JAPAN* and [2]*Keio University, JAPAN*

Tactile Sensors

M3P.021 **A TACTILE FUNCTION EMBEDDED FLEXIBLE DYNAMIC CURVATURE SENSOR WITH ROTATIONAL SCANNING DETECTION ABILITY**
G.H. Feng and G.Y. Chu
National Chung Cheng University, TAIWAN

M3P.022 **DYNAMIC RESPONSE OF TACTILE SENSOR APPLYING CANTILEVER IN ELASTOMER**
M. Hosono[1], K. Noda[2], K. Matsumoto[2], and I. Shimoyama[2]
[1]*Industrial Research Institute of Shizuoka Prefecture, JAPAN and* [2]*University of Tokyo, JAPAN*

M3P.023 **MICRO-NEEDLE ELECTRODE ARRAY FOR ELECTRO TACTILE DISPLAY**
N. Kitamura[1], J. Chim[1], and N. Miki[1,2]
[1]*Keio University, JAPAN* and [2]*Japan Science and Technology Agency (JST), JAPAN*

Thermometers

M3P.024 **AN ULTRA-LOW POWER SWITCH ARRAY OF TEMPERATURE AND HUMIDITY SENSORS WITH DIRECT DIGITAL OUTPUT**
W. Zhu, Y. Zhang, and N. Yazdi
Evigia Systems, Inc., USA

M3P.025 **ON-SITE MONITORING OF SOIL CONDITION FOR PRECISION AGRICULTURE BY USING MULTIMODAL MICRO-CHIP INTEGRATED WITH EC AND TEMPERATURE SENSORS**
M. Futagawa[1], Y. Ban[2], K. Kawashima[2], and K. Sawada[1,3]
[1]*Toyohashi University of Technology, JAPAN,* [2]*Aichi Agricultural Research Center, JAPAN, and* [3]*Japan Science and Technology Agency (JST), JAPAN*

M3P.026 **SURFACE EMBEDDED TEMPERATURE SENSOR ON TOOL PART FOR REAL TIME INJECTION MOULDING PROCESS MONITORING**

T. Schönberg[1], K. Ruusuvuori[2], B.H. Christensen[3], K. Boivie[4], J.P. Berild[5], H. Ronkainen[2], and L.T. Gellein[4]
[1]Acreo Swedish ICT AB, SWEDEN, [2]VTT, FINLAND, [3]Danish Technological Institute (DTI), DENMARK, [4]SINTEF, and [5]Plasto, NORWAY

Materials, Fabrication & Packaging Technologies

3-D Structures

M3P.027 **BIOCOMPATIBLE MICROFABRICATED MAGNETIC CYLINDERS AS CONTRAST AGENTS FOR MAGNETIC RESONANCE IMAGING**

C. Wang[1], X. Wang[1], S. Anderson[2], and X. Zhang[1]
[1]Boston University, USA and *[2]Boston University Medical Center, USA*

M3P.028 **FABRICATION OF STRESS-INDUCED SELF-ROLLED METAL/INSULATOR BIFILM MICROTUBE WITH MICROMESH WALLS**

K.N. Lee[1], Y.T. Seo[2], J.-M. Kim[3], Y.-K. Kim[2], M.H. Lee[1], and W.K. Seong[1]
[1]Korea Electronics Technology Institute (KETI), SOUTH KOREA, [2]Seoul National University, SOUTH KOREA, and *[3]Chonbuk National University, SOUTH KOREA*

M3P.029 **POST-CMOS ON-CHIP INTEGRATION OF 3D MEMS INDUCTORS USING A NOVEL CHIP EMBEDDING TECHNIQUE**

M.K. Yapici[1], J.M. Hong[2], J. Zou[3], and K. Balareddy[4]
[1]Khalifa University, UAE, [2]Samsung Electronics, SOUTH KOREA, [3]Texas A&M University, USA, and *[4]University of Michigan, USA*

M3P.030 **WATER-SOLUBLE SACRIFICIAL LAYER ENABLES ULTRA LOW-COST LOC INTEGRATION OF MAGNETIC RESONANCE MICROCOILS WITH 100% FILLING FACTOR.**

O.G. Gruschke, R. Kamberger, J. Höfflin, and J.G. Korvink
University of Freiburg - IMTEK, GERMANY

Films & Nanostructures

M3P.031 **ANALYSIS OF COTTON-LIKE SILICA CONTAMINANTS INDUCED BY OXYGEN CONTAINING PLASMA STRIPPING OF ORGANIC STRUCTURES ON SILICON WAFER**

D.D. She, L.R. Zhao, Z.Q. Wang, X.Y. Ma, and W.G. Wu
Peking University, CHINA

M3P.032 **FORMATION OF A $SiO_2/SI_3N_4/SiO_2$ ELECTRET ON A SILICON SUBSTRATE**

M.M. Crain, S. McNamara, and R. Keynton
University of Louisville, USA

M3P.033 **LOW-COST AND FLEXIBLE VEGF SENSORS BASED ON MICROFLUIDIC INDUCED TUNABLE GRAPHENE FILMS**

B. Zhang[1], R. Lezzi[2], and T. Cui[1]
[1]University of Minnesota, USA and *[2]Mayo Clinic, USA*

M3P.034 **A SOI-CMOS COMPATIBLE SMART YARN TECHNOLOGY**

H. Tu and Y. Xu
Wayne State University, USA

Materials Characterization

M3P.035 **EVALUATION OF SILICON FRACTURE STRENGTH DEPENDENCE ON STEALTH DICING LAYERS FOR "CLEAVE-BEFORE-USE" MEMS FREESTANDING CANTILEVER PROBES**
M. Kubota, K. Hosaka, M. Sugiyama, and Y. Mita
University of Tokyo, JAPAN

M3P.036 **NOVEL PARYLENE FABRICATION TECHNOLOGIES FOR MICROFLUIDICS SYSTEMS WITH REDUCED MASS, VOLUME, AND POWER CONSUMPTION**
P. Satsanarukkit[1] and J.J. van Zyl[2]
[1]*California Institute of Technology, USA* and [2]*Jet Propulsion Lab, USA*

M3P.037 **THE PLASTIC AND CREEP BEHAVIOR OF SILICON MICROSTRUCTURE AT HIGH TEMPERATURE**
S.K. Yao, D.H. Xu, B. Xiong, and Y.L. Wang
Chinese Academy of Sciences, CHINA

Packaging

M3P.038 **RELEASE OF MOVING SILICON MICROSTRUCTURES EMBEDDED IN A BONDED MULTI-WAFER STACK USING DRIE**
R.J. Hegert, W. Karl, and A.S. Holmes
Imperial College London, UK

M3P.039 **VERY HIGH ASPECT RATIO THROUGH SILICON VIAS (TSVS) USING WIRE BONDING**
S. Schröder, A.C. Fischer, G. Stemme, and F. Niklaus
KTH Royal Institute of Technology, SWEDEN

M3P.040 **WAFER-TO-WAFER TRANSFER PROCESS OF BARIUM STRONTIUM TITANATE METAL-INSULATOR-METAL STRUCTURES BY LASER PRE-IRRADIATION AND GOLD-GOLD BONDING FOR FREQUENCY TUNING APPLICATIONS**
T. Samoto[1], H. Hirano[1], T. Somekawa[2], K. Hikichi[1], M. Fujita[2], M. Esashi[1], and S. Tanaka[2]
[1]*Tohoku University, JAPAN and* [2]*Institute for Laser Technology, JAPAN*

Patterning Printing & Etching

M3P.041 **HIGHLY UNIFORM AND CONTROLLABLE MICROPATTERNING OF A HYDROGEL ON MICROCANTILEVER SENSORS**
I. Lee and J. Lee
Sogang University, SOUTH KOREA

M3P.042 **MULTILAYER PASSIVE RF MICROFABRICATION USING JET-PRINTED AU NANOPARTICLE INK AND AEROSOL-DEPOSITED DIELECTRIC**
R.C. Roberts and N.C. Tien
University of Hong Kong, HONG KONG

M3P.043 **ULTRA-HIGH ASPECT RATIO TRENCHES IN SINGLE CRYSTAL SILICON WITH EPITAXIAL GAP TUNING**
E.J. Ng, C.-F. Chiang, Y. Yang, V.A. Hong, C.H. Ahn, and T.W. Kenny
Stanford University, USA

Nanoscale Materials, Devices & Fabrication

Bio/Chemical Sensor

M3P.044 **A MICROCALORIMETER WITH IN-SITU SYNTHESIZED NANOTUBE ADSORBER FOR TRACE ENERGETIC SUBSTANCE DETECTION**
W.Z. Ruan, Y.C. Li, Z.M. Tan, and Z.Y. Wang
Tsinghua University, CHINA

M3P.045 **EFFECT OF INTERFACIAL PDNI CONCENTRATION ON TIME RESPONSE OF SI-BASED ELECTRODEPOSITED HYDROGEN SENSORS**
L. Dong[1], C.H. de Groot[1], A. Usgaocar [1], and V. Chavagnac[2]
[1]*University of Southampton, UK* and [2]*Géosciences Environnement Toulouse (GET), FRANCE*

M3P.046 **HYBRID ALIGNED ZINC OXIDE NANOWIRES ARRAY ON CVD GRAPHENE FOR HYDROGEN SENSING**
J.W. Liu[1], J. Wu[1], M.Z. Ahmad[2], and W. Wlodarski[2]
[1]*University of Kansas, USA* and [2]*RMIT University, AUSTRALIA*

M3P.047 **COPPER(II) OXIDE NANOWIRE ARRAY HYDROGEN SENSOR *VIA* FACILE LARGE AREA CONTACT INTEGRATION**
K. Limkrailassiri, A. Kozinda, and L. Lin
University of California, Berkeley, USA

Fabrication

M3P.048 **EFFICIENT TRANSFER OF CARBON NANOTUBES USING AN LOR RESIST SACRIFICIAL LAYER**
V. Döring, T. Süss, and C. Hierold
ETH Zürich, SWITZERLAND

M3P.049 **LARGE AREA METAL NANOWIRE ARRAYS WITH SUBMICRON PITCH AND TUNABLE SUB-20 NM NANOGAPS**
L. Le Thi Ngoc[1], M. Jin[2], A. van den Berg[1], and E.T. Carlen[1]
[1]*MESA+, University of Twente, THE NETHERLANDS and* [2]*South China Normal University, CHINA*

M3P.050 **MULTISITE WIDE-AREA DEPTH TRANSFERS OF NANOPARTICLES INTO A SOFT MATERIAL VIA NANOTIP PROBE ARRAYS**
A. Goryu, R. Numano, M. Ishida, and T. Kawano
Toyohashi University of Technology, JAPAN

Nanodevices

M3P.051 **BOTTOM-UP SILICON NANOWIRE RESONATORS FOR NANOMECHANICAL SENSING: CONTROLLED FABRICATION TECHNOLOGY AND HIGH-SENSITIVITY FREQUENCY MODULATION TRANSDUCTION**
M. Sansa[1], M. Fernandez-Regulez[1], M. Serra-Garcia[1], A. San Paulo[1,2], and F. Perez-Murano[1]
[1]*Instituto de Microelectrónica de Barcelona (IMB), SPAIN and*
[2]*Instituto de Microelectrónica de Madrid, (IMM), SPAIN*

M3P.052 **NANO-DIAMOND VACUUM MEMS FOR RF APPLICATIONS**

N. Heidrich[1], J. Hees[1], V. Zuerbig[1,2], D. Iankov[1,2], W. Pletschen[1], R.E. Sah[1], B. Raynor[1], L. Kirste[1], C.E. Nebel[1], O. Ambacher[1,2], and V. Lebedev[1]
[1]*Fraunhofer Institut für Angewandte Festkörperphysik (IAF), GERMANY and*
[2]*University of Freiburg – IMTEK, GERMANY*

Nanomaterial & Characterization

M3P.053 **A MEMS PLATFORM FOR THE DIELECTROPHORETIC AND THERMOELECTRIC CHARACTERIZATION OF Bi_2Te_3 NANOWIRES**

Z. Wang[1], W. Toellner[3], S.S. Adhikari[1], M. Kroenier[1], D. Kojda[2], R. Mitdank[2], S.F. Fischer[2], K. Nielsch[3], and P. Woias[1]
[1]*University of Freiburg - IMTEK, GERMANY,* [2]*Humboldt-Universität zu Berlin, GERMANY,* and
[3]*Universität Hamburg, GERMANY*

M3P.054 **MICROFLUIDIC SYNTHESIS OF FLUORESCENT MAGNETONANOPARTICLES AND CHARACTERIZATION**

H.J. Joen[1], N. Nguyen Thi[1,2], B.H. Kwon[1], D.T. Lam[2], and J.S. Go[1]
[1]*Pusan National University, SOUTH KOREA and* [2]*Vietnam Academy of Science and Technology, VIETNAM*

M3P.055 **SWITCHABLE WETTING & FLEXIBLE SIC THIN FILM WITH NANOSTRUCTURES**

X.S. Zhang, B. Meng, F.Y. Zhu, W. Tang, and H.X. Zhang
Peking University, CHINA

Chemical Sensors & Microsystems

Chemical Sensors

M3P.056 **DESIGN AND EVALUATION OF MICROHEATER COMBINED QCM ARRAY FOR THERMAL DESORPTION SPECTROSCOPY**

J. Sakai, N. Iida, M. Sohgawa, and T. Abe
Niigata University, JAPAN

M3P.057 **NOVEL FORMAT CHROMATOGRAPHIC COLUMNS FOR IMPROVED OVERALL ANALYTICAL PERFORMANCE**

D.E. Gaddes III, J.L. Westland, F.L. Dorman, and S. Tadigadapa
Pennsylvania State University, USA

M3P.058 **PROPOSITION AND FABRICATION OF AMPLIFIED REDOX SENSOR (ARS) FOR HIGH SENSITIVE CHEMICAL ANALYSIS**

S. Takahashi[1], M. Futagawa[1], M. Ishida[1], and K. Sawada[1,2]
[1]*Toyohashi University of Technology, JAPAN and* [2]*Japan Science and Technology Agency (JST), JAPAN*

Environmental Sensors

M3P.059 **DISPOSABLE COPPER-BASED ELECTROCHEMICAL MICROSENSOR FOR ANALYSIS OF LEAD IN ENVIRONMENTAL SAMPLES**

X. Pei[1], W. Kang[1], W. Yue[1], A. Bange[2], W.R. Heineman[1], and I. Papautsky[1]
[1]*University of Cincinnati, USA* and [2]*Xavier University, USA*

FET Based Gas Sensors

M3P.060 **IDENTIFICATION OF AMMONIA AND CARBON MONOXIDE BASED ON THE HYSTERESIS OF A GAS-SENSITIVE SIC FIELD EFFECT TRANSISTOR**
M. Bastuck[1], C. Bur[1], A. Lloyd Spetz[2], M. Andersson[2], and A. Schütze[1]
[1]Saarland University, GERMANY and *[2]Linköping University, SWEDEN*

Gas Sensors

M3P.061 **BENZENE GAS DETECTION USING A MOSFET-BJT HYBRID MODE OPERATED GATED LATERAL BJT**
H. Yuan[1], H.M. Jeong[2], J.S. Lee[2], B.H. Kang[2], S.H. Yeom[2], S.W. Lee[2], S.H. Kim[2], J.K. Shin[2], and S.W. Kang[2]
[1]Beijing University of Aeronautics and Astronautics, CHINA and [2]Kyungpook National University, SOUTH KOREA

M3P.062 **COMBINED CHEMORESISTIVE AND CHEMOCAPACITIVE MICROSENSOR STRUCTURES**
J.-J. Su[1], L.A. Beardslee[2], and O. Brand[1]
[1]Georgia Institute of Technology, USA and *[2]University at Albany (SUNY), USA*

M3P.063 **EXPLOSIVES DETECTION BY USING 8-MICROCANTILEVER CHIPS WITH SELF-HEATING ELEMENTS MODIFIED WITH EXCHANGED BEA TYPE ZEOLITES**
I. Pellejero[1], A. Peralta[1], M.A. Urbiztondo[1,2], J. Sesé[1], M.P. Pina[1,3], and J. Santamaría[1,3]
[1]Universidad de Zaragoza, SPAIN, [2]Centro Universitario de la Defensa (CUD), SPAIN, and [3]Biomedical Research Networking Centre on Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN), SPAIN

M3P.064 **HIGHLY SENSITIVE WAVEGUIDE SENSOR FACILITATED BY A BROADLY TUNABLE QUANTUM CASCADE LASER**
G. Ramer[1], M. Brandstetter[1], J. Kasberger[2], A. Saeed[3], and B. Lendl[1]
[1]Vienna University of Technology, AUSTRIA, [2]Research Center for Non-Destructive Testing, AUSTRIA, and *[3]Center for Surface- and Nanoanlytics, AUSTRIA*

M3P.065 **POLYANILINE-FUNCTIONALIZED POLYACARBONATE FILTER AS A FLOW-THROUGH GAS SENSOR**
P. Kunzo, P. Lobotka, V. Šmatko, and I. Vávra
Institute of Electrical Engineering SAS, SLOVAKIA

M3P.066 **VOC DETECTION USING AN ALL POLYMER FLEXURAL PLATE WAVE SENSOR**
J. Berring, C. Sielmann, B. Stoeber, and K. Walus
University of British Columbia, CANADA

Humidity Sensors

M3P.067 **A PASSIVE WIRELESS GRAPHENE OXIDE BASED HUMIDITY SENSOR AND ASSOCIATED PORTABLE TELEMETRY UNIT**
C. Zhang, J.Q. Huang, and Q.A. Huang
Southeast University, CHINA

M3P.068 **NOVEL SCREEN PRINTED HUMIDITY SENSOR ON TEXTILES FOR SMART TEXTILE APPLICATIONS**
C. Kutzner[1], R. Lucklum[1], R. Torah[2], S. Beeby[2], and J. Tudor[2]
[1]University Magdeburg, GERMANY and *[2]University of Southampton, UK*

Hydrogen Gas Sensors

M3P.069 **HIGH PERFORMANCE FLEXIBLE HYDROGEN SENSOR BASED ON PD-COATED ZNO NANORODS ON POLYIMIDE TAPE**
T.R. Rashid, D.T. Phan, and G.S. Chung
University of Ulsan, SOUTH KOREA

Nanowire Based Sensors

M3P.070 **GOLD NANOPARTICLE-CARBON NANOWIRE HYBRID INTERDIGITATED ARRAY NANOELECTRODES FOR ENHENCING ELECTROCHEMICAL SIGNAL AMPLIFICATION**
Y. Lim, B. Lee, J. Heo, and H. Shin
Ulsan National Institute of Science and Technology (UNIST), SOUTH KOREA

Bio-Sensors & Bio-Microsystems

Cell Sensing & Manipulation

M3P.071 **A MICROFLUIDIC-BASED PLATFORM FOR *IN-VITRO* STUDIES OF CELL SIGNALING IN BLOOD VESSELS**
R. Riahi, Y. Yang, H. Kim, L. Jiang, P.K. Wong, and Y. Zohar
University of Arizona, USA

M3P.072 **LABEL-FREE BLOOD CELLS SEPARATION AND ENRICHMENT FROM WHOLE BLOOD BY HIGH-THROUGHPUT HYDRODYNAMIC AND INERTIAL FORCE**
R.-G. Wu, H.-C. Tseng, H.-Y. Chang, and F.-G. Tseng
National Tsing Hua University, TAIWAN

M3P.073 **LIVER ON A CHIP: ENGINEERING THE LIVER SINUSOID**
Y.B. Kang, T.R. Sodunke, J. Cirillo, M.J. Bouchard, and H. Noh
Drexel University, USA

M3P.074 **MULTI-STAGE, SOLVENT-CONTROLLED ROUTING FOR AUTOMATED ON-DISC EXTRACTION OF TOTAL RNA FROM BREAST CANCER CELL LINE HOMOGENATE**
J. Gaughran[1], N. Dimov[1], E. Clancy[2], T. Barry[2], T.J. Smith[2], and J. Ducrée[1]
[1]*Dublin City University, IRELAND* and [2]*National University of Ireland, IRELAND*

M3P.075 **SEPARATION OF TUMOR CELLS FROM BRONCHOALVEOLAR LAVAGE FLUID (BALF) VIA MICROGROOVES ENHANCED IMMISCIBLE FILTRATION ASSISTED BY SURFACE TENSION (ME-IFAST)**
Y. Chen[1], J. Zhao[1,2], Y. Liu[1], M. Yuan[1,2], W. Wang[1,3], M. Chu[2], Y. Wang[2], and H. Li[1]
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Fluid Manipulation in Microsystems

M3P.076 **A PNEUMATIC OPEN-SURFACE MICROFLUIDIC PLATFORM FOR DROPLET MANIPULATION**
C.J. Huang, M.S. Ke, and J.T. Yang
National Taiwan University, TAIWAN

M3P.077 **BIO-AMPLIFYING LAB-ON-A-CHIP FOR ANTIPSYCHOTIC CLOZAPINE TREATMENT MONITORING**
H. Ben-Yoav, T.E. Winkler, S.E. Chocron, S.M. Restaino, G.R. Costa, E. Kim, D.L. Kelly, G.F. Payne, and R. Ghodssi
University of Maryland, USA

M3P.078 **FLEXIBLE NEURAL PROBE INTEGRATED MICROCHANNEL AND OPTICAL FIBER FOR MULTIPLE STIMULATION**
B.-Y. Lee[1], J.-Y. Jin[1], J.-H. Park[2], and J. Kim[1]
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M3P.079 **IN SITU PROTEIN SYNTHESIS ON GLASS SUBSTRATE WITH ACOUSTIC MICRODROPLET EJECTOR WITH AIR-CAVITY LENS FORMED BY MICROMACHINED SILICON**
Y. Choe, L. Wang, and E.S. Kim
University of Southern California, USA

M3P.080 **MICROFLUIDIC IMPACT PRINTING (MI-PRINTING) FOR BIOMEDICAL APPLICATIONS**
Y. Ding, E. Huang, K.S. Lam, and T. Pan
University of California, Davis, USA

M3P.081 **SAMPLE LOADING CONSIDERATION FOR NANOFLUIDICS CRYSTAL BASED BIOSENSING**
J. Sang[1], H. Du[1], W. Wang[1,2], M. Chu[1], Y. Wang[1], H. Li[3], H.A. Zhang[1,2], W. Wu[1,2], and Z. Li[1,2]
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Manipulation & Detection of Bacteria

M3P.082 **AUTOMATED RAPID DETECTION OF FOODBORNE PATHOGENS**
A. Bajwa[1], S.T. Tan[2], A.M. Parameswaran[2], and B. Bahreyni[2]
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M3P.083 **CNTS GATED NANOFLUIDIC SYSTEM FOR SINGLE BACTERIUM DETECTION BY GNPS-BASED REDOX SIGNAL AMPLIFICATION**
P.-C. Wen, R.-G. Wu, H.-Y. Chang, and F.-G. Tseng
National Tsing Hua University, TAIWAN

Sensing in Biosystems

M3P.084 **A CMOS MICROMANIPULATION AND CAPACITIVE IMMUNOSENSOR ARRAY TOWARDS SINGLE MAGNETIC MICROBEAD DETECTION**
A.-Y. Chang and M.S.-C. Lu
National Tsing Hua University, TAIWAN

M3P.085 **A NEW REAL TIME BIOMIMETIC MEMBRANE BIOSENSOR BASED ON A CAPACITIVE READOUT ASIC FOR ANTIBIOTICS**
S. Kißler[1], T. Zimmermann[1], S. Pierrat[1], B. Klein[1], S. Schiller[2], and M. Kraft[1]
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M3P.086 **IMPROVED ENZYME IMMOBILAZATION FOR ENHANCED BIOELECTROCATALYTIC ACTIVITY OF CHOLINE SENSOR**

Y.T. Wang, J. Wang, H. Peng, and J.Z. Zhu
East China Normal University, CHINA

M3P.087 **LIGATION-BASED MUTATION DETECTION AND RCA IN SURFACE UN-MODIFIED OSTE+ POLYMER MICROFLUIDIC CHAMBERS**

F. Saharil[1], A. Ahlford[2], M. Kühnemund[2], M. Skolimowski[3], A. Conde[4], M. Dufva[3], M. Nilsson[2], M. Brivio[2], W. van der Wijngaart[1], and T. Haraldsson[1]
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M3P.088 **REAL-TIME ANALYSIS OF GLUTAMATE REGULATED FUNCTION IN NEURONS USING LABEL-FREE POTASSIUM IMAGING SYSTEM**

A. Kono[1], T. Sakurai[1,2], T. Hattori[1,2], K. Okumura[1,2], M. Ishida[1,2], and K. Sawada[1,2]
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Medical Microsystems

M3P.089 **A MICROFLUIDIC SYSTEM WITH VOLUME SENSOR AND DIELECTRIC GLUCOSE SENSOR FOR CONTINUOUS GLUCOSE MONITORING**

D. Li[1], H. Yu[1], X. Huang[2], B. Song[2], Y. Jia[2], Y. Ji[1], N. Li[3], J. Chen[3], K. Xu[1], and Q. Lin[2]
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M3P.090 **ANALYSIS OF CELL RATIO AND DRUG CONCENTRATION INFLUENCE IN FEIGNING LUNG CANCER MODEL**

K.-W. Chang[1], T.-S. Chen[1], S. Sivashankar[1], M.-Y. Chen[1], K.-Y. Lee[2], and C.-H. Liu[1]
[1]National Tsing Hua University, TAIWAN and *[2]Chang Gung Memorial Hospital, TAIWAN*

M3P.091 **FABRICATION OF HOLLOW MICRONEEDLE ARRAYS USING ELECTRODEPOSITION OF METAL ONTO SOLVENT CAST CONDUCTIVE POLYMER STRUCTURES**

I. Mansoor, Y. Liu, U.O. Häfeli, and B. Stoeber
University of British Columbia, CANADA

M3P.092 **FULL INTEGRATION OF A LIVER ASSAY PANEL ON A CENTRIFUGAL MICROFLUIDIC PLATFORM**

C.E. Nwankire, R. Burger, T. O'Connell, T. Glennon, and J. Ducrée
Dublin City University, IRELAND

M3P.093 **MICROMACHINED BIOCOMPATIBLE CATHETER FLOW SENSOR WITH TRENCH STRUCTURE**

T. Matsuyama, Y. Yamazaki, M. Shikida, M. Matsushima, and T. Kawabe
Nagoya University, JAPAN

M3P.094 **TOWARDS A WIRELESS AND FULLY-IMPLANTABLE ECOG SYSTEM**

E. Tolstosheeva, J. Hoeffmann, J. Pistor, D. Rotermund, T. Schellenberg, D. Boll, T. Hertzberg, V. Gordillo-Gonzalez, S. Mandon, D. Peters-Drolshagen, M. Schneider, K. Pawelzik, A. Kreiter, S. Paul, and W. Lang
University of Bremen, GERMANY

Microfluidics

Droplet Based Microfluidics

M3P.095 **FINGER-TRIGGERED DIGITAL MICROFLUIDICS**
C. Peng, C.-J. Kim, and Y.S. Ju
University of California, Los Angeles, USA

Microfluidics

M3P.096 **A MICROFLUIDIC DEVICE TO LOAD MULTIPLE MECHANICAL STIMULATORS WITH DIFFERING STRAIN MAGNITUDES WITH A SINGLE PUMP**
Q. Wang and Y. Zhao
Ohio State University, USA

M3P.097 **AUTONOMOUS MICROFLUIDIC CONTROL BY MIXED POTENTIALS GENERATED ON COMPOSITE METAL ELECTRODES**
K. Kojima, M. Yokokawa, and H. Suzuki
University of Tsukuba, JAPAN

M3P.098 **HYBRID TECHNOLOGY (3D ADDITIVE PRINTING – SILICON - GLASS) MULTILINE EVAPORATIVE CONCENTRATOR FOR WATER QUALITY MONITORING SYSTEM**
W.P. Bula[1,2,3], Y. Takahata[1,2], K. Aritome[1,2], Y. Murakami[1,2], J.G.E. Gardeniers[3], and R. Miyake[1,2]
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[3]*MESA+, University of Twente, THE NETHERLANDS*

M3P.099 **PRESSURE GAIN IN SINGLE-LAYER MICROFLUIDICS DEVICES *VIA* OPTOFLUIDIC LITHOGRAPHY**
C.C. Glick, R.D. Sochol, K.T. Wolf, N. Shahmohhamadi, S. Miller-Hack, V. Jayaprakash, K. Iwai, L.P. Lee, and L. Lin
University of California, Berkeley, USA

M3P.100 **ROBUST MICRODEVICE MANUFACTURING BY DIRECT LITHOGRAPHY AND ADHESIVE-FREE BONDING OF OFF-STOICHIOMETRY THIOL-ENE-EPOXY (OSTE+) POLYMER**
A. Vastesson[1], X. Zhou[1], N. Sandström[1], F. Saharil[1], O. Supekar[2], G. Stemme[1], W. van der Wijngaart[1], and T. Haraldsson[1]
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Microfluidics with Cells

M3P.101 **A NOVEL OXYGEN TENSION PROGRAMMABLE MICROFLUIDIC SYSTEM (oPROMs) FOR *IN VITRO* CELL BIOLOGY STUDIES**
N. Rajan[1], A. Narayan[1], Z. Wu[2], P. Wu[1], C.H. Ahn[2], R.K. Narayan[1], and C. Li[1]
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M3P.102 **CONFOCAL LASER SCANNING MICROSCOPIC OBSERVATION OF DEFORMATION, BIOLOGICAL REACTION, AND CONTACT OF CELLS USING MECHANICAL TRAPPING SYSTEM WITH PARYLENE MICRO FILTER**
Y. Abe[1,3], K. Kamiya[1], T. Osaki[1], R. Kawano[1], N. Miki[3], and S. Takeuchi[1,2]
[1]*Kanagawa Academy of Science and Technology, JAPAN,* [2]*University of Tokyo, JAPAN, and*
[3]*Keio University, JAPAN*

M3P.103 **WELL-BASED MICROFLUIDIC CHIP FOR MONITORING NON-CONTACTING CELL-TO-CELL INTERACTIONS THROUGH MICROCHANNEL**

M. Jeon[1], H.J. Tak[1], Y.K. Kim[1], E.-S. Yoon[1], S. Shin[2], and I.J. Cho[1]
[1]*Korea Institute of Science and Technology, SOUTH KOREA* and [2]*Korea University, SOUTH KOREA*

Composite Materials/Polymers, Devices & Fabrication

M3P.104 **ALIGNED ELECTROSPUN PVDF-TrFE NANOFIBERS FOR FLEXIBLE PRESSURE SENSORS ON CATHETER**

T. Sharma[1], J. Langevine[1], S. Naik[1], K. Aroom[2], B. Gill[2], and J.X.J. Zhang[1]
[1]*University of Texas, Austin, USA* and [2]*University of Texas Health Science Center, USA*

M3P.105 **FABRICATION OF HYDROGEL PARTICLES WITH TANTALUM OXIDE NANOPARTICLE PAYLOADS AS COMPUTED TOMOGRAPHY CONTRAST AGENTS**

X. Wang[1], C. Wang[1], S. Anderson[2], and X. Zhang[1]
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M3P.106 **LAB ON A SOFT ROBOT: ELECTRICALLY CONTROLLED TUNING FORK SHAPED IPMC CLAMPING ACTUATOR WITH ULTRASONIC IMAGING AND DISPLACEMENT SELF-DETECTING CAPABILITIES**

G.-H. Feng and W.-L. Huang
National Chung Cheng University, TAIWAN

M3P.107 **TUNABLE DIELECTRIC CONSTANTS AND MECHANICAL PROPERTIES OF PDMS AND CONDUCTING POLYMER NANOWIRE COMPOSITES**

P. Du, X. Lin, and X. Zhang
Boston University, USA

Energy & Power MEMS

Electro Chemical Energy Storage

M3P.108 **IN-SITU NANOMECHANICAL CHARACTERIZATION OF ELECTROCHEMICAL CYCLES IN LITHIUM ION BATTERIES**

J.H. Yang, J.C.M. Chen, and M.M.C. Cheng
Wayne State University, USA

Electro Static/Electret Harvesters

M3P.109 **ELECTROSTATIC MICRO TRANSFORMER USING POTASSIUM ION ELECTRET FORMING ON A COMB-DRIVE ACTUATOR**

H. Hayashi[1], M. Suzuki[1], A. Mori[1], T. Sugiyama[2], and G. Hashiguchi[2]
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Harvesting Energy from Mechanical Vibrations

M3P.110 **A COUPLED BISTABLE STRUCTURE FOR BROADBAND VIBRATION ENERGY HARVESTING**

D. Zhu and S.P. Beeby
University of Southampton, UK

M3P.111 **AN EFFICIENT INTEGRATED INTERFACE ELECTRONICS FOR ELECTROMAGNETIC ENERGY HARVESTING FROM LOW VOLTAGE SOURCES**
H. Uluşan, K. Gharehbaghi, Ö. Zorlu, A. Muhtaroğlu, and H. Külah
Middle East Technical University (METU), TURKEY

M3P.112 **DIRECTLY AND PARAMETRICALLY EXCITED BI-STABLE VIBRATION ENERGY HARVESTER FOR BROADBAND OPERATION**
Y. Jia and A.A. Seshia
University of Cambridge, UK

M3P.113 **TRI-STABLE BEHAVIOR IN MECHANICAL OSCILLATORS TO IMPROVE THE PERFORMANCE OF VIBRATION ENERGY HARVESTERS**
C. Trigona, F. Maiorca, B. Andò, and S. Baglio
University of Catania, ITALY

Magnetic Sensors/Voltage Sensors

M3P.114 **A MEMS TORSIONAL RESONANT MAGNETOMETER FOR THE ATTITUDE DETERMINATION IN SPACE**
D.H. Ren, M.Y. Cui, L.Q. Wu, T.W. Guo, C.T. Xu, and Z. You
Tsinghua University, CHINA

M3P.115 **A THIN FILM PASSIVE MAGNETIC FIELD SENSOR OPERATED AT 425 MHZ**
B. Li and J. Kosel
King Abdullah University of Science and Technology, SAUDI ARABIA

Microfuel Cells

M3P.116 **ON DEMAND MICRO-FUEL-DROPLETS SUPPLY SYSTEM FOR SELF-SUSTAINED DIRECT METHANOL FUEL CELL**
T.-W. Liu[1], W. Ling[2], Y.-C. Su[1], S.-H. Liang[2], C.-H. Tai[2], and F.-G. Tseng[1,3]
[1]*National Tsing Hua University, TAIWAN,* [2]*Industrial Technology Research Institute (ITRI), TAIWAN, and* [3]*Academia Sinica, TAIWAN*

Piezo/Pyro Electric Energy Harvester

M3P.117 **LEAD-FREE PIEZOELECTRIC MEMS ENERGY HARVESTERS OF STAINLESS STEEL CANTILEVERS**
Y. Tsujiura[1], E. Suwa[1], H. Nida[1], K. Suenaga[2], K. Shibata[2], and I. Kanno[1]
[1]*Kobe University, JAPAN* and [2]*Hitachi Cable, Ltd., JAPAN*

Thermoelectric Thermal Energy Harvesters

M3P.118 **EXPLORING SCREEN PRINTING TECHNOLOGY ON THERMOELECTRIC ENERGY HARVESTING WITH PRINTING COPPER-NICKEL AND BISMUTH-ANTIMONY THERMOCOUPLES**
Z. Cao, E. Koukharenko, R.N. Torah, and S.P. Beeby
University of Southampton, UK

M3P.119 **SILICON-BASED THERMOGENERATOR FOR WIDE TEMPERATURE RANGE APPLICATIONS EMBEDDED USING METAL-SPRAY-DEPOSITION**

A. Ibragimov[1], V. Uhlenwinkel[2], N. Ellendt[2], L. Mädler[2], and W. Lang[1]
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M3P.120 **TWO-LAYER PROCESS FOR A MICRO THERMOELECTRIC CROSS-PLANE GENERATOR WITH ELECTROPLATING AND REFLOW SOLDERING**

R. Roth, R. Rostek, G. Lenk, M. Kratschmer, K. Cobry, and P. Woias
University of Freiburg - IMTEK, GERMANY

RF MEMS, Resonators & Oscillators

Resonators Oscillators

M3P.121 **A LOW PHASE-NOISE PIERCE OSCILLATOR USING A PIEZOELECTRIC-ON-SILICA MICROMECHANICAL RESONATOR**

Z.Z. Wu, V.A. Tharkar, A. Peczalski, and M. Rais-Zadeh
University of Michigan, USA

M3P.122 **DIGITALLY PROGRAMMABLE RESONATOR BY PZT-SOI PROCESS**

N. Lafitte[1], T. Takahashi[1], M. Tani[2], M. Akamatsu[2], Y. Yasuda[2], H. Fujita[1], and H. Toshiyoshi[1]
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M3P.123 **HIGHER-ORDER LAMÉ-MODE SQUARE MICRORESONATOR WITH IMPROVED QUALITY FACTOR AND f-Q PRODUCT**

M.A. Rasouli, M.S. HajHashemi, and B. Bahreyni
Simon Fraser University, CANADA

M3P.124 **MECHANICAL COUPLING OF DUAL BREATHE-MODE RING RESONATOR**

Y. Yang, E.J. Ng, C.H. Ahn, V.A. Hong, E. Ahadi, and T.W. Kenny
Stanford University, USA

M3P.125 **SEGMENTED ELECTRODE EXCITATION OF ALUMINUM NITRIDE CONTOUR MODE RESONATORS TO OPTIMIZE THE DEVICE FIGURE OF MERIT**

C. Cassella, J. Segovia-Fernandez, and G. Piazza
Carnegie Mellon University, USA

RF MEMS Waveguides

M3P.126 **100 GHZ SOI GAP WAVEGUIDES**

S. Rahiminejad[1], A. Algaba Brazález[1], H. Raza[1], E. Pucci[1], S. Haasl[2], P.-S. Kildal[1], and P. Enoksson[1]
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M3P.127 **LEADING AND TRAILING EDGE HOT SWITCHING DAMAGE IN A METAL CONTACT RF MEMS SWITCH**

A. Basu, R. Hennessy, G. Adams, and N. McGruer
Northeastern University, USA

Optical MEMS

Infrared Devices

M3P.128 **INDIRECT WAVELENGTH SELECTIVE INFRARED MICRO-EMITTER USING SURFACE PLASMON POLARITON FOR GAS SENSING**

T. Sawada[1], S. Kumagai[1], K. Masuno[2], M. Ishii[2], S. Uematsu[2], and M. Sasaki[1]
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Micro Lenses

M3P.129 **TUNABLE HYDROGEL MICROLENS WITH BUILT-IN POLYMER WAVEGUIDE AND FIBER CLAMP FOR MEMS APPLICATIONS**

T. Guan, F. Ceyssens, and R. Puers
Katholieke Universiteit Leuven, BELGIUM

Mirrors

M3P.130 **A TIP-TILT-PISTON PIEOELECTRIC SCANNING MICROMIRROR WITH FOLDED PZT UNIMORPH ACTUATORS**

W. Liao[1], W. Liu[2], J.E. Rogers[1], Y. Tang[2], B. Wang[2], and H. Xie[1]
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Optical Devices

M3P.131 **DOUBLE-LAYER WIRE GRID POLARIZER FOR IMPROVING EXTINCTION RATIO**

A. Isozaki[1], T. Kan[1], K. Takano[2], M. Hangyo[2], K. Matsumoto[1], and I. Shimoyama[1]
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Optical Switches/Splitters

M3P.132 **WAFER-LEVEL FABRICATED MICRO BEAM SPLITTER BASED ON 45-DEGREE SAW DICING OF GLASS SUBSTRATE**

S. Bargiel[1], M. Baránski[1], N. Passilly[1], B. Guichardaz[1], E. Herth[1], C. Gorecki[1], C. Jia[3], J. Frömel[2], and M. Wiemer[2]
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Tera Hertz & Plasmonic Devices

M3P.133 **A TUNABLE MEMS THZ WAVEPLATE BASED ON ISOTROPICITY DEPENDENT METAMATERIAL**

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Actuators

M3P.134 **INDIVIDUALLY CONTROLLED CONDUCTING POLYMER TRI-LAYER MICROACTUATORS**

E.W.H. Jager[1], N. Masurkar[1], N.F. Nworah[1], B. Gaihre[2], G. Alici[2], and G.M. Spinks[2]
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M3P.135 **IMPROVEMENT OF HOT SWITCHING LIFETIME IN MEMS DC SWITCHES USING A DRAIN VOLTAGE-SUSTAINING CAPACITOR**
Y.-H. Song, M.-W. Kim, S.-J. Ahn, and J.-B. YOON
Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA

M3P.136 **MECHANICAL PROPERTIES ANALYZER FOR NANO-SIZE PROTEIN WITH OPTICALLY DRIVEN NANO-BEAM**
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M3P.137 **NOMALLY-CLOSE VALVE INTEGRATION FOR PNEUMATIC ACTUATORS**
K. Kawai, J. Uchikoshi, K. Arima, and M. Morita
Osaka University, JAPAN

Theory, Design & Test Methodology

Fluidic Design & Test

M3P.138 **A NEW METHOD TO DETERMINE THE INTERNAL PRESSURE AND LEAKAGE RATE OF MEMS PACKAGES**
B. Wang[1,2], J. De Coster[1], A. Witvrouw[2], S. Simone[1], M. Wevers[2], and I. De Wolf[1,2]
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Physical MEMS Design

M3P.139 **CALIBRATION METHOD FOR A NEW HIGH-G ACCELEROMETER**
R. Kuells, H. Dessonet, C. Bohland, S. Nau, and K. Thoma
Ernst-Mach-Institut (EMI), GERMANY

M3P.140 **MICROWAVE REFLECTOMETRY: A HIGH-RESOLUTION TECHNIQUE FOR MEASURING VIBRATION OF CAPACITIVE MICRORESONATORS**
B. Legrand[1], D. Ducatteau[1], D. Théron[1], B. Walter[1], and H. Tanbakuchi[2]
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M3P.141 **RELIABILITY OF ANCHORS AT SURFACE MICROMACHINED DEVICES IN SHOCK ENVIRONMENTS**
M. Naumann[2], O. Dietze[1], A. McNeil[2], J. Mehner[1], and S. Daniel[2]
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Switch Design, Simulation & Test

M3P.142 **DESIGN AND TESTING OF A NEW MEMS CONTACT ELEMENT FOR MICROELECTRONIC PROBING BASED ON THE BUCKLING BEAM PRINCIPLE**
M. Schnaithmann[1], J. Sägebarth[1], H. Sandmaier[1], P. Vlachakis[2], G. Steidle[2], A. Weiland[2], J. Seekamp[2], G. Böhm[2], and W. Schäfer[2]
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M3P.143 **OPERATION PRINCIPLES OF MICRO-PLASMA FIELD EFFECT TRANSISTOR**
Y. Zhang, P. Pai, F.K. Chowdhury, and M. Tabib-Azar
University of Utah, USA

Late News

M3P.144 **A GAP-CLOSING ELECTROSTATIC ACTUATOR WITH A LINEAR EXTENDED RANGE**
B. Rivlin, S. Shmulevich, I. Hotzen, and D. Elata
Technion - Israel Institute of Technology, ISRAEL

M3P.145 **A TRANSCONDUCTIVE GRAPHENE PRESSURE SENSOR**
A.M. Hurst[1,2], S. Lee[1], N. Petrone[1], J. VanDeWeert[2], A.M. van der Zande[1], and J. Hone[1]
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M3P.146 **CARBON NANOTUBE/TiO_2 NANOTUBE HYBRID FILMS AS RESISTIVE GAS SENSORS**
I. Sayago[1], M. Aleixandre[1], M.C. Horrillo[1], R. Garriga[2], A. Kukovecz[3], and E. Muñoz[1]
[1]Spanish Council for Scientific Research (CSIC), SPAIN, [2]Universidad de Zaragoza, and [3]University of Szeged, HUNGARY

M3P.147 **FREQUENCY SCALING OF CATHETER-BASED MAGNETO-INDUCTIVE MR IMAGING DETECTORS**
R.R.A. Syms[1], I.R. Young[1], and M. Rea[2]
[1]Imperial College London, UK and [2]Imperial College Healthcare NHS Trust, UK

M3P.148 **IMMOBILIZATION METHOD OF *ESCHERICHIA COLI* FOR MICROFLUIDIC APPLICATION**
I. Kim[1], T. An[2], W. Choi[1], C.S. Kim[1], H.J. Cha[1], and G. Lim[1]
[1]Pohang University of Science and Technology (POSTECH), SOUTH KOREA and [2]Andong National University, SOUTH KOREA

16:00 - 16:30 **Break & Exhibit Inspection**

Session M4A - Accelerometers
Session Chairs: T. Akin, *Middle East Technical University (METU), TURKEY* and K. Sawada, *Toyohashi University of Technology, JAPAN*

16:30 - 17:00 **Invited Speaker**
M4A.001 **ROAD TO ULTRA LOW COST MULTI-SENSOR INTEGRATION**
Y. Zhao and Y. Cai
MEMSIC, Inc., USA

17:00 - 17:15
M4A.002 **HERMETICALLY ENCAPSULATED DIFFERENTIAL RESONANT ACCELEROMETER**
D.L. Christensen, C.H. Ahn, V.A. Hong, E.J. Ng, Y. Yang, B.J. Lee, and T.W. Kenny
Stanford University, USA

17:15 - 17:30
M4A.003 **A FULLY-DIFFERENTIAL, MULTIPLEX-SENSING INTERFACE CIRCUIT MONOLITHICALLY INTEGRATED WITH TRI-AXIS PURE OXIDE CAPACITIVE CMOS-MEMS ACCELEROMETERS**
Y.-C. Liu[1], M.-H. Tsai[2], S.-S. Li[1], and W. Fang[1]
[1]National Tsing Hua University, TAIWAN and [2]PixArt Imaging Inc., TAIWAN

17:30 - 17:45
M4A.004 **SENSING ELECTRODES WITH NANOPOROUS ANODIC ALUMINUM OXIDE FOR PERFORMANCE ENHANCEMENT OF CMOS-MEMS ACCELEROMETER**
C.-I. Chang[1], M.-H. Tsai[2], P.-H. Lo[1], J.-H. Yeh[1], Y.-C. Liu[1], C.-M. Sun[2], C. Hong[1], and W. Fang[1]
[1]National Tsing Hua University, TAIWAN and *[2]PixArt Imaging Inc., TAIWAN*

17:45 - 18:00

M4A.005 **X-Y AND Z-AXIS CAPACITIVE ACCELEROMETERS PACKAGED IN AN ULTRA-CLEAN HERMETIC ENVIRONMENT**

V.A. Hong, B.J. Lee, D.L. Christensen, D.B. Heinz, E.J. Ng, C.H. Ahn, Y. Yang, and T.W. Kenny

Stanford University, USA

18:00 - 18:15

M4A.006 **A SILICON MICROSEISMOMETER FOR MARS**

W.T. Pike[1], I.M. Standley[2], and S. Calcutt[3]

[1]*Imperial College London, UK,* [2]*Kinemetrics, Inc., USA,* and [3]*University of Oxford, UK*

18:15 - 18:30

M4A.007 **THRESHOLD SHOCK SENSOR BASED ON BI-STABLE MECHANISM**

A. Frangi[1], B. De Masi[1], F. Confalonieri[1], and L. Baldasarre[2]

[1]*Politecnico di Milano, ITALY* and [2]*STMicroelectronics, ITALY*

Session M4B - Bio-Microsystems

Session Chairs: J. Ducrée, *Dublin City University, IRELAND* and S. Shoji, *Waseda University, JAPAN*

16:30 - 17:00 **Invited Speaker**

M4B.001 **SINGLE-MOLECULE COUNTING OF BIOMOLECULES WITH FEMTOLITER DROPRET CHAMBER ARRAY**

H. Noji

University of Tokyo, JAPAN

17:00 - 17:15

M4B.002 **SINGLE MOLECULE ENZYMOLOGY USING CARBON NANOTUBE CIRCUITS**

Y. Choi, P.C. Sims, T. Olsen, O.T. Gul, B.L. Corso, M. Iftikhar, G.A. Weiss, and P.G. Collins

University of California, Irvine, USA

17:15 - 17:30

M4B.003 **THREE DIMENSIONAL LOBULE-MIMETIC REGENERATION IN VITRO BY PEGDA-BASED CELL SHEETS**

Y.S. Chen, L.Y. Ke, C.K. Tung, C.H. Lu, C.C. Hu, and C.H. Liu

National Tsing Hua University, TAIWAN

17:30 - 17:45

M4B.004 **MEMBRANE MICROCHANNEL MADE OF COLLAGEN WITH SELF-ASSEMBLED MICRO FIBRIL STRUCTURES FOR TISSUE ENGINEERING**

M. Ikeuchi[1,2] and K. Ikuta[1]

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

17:45 - 18:00

M4B.005 **REAL-TIME 3D FORCE/POSITION SENSING SYSTEM BY A SINGLE CCD FOR OPTICALLY DRIVEN MICRO-ROBOT**

N. Shimada[1], K. Asano[2], M. Ikeuchi[1,3], and K. Ikuta[2]

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

18:00 - 18:15

M4B.006 **HIGH TEMPERATURE MICRO FLOW CONTROL DEVICE FOR MEMS ENABLED CHOPPER STABLIZED GAS CHROMATOGRAPHY - ELECTROANTENNOGRAPHY (MEMS-GC-EAG)**

M.-D. Zhou, A.J. Myrick, W.J. Khan, X. Gao, T.C. Baker, and S.-Y. Zheng
Pennsylvania State University, USA

18:15 - 18:30

M4B.007 **SELF FOCUSING ACOUSTIC TRANSDUCER (SFAT) WITH 10 MM FOCAL LENGTH FOR CANCER-SPECIFIC LOCALIZED CYTOLYSIS OF 3D CELL SPHEROIDS IN 3D MATRIGEL**

L. Wang, C.-P. Liao, M.-E. Gross, and E.S. Kim
University of Southern California, USA

Session M4C - Nano-Mechanical Resonators

Session Chairs: W. King, *University of Illinois, Urbana-Champaign, USA* and T. Ono, *Tohoku University, JAPAN*

16:30 - 17:00 **Invited Speaker**

M4C.001 **NANOMECHANICAL RESONATORS BASED ON NANOTUBES AND GRAPHENE**

J. Moser[1,2], A. Eichler[1,2], J. Chaste[2], and A. Bachtold[1,2]
[1]ICFO, SPAIN and [2]Institut Català de Nanotecnologia (ICN), SPAIN

17:00 - 17:15

M4C.002 **AEROSOL IMPACTOR WITH EMBEDDED MEMS RESONANT MASS BALANCE FOR REAL-TIME PARTICULATE MASS CONCENTRATION MONITORING**

E. Mehdizadeh[1,3], J.C. Wilson[1], A. Hajjam[2], A. Rahafrooz[1], and S. Pourkamali[2,3]
[1]University of Denver, USA, [2]FemtoScale, Inc., USA, and *[3]University of Texas, USA*

17:15 - 17:30

M4C.003 **FREQUENCY-ADDRESSED NEMS ARRAYS FOR MASS AND GAS SENSING APPLICATIONS**

E. Sage, O. Martin, C. Dupré, T. Ernst, G. Billiot, L. Duraffourg, E. Colinet, and S. Hentz
Commissariat à l'énergie Atomique (CEA), FRANCE

17:30 - 17:45

M4C.004 **TIME-DOMAIN *AC* CHARACTERIZATION OF SILICON CARBIDE (SiC) NANOELECTROMECHANICAL SWITCHES TOWARD HIGH SPEED OPERATIONS**

T. He, V. Ranganathan, R. Yang, S. Rajgopal, S. Bhunia, M. Mehregany, and P.X.-L. Feng
Case Western Reserve University, USA

17:45 - 18:00

M4C.005 **A NANOWIRE FET SWITCH INTEGRATED WITH A MICROELECTRODE ARRAY FOR RETINAL PROSTHETIC SYSTEMS**

S. Lee[1], S.W. Jung[1,2], J. Ahn[1], H.J. Yoo[1], S.K. Park[1], and D.-I. Cho[1]
[1]Seoul National University, SOUTH KOREA and [2]Korea Electronics Technology Institute, SOUTH KOREA

18:00 - 18:15

M4C.006 **IMPLEMENTATION OF ELECTROSTATICALLY CONTROLLED FABRY-PEROT INTERFEROMETER USING NANOPOROUS ANODIC ALUMINUM OXIDE LAYER**

P.-H. Lo, C.-C. Lee, and W. Fang
National Tsing Hua University, TAIWAN

18:15 - 18:30

M4C.007 **INTEGRATED FINFET BASED SENSING IN A LIQUID ENVIRONMENT**

S. Rigante[1], M. Wipf[2], A. Tarasov[2], D. Bouvet[1], K. Bedner[3], R.L. Stoop[2], and A.M. Ionescu[1]
[1]*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND,* [2]*University of Basel, SWITZERLAND,* and [3]*Paul Scherrer Institut, SWITZERLAND*

Session M4D - Energy Scavenging & Magnetometers

Session Chairs: P. Woias, *University of Freiburg - IMTEK, GERMANY* and E. Yeatman, *Imperial College London, UK*

16:30 - 17:00 **Invited Speaker**

M4D.001 **MEMS BASED VIBRATION HARVESTING: FACING THE UGLY FACTS**

R.J.M. Vullers, M. Renaud, R. Elfrink, and R. van Schaijk
imec/Holst Centre, THE NETHERLANDS

17:00 - 17:15

M4D.002 **AN ENERGY HARVESTER FOR ROTATING ENVIRONMENTS USING OFFSET PENDULUM DYNAMICS**

S.J. Roundy and J. Tola
University of Utah, USA

17:15 - 17:30

M4D.003 **A HIGH PERFORMANCE ELECTROSTATIC MEMS VIBRATION ENERGY HARVESTER WITH CORRUGATED INORGANIC SiO_2-Si_3N_4 ELECTRET**

M. Renaud[1], G. Altena[1], M. Goedbloed[1], C. de Nooijer[1], S. Matova[1], Y. Naito[2], T. Yamakawa[2], H. Takeuchi[2], K. Onishi[2], and R. van Schaijk[1]
[1]*imec/Holst Centre, THE NETHERLANDS* and [2]*Panasonic Corporation, JAPAN*

17:30 - 17:45

M4D.004 **A WIDE-BAND PIEZOELECTRIC ENERGY-HARVESTER FOR HIGH-EFFICIENCY POWER GENERATION AT LOW FREQUENCIES**

Q.C. Tang and X. Li
Chinese Academy of Sciences, CHINA

17:45 - 18:00

M4D.005 **ON-CHIP RF POWER INDUCTORS WITH NANOGRANULAR MAGNETIC CORES USING PRISM-ASSISTED UV-LED LITHOGRAPHY**

D.V. Harburg[1], G.R. Khan[1], F. Herrault[2], J. Kim[2], C.G. Levey[1], and C.R. Sullivan[1]
[1]*Thayer School of Engineering at Dartmouth, USA* and [2]*Georgia Institute of Technology, USA*

18:00 - 18:15

M4D.006 **TOWARDS A MINIATURE ATOMIC SCALAR MAGNETOMETER USING LIQUID CRYSTAL POLARIZATION ROTATOR**

J. Rutkowski[1], W. Fourcault[1], F. Bertrand[1], U. Rossini[1], S. Gétin[1], O. Lartigue[1], S. Le Calvez[1], T. Jager[1], E. Herth[2], M. Le Prado[1], J.M. Leger[1], and S. Morales[1]
[1]*Commissariat à l'énergie Atomique (CEA), FRANCE and* [2]*FEMTO-ST, FRANCE*

18:15 - 18:30

M4D.007 **COMPARISON OF LORENTZ-FORCE MEMS MAGNETOMETERS BASED ON DIFFERENT CAPACITIVE SENSING TOPOLOGIES**

G. Langfelder[1], A. Tocchio[2], E. Lasalandra[2], and A. Longoni[1]
[1]*Politecnico di Milano, ITALY* and [2]*STMicroelectronics, ITALY*

18:30	**Adjourn for the Day**
19:45 - 21:45	**MNAC Visit and Cocktails**

Tuesday 18 June 2013

Session T1A - Physical Microsystems 1
Session Chairs: W. Fang, *National Tsing Hua University, TAWAIN* and O. Paul, *University of Freiburg - IMTEK, GERMANY*

08:30 - 09:00 **Invited Speaker**
T1A.001 **MEMS DEVICES AND SENSORS IN STANDARD CMOS PROCESSING**
J. Montanyà i Silvestri, J.J. Valle Fraga, L. Barrachina Saralegui, and D. Fernández Martínez
Baolab Microsystems, SPAIN

09:00 - 09:15
T1A.002 **SILICON NANOWIRE BASED RING SHAPE FORCE SENSOR FOR SENSORIZED GUIDEWIRES**
B. Han[1,2], Y.-J. Yoon[2], M. Hamidullah[1], A.T.-H. Lin[2], and W.-T. Park[3]
*[1]Agency for Science, Technology and Research (A*STAR), SINGAPORE, [2]Nanyang Technological University, SINGAPORE,* and *[3]Seoul National University of Science and Technology, SOUTH KOREA*

09:15 - 09:30
T1A.003 **A 2-D DIRECTIONAL AIR FLOW SENSOR ARRAY MADE USING STEREOLITHOGRAPHY AND MEMS MICRO-HYDRAULIC STRUCTURES**
M.M. Sadeghi, R.L. Peterson, and K. Najafi
University of Michigan, USA

09:30 - 09:45
T1A.004 **DESIGN, MODELING, FABRICATION AND CHARACTERIZATION OF A MEMS ACCELERATION SENSOR FOR ACOUSTIC EMISSION TESTING**
A. Sorger, C. Auerswald, A. Shaporin, M. Freitag, M. Dienel, and J. Mehner
Chemnitz University of Technology, GERMANY

09:45 - 10:00
T1A.005 **SINGLE CHIP PROCESS FOR SENSORS IMPLEMENTATION, INTEGRATION, AND CONDITION MONITORING**
C.-W. Cheng[1,2], K.-C. Liang[1,2], C.-H. Chu[1], D.A. Horsley[3], and W. Fang[2]
[1]Taiwan Semiconductor Manufacturing Company, TAIWAN, [2]National Tsing Hua University, TAIWAN, and *[3]University of California, Davis, USA*

10:00 - 10:15
T1A.006 **FULLY MONOLITHIC MEMS BASED THERMAL SENSOR IN 22nm CMOS TECHNOLOGY FOR SOC THERMAL MANAGEMENT**
R. Mahameed[1], M. Abdelmoneum[1], D. Duarte[2], G. Taylor[2], S.-J. Choi[2], R. Brain[2], P. Morrow[2], and P. Fischer[2]
[1]Intel Architecture Group, USA and [2]Intel Technology Manufacturing Group, USA

Session T1B - Electrical Recording & Stimulation
Session Chairs: J.W. Kwon, *University of Missouri, Columbia, USA* and W. van der Wijngaart, *KTH Royal Institute of Technology, SWEDEN*

08:30 - 09:00 **Invited Speaker**
T1B.001 **TOWARD A HIGH VISUAL-ACUITY RETINAL PROSTHESIS**
L.-S. Fan
National Tsing Hua University, TAIWAN

09:00 - 09:15

T1B.002 **CONFERRING FLEXIBILITY AND RECONFIGURABILITY TO A 26,400 MICROELECTRODE CMOS ARRAY FOR HIGH THROUGHPUT NEURAL RECORDINGS**

J. Müller[1], M. Ballini[1], P. Livi[1], Y. Chen[1], A. Shadmani[1], U. Frey[2], I.L. Jones[1], M. Fiscella[1], M. Radivojevic[1], D.J. Bakkum[1], A. Stettler[1], F. Heer[1], and A. Hierlemann[1]
[1]ETH Zürich, SWITZERLAND and *[2]RIKEN, JAPAN*

09:15 - 09:30

T1B.003 **NANOGRASS BORON DOPED DIAMOND MICROELECTRODE ARRAYS FOR RECORDING AND STIMULATING NEURONAL TISSUES**

R. Kiran[1], M. Cottance[2], S. Joucla[5], L. Rousseau[2], A. Bongrain[1,2], B. Yvert[5], E. Sccorsone[1], A. Bendali[3,4], G. Lissorgues[2], S. Picaud[3,4,6], and P. Bergonzo[1]
[1]Commissariat à l'énergie Atomique (CEA), FRANCE, [2]University Paris Est, FRANCE, [3]Institut de la Vision, FRANCE, [4]Université Pierre et Marie Curie, FRANCE, [5]Université de Bordeaux, FRANCE, and [6]Fondation Ophtalmologique Adolphe de Rothschild, FRANCE

09:30 - 09:45

T1B.004 **SENSING AND ACTUATING ELECTROPHYSIOLOGICAL ACTIVITY ON BRAIN TISSUE AND NEURONAL CULTURES WITH A HIGH-DENSITY CMOS-MEA**

A. Maccione[1], A. Simi[1], T. Nieus[1], M. Gandolfo[2], K. Imfeld[2], E. Ferrea[1], E. Sernagor[3], and L. Berdondini[1]
[1]Istituto Italiano di Tecnologia, ITALY, [2]3Brain GmbH, SWITZERLAND, and *[3]Newcastle University, UK*

09:45 - 10:00

T1B.005 **A WEARABLE PERCUTANEOUS IMPLANT FOR LONG TERM ZEBRAFISH EPICARDIAL ECG RECORDING**

Y. Zhao[1], F. Yu[2], H. Cao[2], H. Chang[3], X. Zhang[1], T.K. Hsiai[2], and Y.C. Tai[1]
[1]California Institute of Technology, USA, [2]University of Southern California, USA, and *[3]Northwestern Polytechnical University, USA*

10:00 - 10:15

T1B.006 **ACETYLCHOLINE DYNAMICS IN CORTICAL NETWORKS BY AN ION IMAGE SENSOR WITH NEUROTRANSMITTER-SENSITIVE MAGNETIC NANOMACHINES**

T. Sakurai[1,2], A. Iwashita[1], K. Okumura[1,2], M. Ishida[1,2], and K. Sawada[1,2]
[1]Toyohashi University of Technology, JAPAN and [2]Japan Science and Technology Agency (JST), JAPAN

Session T1C - Nanomaterials (Characterization)

Session Chairs: L. Buchaillot, *IEMN, FRANCE* and W. Wu, *Peking University, CHINA*

08:30 - 09:00 **Invited Speaker**

T1C.001 **ATOMICALLY-PRECISE THREE-DIMENSIONAL TOP DOWN FABRICATION**

J.B. Ballard[1], J.H.G. Owen[1], E. Fuchs[1], S. McDonnell[2], D. Dick[2], G. Mordi[2], A. Azcatl[2], O. Seitz[2], P. Campbell[2], J.F. Veyan[2], Y. Chabal[2], R.M. Wallace[2], M. Bischof[3], D. Jaeger[3], R. Reidy[3], N. Sarkar[4], and J.N. Randall[1]
[1]Zyvex Labs, USA, [2]University of Texas, USA, [3]University of North Texas, USA, and [4]Integrated Circuit Scanning Probe Instruments, CANADA

09:00 - 09:15

T1C.002 **STRESS REDUCTION IN ULTRA-SMALL THIN FILM AL_2O_3 DIAPHRAGMS BY ATOMIC LAYER DEPOSITION**

T. Süss, P. Braeuninger-Weimer, and C. Hierold
ETH Zürich, SWITZERLAND

09:15 - 09:30

T1C.003 **PYROELECTRIC ELECTRON EMISSION FROM A THIN FILM OF $PbZr_XTi_{1-X}O_3$ ON A NANOFABRICATED CATHODE**

P.C. Fletcher, R.V.K. Mangalam, L.W. Martin, and W.P. King

University of Illinois, Urbana-Champaign, USA

09:30 - 09:45

T1C.004 **SIMULTANEOUS CHARACTERIZATION OF MECHANICAL AND ELECTRICAL PROPERTIES OF NANOWIRE USING MEMS DEVICE**

H. Zeng[1], T. Li[1], M. Bartenwerfer[2], S. Fatikow[2], and Y. Wang[1]

[1]*Chinese Academy of Sciences, CHINA* and [2]*University of Oldenburg, GERMANY*

09:45 - 10:00

T1C.005 **PROBING MECHANICAL, ELECTRICAL AND THERMAL PROPERTIES OF NANOSCALE MATERIALS USING MEMS DEVICES**

M.T. Alam and M.A. Haque

Pennsylvania State University, USA

10:00 - 10:15

T1C.006 **DIRECT OBSERVATION OF DAMAGE ACCUMULATION PROCESS INSIDE SILICON UNDER MECHANICAL FATIGUE LOADING**

S. Kamiya[1], R. Hirai[1], H. Izumi[1], N. Umehara[2], and T. Tokoroyama[2]

[1]*Nagoya Institute of Technology, JAPAN* and [2]*Nagoya University, JAPAN*

Session T1D - Acoustic/RF Resonators & Oscillators

Session Chairs: F. Ayazi, *Georgia Institute of Technology, USA* and D. Weinstein, *Massachusetts Institute of Technology, USA*

08:30 - 09:00 **Invited Speaker**

T1D.001 **TIME REVERSAL MIRRORS: PAST, PRESENT AND FUTURE**

M. Fink

Ecole Supérieure de Physique et de Chimie Industrielles (ESPCI), FRANCE

09:00 - 09:15

T1D.002 **A CURVATURE SELF-DETECTABLE 3D ARC-SHAPED IPMC/PVDF TRANSDUCER WITH ACOUSTIC BEAM GENERATION AND TUNABLE FOCAL RANGE ABILITIES**

G.-H. Feng and G.-Y. Chu

National Chung Cheng University, TAIWAN

09:15 - 09:30

T1D.003 **TEMPERATURE COMPENSATED OVERTONE RESONATORS**

J.R. Clark[1], A.R. Brown[2], G. He[3], and W. Hsu[1]

[1]*Discera, Inc., USA,* [2]*A. Brown Design, USA,* and [3]*University of Michigan, USA*

09:30 - 09:45

T1D.004 **TIP-BASED GRAPHENE ETCHING FOR MEMS RESONATOR FREQUENCY TRIMMING**

H. Hosseinzadegan and A. Lal

Cornell University, USA

09:45 - 10:00

T1D.005 **HIGH PRECISION FREQUENCY SYNTHESIZER BASED ON MEMS PIEZORESISTIVE RESONATOR**

K.L. Phan[1], T. van Ansem[1], C. van der Avoort[1], J.T.M. van Beek[1], M.J. Goossens[1], S. Jose[1], R.J.P. Lander[2], S. Menten[1], T. Naass[1], J. Sistermans[1], E. Stikvoort[1], F. Swartjes[1], K. Wortel[1], and M.A.A. in 't Zandt[1]
[1]NXP Semiconductors, THE NETHERLANDS and [2]NXP Semiconductors, BELGIUM

10:00 - 10:15

T1D.006 **A 3V CMOS-MEMS OSCILLATOR IN 0.35UM CMOS TECHNOLOGY**

J. Verd[1], A. Uranga[2], J. Segura[1], and N. Barniol[2]
[1]Universitat de les Illes Balears, SPAIN and [2]Universitat Autónoma de Barcelona, SPAIN

10:15 -10:45 **Break & Exhibit Inspection**

Session T2A - Packaging & Technology

Session Chairs: J.-U. Bu, *Senplus, SOUTH KOREA* and L. Lin, *University of California, Berkeley, USA*

10:45 - 11:00

T2A.001 **FABRICATION OF MULTI-LAYER VERTICALLY STACKED FUSED SILICA MICROSYSTEMS**

Z. Cao, Y. Yuan, G. He, R.L. Peterson, and K. Najafi
University of Michigan, USA

11:00 - 11:15

T2A.002 **LEAK RATE AND RELIABILITY OF LOW TEMPERATURE THIN-FILM INDIUM BONDING**

R. Straessle, Y. Pétremand, D. Briand, and N.F. de Rooij
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

11:15 - 11:30

T2A.003 **MULTI-FORCE-FIELD ASSISTED SELF-ASSEMBLY PROCESS OF THERMOELECTRIC DEVICE**

Y.B. Lin[1], Y.L. Tzeng[1], M.J. Dai[2], C.K. Liu[2], L.L. Liao[2], H.C. Chien[2], Y.S. Chen[2], and K. Wang[1]
[1]National Changhua University of Education, TAIWAN and
[2]Industrial Technology Research Institute (ITRI), TAIWAN

11:30 - 11:45

T2A.004 **NEW SELF-SEALING THIN-FILM ENCAPSULATION PROCESS FOR MEMS**

F. Santagata, I. Zaccaria, R.H. Poelma, J.F. Creemer, G.Q. Zhang, and P.M. Sarro
Delft University of Technology, THE NETHERLANDS

11:45 - 12:00

T2A.005 **A FULLY INTEGRATED MEMS TERA HERTZ INTERACTION CIRCUIT WITH MULTI WAFER PACKAGING**

Y. Kim, J. Lee, C.-W. Baek, H.Y. Ahn, S. Hong, S.-H. Lee, and C.-Y. Moon
Samsung Advanced Institute of Technology, SOUTH KOREA

12:00 - 12:15

T2A.006 **RF-TSVs COMPATIBLE WITH HARSH-ENVIRONMENT POST-PROCESSING FOR "VIA-FIRST" 3D INTEGRATION**

R. Gueye[1], S.W. Lee[2], W.A. Vitale[3], S. Truax[2], T. Akiyama[1], C. Roman[2], A. Ionescu[1], C. Hierold[2], D. Briand[1], and N.F. de Rooij[1]
[1]École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND and *[2]ETH Zürich, SWITZERLAND*

12:15 - 12:30

T2A.007 **THROUGH SILICON VIAS AND THERMOCOMPRESSION BONDING USING INKJET- PRINTED GOLD NANOPARTICLES FOR HETEROGENEOUS MEMS INTEGRATION**

N. Quack, J. Sadie, V. Subramanian, and M.C. Wu
University of California, Berkeley, USA

Session T2B - Liquid Chemical Sensing

Session Chairs: O. Brand, *Georgia Institute of Technology, USA* and Z. Brzózka, *Warsaw University of Technology, POLAND*

10:45 - 11:00

T2B.001 **SELF-STANDING PRINTED HUMIDITY SENSOR WITH THERMO-CALIBRATION AND INTEGRATED HEATER**

A. Vásquez Quintero, F. Molina-Lopez, G. Mattana, D. Briand, and N.F. de Rooij
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

11:00 - 11:15

T2B.002 **A HIGH-*Q* BULK-RESONATOR EQUIPPED WITH ULTRA-SENSITIVE MESOPOROUS NANO-MATERIAL FOR DETECTION OF TRACE-LEVEL CHEMICALS**

F. Yu, H. Yu, P. Xu, T. Xu, C. Yang, and X. Li
Chinese Academy of Sciences, CHINA

11:15 - 11:30

T2B.003 **RESONANT PHOTOTHERMAL IR SPECTROSCOPY OF PICOGRAM SAMPLES WITH MICROSTRING RESONATOR**

S. Yamada, S. Schmid, and A. Boisen
Technical University of Denmark, DENMARK

11:30 - 11:45

T2B.004 **MICRO-OPTOFLUIDIC RING RESONATOR STRUCTURES FOR SELECTIVE DETECTION OF ORGANIC VAPORS**

K. Scholten, K. Reddy, X. Fan, and E.T. Zellers
University of Michigan, USA

11:45 - 12:00

T2B.005 **SYNTHETIC NANOCAGE FORMED BY RHODIUM-ORGANIC CUBOCTAHEDRA: FOR SINGLE MOLECULE DETECTION IN LIPID BILAYER**

R. Kawano[1], S. Furukawa[2], D. Kiriya[3], T. Osaki[1], K. Kamiya[1], S. Kitagawa[2], and S. Takeuchi[1,3]
[1]*Kanagawa Academy of Science and Technology (KAST), JAPAN,* [2]*Kyoto University, JAPAN, and* [3]*University of Tokyo, JAPAN*

12:00 - 12:15

T2B.006 **APPLICATION OF SHRINK INDUCED THREE-DIMENSIONAL STRUCTURES TO BIOSENSOR SYSTEMS INTEGRATED WITH FLEXIBLE SOLAR CELLS**

Q. Li, B. Zhang, and T. Cui
University of Minnesota, USA

12:15 - 12:30

T2B.007 **AN INTEGRATED MICROFLUIDIC SYSTEM FOR RAPID HBA1C AND GLUCOSE MEASUREMENT**

T.-H. Lee, C.-L. Lin, C.-C. Wu, and G.-B. Lee
National Tsing Hua University, TAIWAN

Session T2C - Neural Probes
Session Chairs: D. Borkholder, *Rochester Institute of Technology, USA* and G.-B. Lee, *National Tsing Hua University, TAWAIN*

10:45 - 11:00
T2C.001 **DEVELOPMENT AND EVALUATION OF TUBE-SHAPED NEURAL PROBE WITH WORKING CHANNEL**
S. Tamaki, T. Matsunaga, T. Kuki, Y. Furusawa, H. Musiake, and Y. Haga
Tohoku University, JAPAN

11:00 - 11:15
T2C.002 **LONG TERM LFP MEASUREMENTS WITH ULTRA-FINE NEURAL ELECTRODES EMBEDDED IN POROUS RESORBABLE CARRIER**
F. Ceyssens, K. van Kuyck, B. Nuttin, and R. Puers
Katholieke Universiteit Leuven, BELGIUM

11:15 - 11:30
T2C.003 **ULTRASONICALLY ACTUATED INSERTED NEURAL PROBES FOR INCREASED RECORDING RELIABILITY**
P.-C. Chen, C. Clark, C.-P.J. Shen, C. Schaffer, and A. Lal
Cornell University, USA

11:30 - 11:45
T2C.004 **A NEW MEMS NEURAL PROBE INTEGRATED WITH EMBEDDED MICROFLUIDIC CHANNEL FOR DRUG DELIVERY AND ELECTRODE ARRAY FOR RECORDING NEURAL SIGNAL**
Y. Kim, H.J. Lee, D. Kim, Y.K. Kim, S.H. Lee, E.-S. Yoon, and I.-J. Cho
Korea Institute of Science and Technology (KIST), SOUTH KOREA

11:45 - 12:00
T2C.005 **MULTIFUNCTIONAL LAB-ON-A-TUBE (LOT) PROBE FOR SIMULTANEOUS NEUROCHEMICAL AND ELECTROPHYSIOLOGICAL ACTIVITY MEASUREMENTS**
C. Li[1], P.M. Wu[1], S.J. Prince[1], Z. Wu[2], S. Chakraborti[2], C.H. Ahn[2], J.A. Hartings[2], and R.K. Narayan[1]
[1]*Feinstein Institute for Medical Research, USA* and [2]*University of Cincinnati, USA*

12:00 - 12:15
T2C.006 **NOVEL TECHNOLOGY FOR THE IN-PLANE TO OUT-OF-PLANE TRANSFER OF MULTIPLE INTERCONNECTION LINES IN 3D NEURAL PROBES**
F. Barz, T. Holzhammer, O. Paul, and P. Ruther
University of Freiburg - IMTEK, GERMANY

12:15 - 12:30
T2C.007 **A MULTI-SHANK SILK-BACKED PARYLENE NEURAL PROBE FOR RELIABLE CHRONIC RECORDING**
F. Wu[1], L. Tien[2], F. Chen[1], D. Kaplan[2], J. Berke[1], and E. Yoon[1]
[1]*University of Michigan, USA* and [2]*Tufts University, USA*

Session T2D - NEMS & AFM
Session Chairs: A. Lal, *Cornell University, USA* and T. Tsuchiya, *Kyoto University, JAPAN*

10:45 - 11:00
T2D.001 **FABRICATION AND CHARACTERIZATION OF A SILICON NANOFIN NON-VOLATILE MEMORY**
B. Soon[1,2], N. Singh[1], J.M. Tsai[1], and C. Lee[2]
[1]*Agency for Science, Technology and Research (A*STAR), SINGAPORE and*
[2]*National University of Singapore, SINGAPORE*

11:00 - 11:15

T2D.002 **STABLE RUTHENIUM-CONTACT RELAY TECHNOLOGY FOR LOW-POWER LOGIC**

I.-R. Chen[1], Y. Chen[1], L. Hutin[1], V. Pott[2], R. Nathanael[3], and T.-J. King Liu[1]
[1]University of California, Berkeley, USA, [2]Now with LSI Technology Pte Ltd., SINGAPORE, and
[3]Now with Xilinx, Inc., USA

11:15 - 11:30

T2D.003 **NEMS ACTUATOR DRIVEN BY OPTICAL GRADIENT FORCE**

B. Dong[1,2], H. Cai[2], J.M. Tsai[2], P. Kropelnicki[2], A.B. Randles[2], M. Tang[2], D.L. Kwong[2], and A.Q. Liu[1,2]
[1]Nanyang Technological University, SINGAPORE, and
*[2]Agency for Science, Technology and Research (A*STAR), SINGAPORE*

11:30 - 11:45

T2D.004 **ULTRA-LOW POWER SI-PHOTONIC VARIABLE-GAP COUPLER SWITCH WITH NANO-LATCH MECHANISM**

S. Abe, Y. Munemasa, Y. Kanamori, and K. Hane
Tohoku University, JAPAN

11:45 - 12:00

T2D.005 **CANTILEVER DYNAMICS AND ENERGY LOCALIZATION DURING ATOMIC FORCE MICROSCOPE INFRARED SPECTROSCOPY**

H. Cho[1], J.R. Felts[1], M.-F. Yu[2], L.A. Bergman[1], A.F. Vakakis[1], and W.P. King[1]
[1]University of Illinois, Urbana-Champaign, USA and *[2]Georgia Institute of Technology, USA*

12:00 - 12:15

T2D.006 **ELECTROSTATICALLY ACTUATED DOUBLE CANTILEVER AFM PROBE FOR HIGH SPEED IMAGING**

R. Vermeer[1], E. Sarajlic[2], M. Siekman[1], H. Kawakutsa[3], H. Fujita[3], N.R. Tas[1], and H.V. Jansen[1]
[1]MESA+, University of Twente, THE NETHERLANDS, [2]SmartTip B.V., THE NETHERLANDS, and
[3]University of Tokyo, JAPAN

12:15 - 12:30

T2D.007 **CMOS-MEMS DYNAMIC FM ATOMIC FORCE MICROSCOPE**

N. Sarkar[1,2], G. Lee[1], and R.R. Mansour[1,2]
[1]University of Waterloo, CANADA and [2]ICSPI Corp., CANADA

12:30 - 14:15 **Lunch on Own & Exhibit Inspection**

14:15 - 16:30 **Poster Session T3P**

Mechanical/Physical Sensors and Microsystems

Accelerometer

T3P.001 **A MEMS BASED ELECTROCHEMICAL SEISMIC SENSOR**

T. Deng, D.Y. Chen, J.B. Wang, J. Chen, W.T. He, and Y.J. Fan
Chinese Academy of Sciences, CHINA

T3P.002 **AN ELECTROLYTE DROPLET-BASED LOW FREQUENCY ACCELEROMETER BASED ON MOLECULAR ELECTRONIC TRANSDUCER**

H. Huang, M. Liang, R. Tang, J. Oiler, T. Ma, and H. Yu
Arizona State University, USA

T3P.003 **HIGH RESOLUTION PULL-IN INCLINOMETER**

F.S. Alves[1], R.A. Dias[1], J. Cabral[1], J. Gaspar[2], and L.A. Rocha[1]
[1]University of Minho, PORTUGAL and *[2]International Iberian Nanotechnology Laboratory (INL), PORTUGAL*

T3P.004 **MICROMACHINED ACCELERATION SWITCH WITH BI-DIRECTIONALLY TUNABLE THRESHOLD**

H.-S. Kim[1], Y.-H. Jang[1], Y.-S. Hwang[2], Y.-K. Kim[2], and J.-M. Kim[3]
[1]Seoul National University, SOUTH KOREA, [2]Microinfinity Co., Ltd, SOUTH KOREA, and
[3]Chonbuk National University, SOUTH KOREA

Acoustic Sensors

T3P.005 **A SMART ACOUSTIC EMISSION AND MECHANICAL IMPEDANCE HYBRID SENSOR WITH STATIC FORCE DETECTING AND DYNAMIC MEASURING CAPABILITIES**

G.-H. Feng and Z.-W. Huang
National Chung Cheng University, TAIWAN

T3P.006 **POSITION DETECTION WITH MICRO WHISTLES**

J.M. Ibargüen, R. Lewandowski, C. Gerhardy, and W.K. Schomburg
RWTH Aachen Univesity, GERMANY

Actuators & Characterization Tools

T3P.007 **CARBON NANOTUBE IN SITU TEM LARGE STRAIN AND CHIRAL ANGLE ANALYSIS ENABLED BY MODULAR COUPON AND MEMS TEST PLATFORM SYSTEM**

J.J. Brown[1], M. Muoth[2], C. Hierold[2], and V.M. Bright[1]
[1]University of Colorado, USA and *[2]ETH Zürich, SWITZERLAND*

T3P.008 **RADIO-FREQUENCY AND DC ELECTRICAL CHARACTERIZATION ON A MODULAR MEMS MECHANICAL TEST PLATFORM FOR NANOMATERIALS**

J.J. Brown[1], T.M. Wallis[2], P. Kabos[2], K.A. Bertness[2], N. Sanford[2], and V.M. Bright[1]
[1]University of Colorado, USA and [2]National Institute of Standards and Technology (NIST), USA

T3P.009 **SYNTHESIS AND ELASTIC PROPERTIES OF SIO2 NANOTUBES AND HELICAL NANOSPRINGS TEMPLATED FROM ORGANIC AMPHIPHILIC SELF-ASSEMBLIES THROUGH INORGANIC TRANSCRIPTION**

S. Houmadi[1,2], S. Habtoun[1,2], D. Dedovet[3], S. Si[3], R. Tamoto[3,4], R. Oda[3,4], M.H. Delville[3], and C. Bergaud[1]
[1]Laboratoire d'Analyse et d'Architecture des Systémes (LAAS-CNRS), FRANCE, [2]Université de Toulouse, FRANCE, [3]Université de Bordeaux, FRANCE, and [4]Institut Européen de Chimie et Biologie (IECB), FRANCE

Gyroscope

T3P.010 **A NEW VERTICAL SUSPENSION INERTIAL GRADE GYROSCOPE**

A. Abdel Aziz[1], H.H. Tawfik[1], A. Sharaf[1,3], A.M. Elshurafa[4], M. Serry[1], and S. Sedky[2]
[1]American University of Cairo, EGYPT, [2]Zewail University of Science and Technology, EGYPT, [3]Egyptian Atomic Energy Authority, EGYPT, and [4]King Abdullah University of Science and Technology, EGYPT

T3P.011 **COMBINED PHASE-READOUT AND SELF-CALIBRATION OF MEMS GYROSCOPES**

A. N. Shirazi, G. Casinovi, M. Dalal, and F. Ayazi
Georgia Institute of Technology, USA

Infrared & Magnetic

T3P.012 **AN ULTRA-THIN BENDABLE SI-MONOLITHIC IMAGING TEST SENSOR**
G.C. Dogiamis[1], J. Häfner[2], W. Mokwa[2], B.J. Hosticka[1], and A. Grabmaier[1]
[1]University Duisburg Essen, GERMANY and *[2]RWTH Aachen University, GERMANY*

T3P.013 **HIGH PERFORMANCE NEMS RESONANT INFRARED DETECTOR BASED ON AN ALUMINUM NITRIDE NANO-PLATE RESONATOR**
Y. Hui and M. Rinaldi
Northeastern University, USA

T3P.014 **MONOLITHIC DISPLACEMENT ENCODER SENSOR INTEGRATING GAN LED AND SI PHOTODIODES**
S. Nagai[1], T. Sasaki[1], H. Kawaguchi[2], A. Iwabuchi[2], and K. Hane[1]
[1]Tohoku University, JAPAN and *[2]Sanken Electric Co. Ltd., JAPAN*

Pressure & Flow

T3P.015 **BIOMIMETIC POLYMER MEMS HAIRCELLS WITH HIGH-ASPECT RATIO FOR HIGH ACCURACY FLOW SENSING**
A.G.P. Kottapalli[1], M. Asadnia[1], J.M. Miao[1], and M.S. Triantafyllou[2]
[1]Nanyang Technological University, SINGAPORE and *[2]Massachusetts Institute of Technology, USA*

T3P.016 **GAS VISCOSITY MEMS SENSOR BASED ON PULL-IN**
R.A. Dias[1,2], G. de Graaf[3], R.F. Wolffenbuttel[3], and L.A. Rocha[1,2]
[1]University of Minho, PORTUGAL, [2]International Iberian Nanotechnology Laboratory, PORTUGAL, and *[3]Delft University of Technology, THE NETHERLANDS*

T3P.017 **PERFORMANCE ANALYSISIS OF PZT (0.52/0.48) FOR HIGH TEMPERATURE AND PRESSURE SENSING APPLICATIONS**
M. Asadnia[1], A.G.P. Kottapalli[1], J.M. Miao[1], A.B. Randles[2], and J.M. Tsai[2]
[1]Nanyang Technological University, SINGAPORE and
*[2]Agency for Science, Technology and Research (A*STAR), SINGAPORE*

Resonant Sensors

T3P.018 **ALL-OXIDE MICROCANTILEVERS: PERSPECTIVES FOR DEVICE APPLICATIONS**
L. Pellegrino[1], N. Manca[1,2], T. Kanki[3], S. Yamasaki[3], H. Tanaka[3], M. Biasotti[2], R. Buzio[1], E. Bellingeri[1], V. Ceriale[2], A.S. Siri[2], and D. Marré[2]
[1]CNR-SPIN, ITALY, [2]Genoa University, ITALY, and *[3]Osaka University, JAPAN*

T3P.019 **HIGH-RESOLUTION STRAIN SENSING ON STEEL BY SILICON-ON-INSULATOR FLEXURAL RESONATORS FABRICATED WITH CHIP-LEVEL VACUUM PACKAGING**
L. Belsito[1], M. Ferri[1], F. Mancarella[1], A. Roncaglia[1], J. Yan[2], A.A. Seshia[2], and K. Soga[2]
[1]CNR IMM, ITALY and *[2]University of Cambridge, UK*

T3P.020 **ULTRASENSITIVE RESONANT MEMS TRANSDUCERS WITH TUNABLE COUPLING**
M. Manav, G. Reynen, M. Sharma, E. Cretu, and A.S. Phani
University of British Columbia, CANADA

Tactile Sensors

T3P.021 **A DIELECTIRIC LIQUID-BASED CAPCITIVE TACTILE SENSOR FOR NORMAL AND SHEAR FORCE SENSING**
K.W. Liao[1], M.T. Hou[2], and J.A. Yeh[1]
[1]National Tsing Hua University, TAIWAN and *[2]National United University, TAIWAN*

T3P.022 **BATCH FABRICATED FLEXIBLE TACTILE SENSOR BASED ON CARBON NANOTUBE-POLYMER COMPOSITES**
S. Pyo[1], J.-I. Lee[1], M.-O. Kim[1], T. Chung[1], Y. Oh[1], S.-C. Lim[2], J. Park[2], and J. Kim[1]
[1]Yonsei University, SOUTH KOREA and *[2]Samsung Advanced Institute of Technology, SOUTH KOREA*

T3P.023 **FINGERTIP-CONTROLLABLE PULLING FORCE SENSOR**
T.Y. Chen, Y.C. Wang, C.Y. Lo, and R. Chen
National Tsing Hua University, TAIWAN

T3P.024 **MULTI-AXIAL TACTILE SENSOR WITH MICRO-CANTILEVER EMBEDDED IN HEMISPHERICAL ELASTOMER FOR SURFACE TEXTURE MEASUREMENT**
K. Watanabe[1], M. Sohgawa[1], T. Kanashima[1], M. Okuyama[1], H. Noma[2], and T. Azuma[3]
[1]Osaka University, JAPAN, [2]Advanced Telecommunications Research Institute International, JAPAN, and *[3]Nitta Corporation, JAPAN*

Thermometers

T3P.025 **HARSH ENVIRONMENT TEMPERATURE SENSOR BASED ON 4H-SILICON CARBIDE PN DIODE**
N. Zhang and A.P. Pisano
University of California, Berkeley, USA

T3P.026 **SILICON CARBIDE DIODE BRIDGE CIRCUIT FOR CAPACITIVE SENSOR READOUT IN HIGH TEMPERATURE (673K) ENVIRONMENT**
R. Chand, S. Tanaka, and M. Esashi
Tohoku University, JAPAN

T3P.027 **WIRELESS CHIPLESS PASSIVE MICROFLUIDIC TEMPERATURE SENSOR**
A. Rifai[1,2], E. Debourg[1,2], S. Bouaziz[1,2], A. Traille[1,2], P. Pons[1,2], H. Aubert[1,2], and M. Tentzeris[3]
[1]Laboratoire d'Analyse et d'Architecture des Systémes (LAAS-CNRS), FRANCE, [2]Universite de Toulouse, FRANCE, and *[3]Georgia Institute of Technology, USA*

Materials, Fabrication & Packaging Technologies

3-D Structures

T3P.028 **FABRICATING BARBED MICROTIP ARRAYS BY LOW-COST SILICON WET ETCHING TECHNIQUES**
S.-W. Tung, C.-H. Kuo, L.-S. Hsu, and Y.-J. Yang
National Taiwan University, TAIWAN

T3P.029 **LARGE DISPLACEMENT PLASTIC DEFORMATION PROCESS FOR SILICON PARASOL STRUCTURE**
T. Aono[1], Y. Ebata[2], S. Matsui[2], and T. Watanabe[2]
[1]Hitachi, Ltd., JAPAN and *[2]Hitachi High Technologies Corporation, JAPAN*

T3P.030 **SIMPLIFIED MONOLITHIC PROCESS FOR FABRICATING LOW-COST, HIGH-FREQUENCY, HIGH-FLATNESS SCANNING MICROMIRRORS**

B.W. Chui[1], T. Sun[2], R. Lim[2], D. U.S.[2], M. Olivo[2], and W. Sun[2]
[1]*Ben Chui Consulting, USA* and [2]*Agency for Science, Technology and Research (A*STAR), SINGAPORE*

Films & Nanostructures

T3P.031 **A NEW METALLIC GLASS FE-B-ND-NB THIN FILM MATERIAL FOR MICRO SENSORS AND ACTUATORS: FABRICATION AND CHARACTERIZATION**

P.A. Tuan[1], H. Oguchi[1], M. Hara[1], M. Shikida[2], H. Hida[2], T. Ando[3], K. Sato[4], and H. Kuwano[1]
[1]*Tohoku University, JAPAN,* [2]*Nagoya University, JAPAN,* [3]*Ritsumeikan University, JAPAN,* and [4]*Aichi Institute of Technology, JAPAN*

T3P.032 **ATOMIC LAYER DEPOSITED AL_2O_3 AND PARYLENE C DUAL-LAYER ENCAPSULATION FOR BIOMEDICAL IMPLANTABLE DEVICES**

X. Xie, L. Rieth, P. Tathireddy, and F. Solzbacher
University of Utah, USA

T3P.033 **GENERATION OF A POROUS DEVICE LAYER ON SOI SUBSTRATES**

A. Backes, P. Walkoun, F. Patocka, and U. Schmid
Vienna University of Technology, AUSTRIA

T3P.034 **MICROFABRICATION OF LEAD-FREE (K,Na)NbO_3 PIEZOELECTRIC THIN FILMS BY DRY ETCHING**

F. Kurokawa[1], R. Yokokawa[2], H. Kotera[2], F. Horikiri[3], K. Shibata[3], M. Sato[1], H. Hida[1], and I. Kanno[1]
[1]*Kobe University, JAPAN,* [2]*Kyoto University, JAPAN, and* [3]*Hitachi Cable, Ltd., JAPAN*

Materials Characterization

T3P.035 **DEPENDENCE OF MECHANICAL ON POSITION IN SILICON INGOTO BY EVALUATING B AND GE CODOPED SILICON**

T. Shirata[1], T. Sato[2], and T. Ando[1]
[1]*Ritsumeikan University, JAPAN* and [2]*Silicon Technology Corporation, JAPAN*

T3P.036 **PRINTED MICRO-HOTPLATES ON FLEXIBLE SUBSTRATE FOR GAS SENSING**

M. Camara[1], F. Molina-Lopez[1], E. Danesh[2], G. Mattana[1], A. Bontempi[3], D. Teyssieux[3], L. Thiery[3], P. Breuil[4], C. Pijolat[4], K. Persaud[2], D. Briand[1], and N.F. de Rooij[1]
[1]*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND,* [2]*University of Manchester, UK,* [3]*FEMTO-ST, FRANCE,* and [4]*Ecole Nationale Supérieure des Mines de Saint-Etienne, FRANCE*

T3P.037 **EXTRACTING VISCOELASTIC PROPERTIES OF SOFT POLYMERS FROM DYNAMIC NANOINDENTATION USING AN IMPROVED MODEL**

P. Du[1], C. Cheng[2], H. Lu[2], and X. Zhang[1]
[1]*Boston University, USA* and [2]*University of Texas, Dallas, USA*

Packaging

T3P.038 **AL-AL THERMOCOMPRESSION BONDING FOR WAFER-LEVEL MEMS PACKAGING**

N. Malik[1,2], K. Schjølberg-Henriksen[2], E. Poppe[2], and T.G. Finstad[1]
[1]*University of Oslo, NORWAY* and [2]*SINTEF ICT, NORWAY*

T3P.039 **SN-CU THIN FILM TRANSIENT LIQUID PHASE BONDING TEST WITH DIFFERENT UNDERLAYERS USING FULLY-IN-VACUUM WAFER ALIGNER/BONDER**

K. Hikichi[1], S. Matsuzaki[1], Y. Nonomura[2], H. Funabashi[2], Y. Hata[2], M. Esashi[1], and S. Tanaka[1]
[1]Tohoku University, JAPAN and [2]Toyota Central Research and Development Laboratories, Inc., JAPAN

T3P.040 **WAFER LEVEL PACKAGING FOR CHAMBERS OF TWO DIFFERENT PRESSURES**

K.-C. Liang[1,2], C.-W. Cheng[1,2], C.-H. Lin[1], W.-C. Lai[1], and W. Fang[1]
[1]National Tsing-Hua University, TAIWAN and
[2]Taiwan Semiconductor Manufacturing Company Ltd., TAIWAN

Patterning Printing & Etching

T3P.041 **A NOVEL FABRICATION PROCESS TO REALISE A VALVELESS MICROPUMP ON A FLEXIBLE SUBSTRATE**

Y. Wei, R. Torah, K. Yang, S. Beeby, and J. Tudor
University of Southampton, UK

T3P.042 **LASER DIRECT WRITING OF THICK HYBRID POLYMER MICROSTRUCTURES**

A. Singh, G. Scotti, V. Jokinen, and S. Fransilla
Aalto University, FINLAND

T3P.043 **PARTICLE SWARM OPTIMIZATION OF MODEL PARAMETERS: SIMULATION OF DEEP REACTIVE ION ETCHING BY THE CONTINUOUS CELLULAR AUTOMATON**

Y. Li[1], Y. Xing[1], M.A. Gosálvez[2], P. Pal[3], and Y. Zhou[1]
[1]Southeast University, CHINA, [2]University of the Basque Country, SPAIN, and
[3]Indian Institute of Technology Hyderabad, INDIA

Nanoscale Materials, Devices & Fabrication

Bio/Chemical Sensor

T3P.044 **A STRETCHABLE AND TRANSPARENT SWNT STRAIN SENSOR ENCAPSULATED IN THIN PDMS FILMS**

Y. Liu[1], Q. Sheng[1], S. Muftu[1], A. Khademhosseini[2], M.L. Wang[1], and M.R. Dokmeci[2]
[1]Northeastern University, USA and *[2]Brigham and Women's Hospital, Harvard Medical School, USA*

T3P.045 **CUO NANOWIRE GAS SENSORS FOR CO DETECTION IN HUMID ATMOSPHERE**

S. Steinhauer, E. Brunet, T. Maier, G.C. Mutinati, and A. Köck
AIT Austrian Institute of Technology GmbH, AUSTRIA

T3P.046 **FUNCTIONALIZED CARBON NANOTUBES FOR THE DISCRIMINATION OF VOLATILE ORGANIC COMPOUNDS**

I. Hafaiedh[1], W. El Euch[1], P. Clement[2], A. Abdelghani[1], and E. Llobet[2]
[1]Institut National des Sciences Appliquées et de Technologie (INSAT), TUNISIA and
[2]Univeristy Rovira i Virgili, SPAIN

T3P.047 **NANOSTRUCTURED MEMBRANE SEPARATORS FOR ELECTROCHEMICAL DETECTION OF HEAVY METALS**

M. Serry[1], A. Gamal[1], A. Kader[1], A. Sharaf[1,2], and M. Shaban[1,3]
[1]American University of Cairo, EGYPT, [2]Egyptian Atomic Energy Authority, EGYPT, and
[3]University of Benisuef, EGYPT

Fabrication

T3P.048 **EXCLUDING GRAIN BOUNDARIES IN THIN SI FILM MEMS/NEMS DEVICES**
T. Tomikawa[1], S. Kumagai[1,3], I. Yamashita[2,3], Y. Uraoka[2,3], and M. Sasaki[1,3]
[1]Toyota Technological Institute, JAPAN, [2]Nara Institute of Science and Technology, JAPAN, and [3]Japan Science and Technology Agency (JST), JAPAN

T3P.049 **LOW TEMPERATURE PROCESS BELOW 170°C FOR HYDROPHILIC AND HYDROPHOBIC MICRO PATTERNS**
C. Nakagami[1], W. Tonomura[1], Y. Kaizuma[2], and S. Konishi[1]
[1]Ritsumeikan University, JAPAN and *[2]Shinko Seiki Co., LTD., JAPAN*

T3P.050 **SILICON NANOWIRES HONEYCOMB ARRAY FABRICATION WITH LOW-COST TOP-DOWN TECHNOLOGY ON (111) SILICON WAFER**
X. Yu, Y. Wang, T. Li, and Y. Wang
Chinese Academy of Sciences, CHINA

Nanodevices

T3P.051 **SELF-ALIGNED, DIRECT-WRITE GRAPHENE CHANNEL FETS**
Y. Liu[1], J. Chang[2], H. Yang[1], S. Lin[1], S. Akhbari[1], Q. Zhou[1], K. Heo[1], and L. Lin[1]
[1]University of California, Berkeley, USA and *[2]University of California, San Francisco, USA*

Nanomaterial & Characterization

T3P.052 **ELECTRICAL EVALUATION OF HYDRATED DIAMETER DEPENDENT THICKNESS OF ELECTRIC DOUBLE LAYER IN NANOCHANNEL**
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Tokyo Institute of Technology, JAPAN

T3P.053 **OPTICAL CONTROL OF SURFACE POTENTIAL USING NANOCAPSULE FOR SELECTIVE INJCRION INTO CELL**
H. Maruyama, T. Masuda, and F. Arai
Nagoya University, JAPAN

Chemical Sensors & Microsystems

Chemical Sensors

T3P.054 **A MINIATURIZED NON-RADIOACTIVE ELECTRON EMITTER FOR ATMOSPHERIC PRESSURE CHEMICAL IONIZATION**
P. Cochems, M. Runge, and S. Zimmermann
Leibniz University Hannover, GERMANY

T3P.055 **DEVELOPMENT OF ELECTROCHEMICAL MICROSENSORS FOR THE MONITORING OF MITOCHONDRIAL ACTIVITIES**
E. Vanhove[1], S. Ben-Amor[1,3], S. Charlot[1,2], D. Colin[1,2], A. Devin[3], M. Rigoulet[3], N. Sojic[1,3], F. Sékli Belaïdi[1,2], J. Launay[1,2], P. Temple-Boyer[1,2], and S. Arbault[1,3]
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T3P.056 **OPTICAL SENSORS CROSS-SENSITIVITY AMENDMENT: THE CASE STUDY OF HEAVY METALS CSPT DETECTION**

L. Lvova[1,2], P. Galloni[1], B. Floris[1], C. Di Natale[1], I. Lundström[3], V. Lippolis[4], A. Garau[4], and R. Paolesse[1]
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T3P.057 **UNUSUAL BEHAVIOR OF UNCOATED THICK-FILM PZT CANTILEVERS TOWARDS FLUID PHASES SENSING. APPLICATION TO WATER AND ETHANOL DETECTION**

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Environmental Sensors

T3P.058 **PALLADIUM-BASED SENSOR FOR ELECTROCHEMICAL DETECTION OF MANGANESE IN THE ENVIRONMENT**

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FET Based Gas Sensors

T3P.059 **SIC - FET BASED SO_2 SENSORS FOR POWER PLANT APPLICATIONS**

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Gas Sensors

T3P.060 **CARBON NANOFIBER FLEXIBLE GAS SENSOR MODULATED BY UV LIGHT**

O. Monereo, S. Claramunt, G. Vescio, H. Lahlou, R. Leghrib, J.D. Prades, A. Cornet, and A. Cirera
Universitat de Barcelona, SPAIN

T3P.061 **DEVELOPMENT OF AN AMPEROMETRIC H_2O_2 SENSOR BASED ON MOx/REDUCED GRAPHENE OXIDE NANOCOMPOSITES**

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T3P.062 **GAS DETECTION AND IDENTIFICATION USING MEMS TOF MASS SPECTROMETER**

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T3P.063 **LOCALIZED HEATING TO TUNGSTEN OXIDE NANOSTRUCTURES DEPOSITION ON GAS MICROSENSOR ARRAYS VIA AEROSOL ASSISTED CVD**

S. Vallejos, R. Cumeras, C. Calaza, N. Sabaté, E. Figueras, C. Cané, and I. Grácia
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T3P.064 **VOLATILE ORGANIC COMPOUNDS SENSOR WITH STACKED INTERDIGITATED ELECTRODES COATED WITH MONOLAYER-PROTECTED GOLD NANOCLUSTERS**

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Humidity Sensors

T3P.065 **A STRETCHABLE HUMIDITY SENSOR BASED ON A WRINKLED POLYANILINE NANOSTRUCTURE**
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[2]*Massachusetts Institute of Technology, USA*

Hydrogen Gas Sensors

T3P.066 **A FAST AND SENSITIVE CATALYTIC HYDROGEN SENSOR BASED ON A STABILIZED NANOPARTICLE CATALYST**
E. Brauns, E. Morsbach, M. Bäumer, and W. Lang
University of Bremen, GERMANY

Nanowire Based Sensors

T3P.067 **POTASSIUM SENSING WITH MEMBRANE-COATED NANOWIRE FIELD-EFFECT TRANSISTORS**
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Bio-Sensors & Bio-Microsystems

Cell Sensing & Manipulation

T3P.068 **2D CANTILEVER ARRAY WITH SPHERICAL TIPS FOR PARALLEL FORCE SPECTROSCOPY ON CANCEROUS CELLS**
F. Loizeau[1], M. Favre[2], T. Akiyama[1], S. Gautsch[1], A. Meister[2], R. Smajda[2], P. Vettiger[1], G. Weder[2], and N.F. de Rooij[1]
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T3P.069 **AN ELECTROKINETICALLY CONTROLLED MICROCHIP FOR STUDYING BINDING INTERACTIONS OF NUCLEIC ACIDS WITH CELLS**
J. Kim, J.P. Hilton, K. Yang, R. Pei, M. Stojanovic, and Q. Lin
Columbia University, USA

T3P.070 **LABEL-FREE COLORECTAL CANCER CELL LINE BIO-SENSING USING RF RESONATOR**
L.Y. Zhang[1], A. Landoulsi[1], C. Bounaix Morand du Puch[2], A. Lacroix[1], C. Dalmay[1], A. Bessaudou[1], C. Lautrette[2], S. Battu[1], F. Lalloué[1], M.-O. Jauberteau[1], P. Blondy[1],and A. Pothier[1]
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T3P.071 **METAMATERIAL APPLICATION IN SENSING FOR LIVING CELLS**
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T3P.072 **ON-CHIP MAGNETIC FIELD MODULATION FOR DISTRIBUTED IMMUNOMAGNETIC DETECTION OF CIRCULATING TUMOR CELLS**
P. Chen, Y.-Y. Huang, K. Hoshino, and X. Zhang
University of Texas, Austin, USA

Fluid Manipulation in Microsystems

T3P.073 **3D ALGINATE CONSTRUCTS FOR TISSUE ENGINEERING PRINTED USING A COAXIAL FLOW FOCUSING MICROFLUIDIC DEVICE**
S.T. Beyer, A. Bsoul, A. Ahmadi, and K. Walus
University of British Columbia, CANADA

T3P.074 **A STACKED ELECTRODE SET INCLUDING SUSPENDED CARBON NANOMESHES AND PLANAR CARBON PADS FOR ELECTROCHEMICAL/BIO SENSOR APPLICATIONS**
Y. Lim, J. Heo, and H. Shin
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T3P.075 **CONDUCTIMETRIC TRANSDUCER ARRAY FOR THE READOUT OF LOW-DENSITY PROTEIN MICROARRAYS**
M. Mallén, D. Bonilla, M. Díaz-González, J.P. Salvador, M.P. Marco, A. Baldi, and C. Fernández-Sánchez
Spanish Council for Scientific Research (CSIC), SPAIN

T3P.076 **FULLY-INTEGRATED PLASTIC-ANTIBODY-BASED BIOCHIPS WITH EASY-TO-ATTACH VACUUM SOURCES FOR C-REACTIVE PROTEIN SENSING**
C.-H. Tsai[1], W. Chung[1], W.-H. Wang[1], K.-W. Chen[1], C.-C. Hong[1], and C.-P. Chen[2]
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T3P.077 **DROPLET NETWORK CONNECTED BY BIOLOGICAL NANOPORES FOR DNA COMPUTING**
H. Yasuga[1,3], R. Kawano[1], M. Takinoue[4], Y. Tsuji[1,3], T. Osaki[1], K. Kamiya[1], N. Miki[1,3], and S. Takeuchi[1,2]
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T3P.078 **ON-DEMAND ELECTROPHORETIC SEPARATION OF DNA IN WRITTEN GEL LINES ON PLANAR SUBSTRATES**
L. Tanguy[1], L. Gutzweiler[2], P. Koltay[2], R. Zengerle[2], and L. Riegger[3]
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T3P.079 **SOFT 3D RETINAL IMPLANTS WITH DIAMOND ELECTRODE A WAY FOR FOCAL STIMULATION**
L. Rousseau[2], E. Scorsonne[1], A. Bendali[3], M. Djilas[3], H. Girard[1], M. Cottance[1], S. Joucla[4], E. Dubus[3], J. Degardin[3], B. Yvert[4], G. Lissorgues[2], P. Bergonzo[1], and S. Picaud[3]
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Manipulation & Detection of Bacteria

T3P.080 **AN INTEGRATED MICROFLUIDIC SYSTEM USING BURIED OPTICAL FIBERS FOR DETECTION OF *PHALAENOPSIS* ORCHID PATHOGENS**
C.-L. Lin[1], W.-H. Chang[1], C.-H. Wang[1], P.-C. Li[2], F.-J. Jan[2], T.-Y. Chen[2], and G.-B. Lee[1]
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T3P.081 **AXIAL CENTRIFUGAL FILTRATION – A NOVEL APPROACH FOR RAPID BACTERIAL CONCENTRATION FROM A LARGE VOLUME**
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Sensing in Biosystems

T3P.082 **A MICROFLUIDIC DEVICE CAPABLE OF CONTINUOUS QUANTIFICATION OF SINGLE-CELL SPECIFIC MEMBRANE CAPACITANCE AND CYTOPLASM CONDUCTIVITY**
Y. Zhao[1], D. Chen[1], Y. Luo[1], H. Li[1], B. Deng[1], S.-B. Huang[2], T.-K. Chiu[2], M.-H. Wu[2], R. Long[3], J. Wang[1], and J. Chen[1]
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T3P.083 **ACCURATE QUANTIFICATION OF MULTIPLE BIOMARKERS USING MICROFLUIDIC DETERMINATION OF TUMOR-SPECIFIC ANTIGENIC SITES IN CANCER TISSUES**
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[2]National Cancer Center, SOUTH KOREA

T3P.084 **CIRCADIAN RHYTHMS IN NEUROSPORA CRASSA ON A MICROFLUIDIC DEVICE FOR REAL-TIME GAS PERTURBATIONS**
K.K. Lee, C.H. Ahn, and C.I. Hong
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T3P.085 **IN VITRO TUMOR MODEL FOR EVALUATING THE LUNG CANCER INDUCED TUMOR ANGIOGENESIS**
T.-S. Chen[1], K.-W. Chang[1], S. Sivashankar[1], K.-Y. Lee[2], and C.-H. Liu[1]
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T3P.086 **NANOPOROUS ALUMINA MEMBRANE AND NANOPARTICLE BASED MICROFLUIDIC SENSING PLATFORM FOR DIRECT DNA DETECTION**
W.W. Ye, J.Y. Shi, C.Y. Chan, L.D. Xiao, and M. Yang
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T3P.087 **SENSITIVE AND SELECTIVE DETECTION OF SUPEROXIDE SECRETED FROM NEUTROPHILS BASED ON ONE-ELECTRODE REDOX REACTIONS**
S. Kimura, Z. Cai, M. Yokokawa, J. Fukuda, and H. Suzuki
University of Tsukuba, JAPAN

Medical Microsystems

T3P.088 **DESIGN AND FABRICATION OF A MULTI-POINT PH AND TEMPERATURE RECORDING PROBE FOR REAL-TIME HEART MUSCLE MONITORING**
Y.T. Fan[1], Y.C. Chen[1], Y.T. Cheng[1], and Y.S. Chen[2]
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T3P.089 **BI-LAYER ENCAPSULATION OF UTAH ARRAY BASED NERUAL INTERFACES BY ATOMIC LAYER DEPOSITED AL_2O_3 AND PARYLENE C**
X. Xie, L. Rieth, R. Cardwell, R. Sharma, J.-M. Yoo, M. Diwekar, P. Tathireddy, and F. Solzbacher
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T3P.090 **FABRICATION OF ROUNDED KNIFE-EDGED STRUCTURE FOR TRANS-DERMAL DRUG DELIVERY SYSTEM**
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T3P.091 **LONG TERM DIFFUSION PERFORMANCE OF NANO POROUS POLYETHER SULFONE MEMBRANE IN DIALYSIS SYSTEM**
G.S. Prihandana, Y. Nishinaka, H. Ito, Y. Kanno, and N. Miki
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T3P.092 **NANOFLEX FOR NEURAL NANOPROBES**
P. Ledochowitsch, R.F. Tiefenauer, B. Pepin, M.M. Maharbiz, and T.J. Blanche
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T3P.093 **WIRELESS INTRAORAL SENSOR FOR THE PHYSIOLOGICAL MONITORING OF TONGUE PRESSURE**
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Microfluidics

Droplet Based Microfluidics

T3P.094 **THREE-DIMENSIONAL DIGITAL MICROFLUIDICS USING AN ALTERNATIVE CURRENT ELECTROWETTING-ON-DIELECTRIC (AC-EWOD)**
J.B. Chae, I.U. Shin, K. Rhee, and S.K. Chung
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Microfluidics

T3P.095 **APPLICATION OF NANOSTRUCTURE ON BUBBLE TRAPPING AND DEGASSING**
H.B. Cheng and Y.W. Lu
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T3P.096 **ENHANCED RADIAL DISPERSION AS A MEANS TO GAIN SEPARATION PERFORMANCE IN MINIATURIZED LIQUID CHROMATOGRAPHY SYSTEMS**
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T3P.097 **MICROFLUIDIC STERILIZATION IN A HIGH TEMPERATURE/PRESSURE CONTINUSOUS FLOWING CHIP**
R. Zhang[1], B. Wang[1], M. Chu[1], R. Ding[2], Y. Wang[1], and W. Wang[1]
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T3P.098 **SEPARATION OF DIFFERENT SIZED NANOPARTICLES WITH TIME USING A ROTATIONAL FLOW IN A 2×2 MICROFLUIDIC CENTRIFUGE**
B.H. Kwon, H.J. Jeon, D.I. Kim, and J.S. Go
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T3P.099 **VIRTUAL CHANNELS FOR A DYNAMICALLY RECONFIGURABLE NETWORK OF FLOWING MAGNETIC BEADS**
H.-W. Chiang, M.-C. Hsieh, Y.-D. Chang, P.-F. Yeh, and J.-C. Tsai
National Taiwan University, TAIWAN

Microfluidics with Cells

T3P.100 **APPLICATION OF MICROFLUIDIC SPOTTING-BASED GENERATOR AND PLURONIC® F127 SOLUTION TO GENERATE COLLAGEN MICROBEADS MICROENCAPSULATION OF CELLS**
S.B. Huang, H.C. Lee, S.W. Tsai, and M.H. Wu
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T3P.101 **MICROFLUIDIC IMPEDANCE CYTOMETER FOR CHARACTERIZATION OF SUBCELLULAR MORPHOLOGY OF SINGLE CELLS**
N. Haandbæk, S.C. Bürgel, F. Rudolf, F. Heer, and A. Hierlemann
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Composite Materials/Polymers, Devices & Fabrication

T3P.102 **3D MICROFLUIDIC CARTRIDGES BY GAS PRESSURE ASSISTED THERMAL BONDING OF MICROTHERMOFORMED FILMS**
D. Kosse[1], F. Schwemmer[2], D. Buselmeier[2], R. Zengerle[2], and F. von Stetten[1]
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T3P.103 **DEVELOPMENT OF MEMS USING BIODEGRADABLE POLYMER MATERIAL**
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T3P.104 **FABRICATION OF POLYMERIC DRY MICRONEEDLE ELECTRODES COATED WITH NANOPOROUS PARYLENE**
Y. Nishinaka[1], R. Jun[1], G.S. Prihandana[1], and N. Miki[1,2]
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Energy & Power MEMS

Electro Chemical Energy Storage

T3P.105 **ALL SOLID-STATE MICRO-SUPERCAPACITORS USING IONOGEL ELECTROLYTE**
B. Hsia[1], S. Wang[1,2], M.-S. Kim[1], C. Carraro[1], and R. Maboudian[1]
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Electro Static/Electret Harvesters

T3P.106 **A SPONTANEOUS POLARIZATION ELECTRET FOR ELECTROSTATIC VIBRATION ENERGY HARVESTING**
H. Asanuma, H. Oguchi, M. Hara, and H. Kuwano
Tohoku University, JAPAN

T3P.107 **NON-LINEAR MEMS ELECTROSTATIC KINETIC ENERGY HARVESTER WITH A TUNABLE MULTISTABLE POTENTIAL FOR STOCHASTIC VIBRATIONS**
F. Cottone[1], P. Basse[1], R. Guillemet[1], D. Galayko[2], F. Marty[1], and T. Bourouina[1]
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Harvesting Energy from Mechanical Vibrations

T3P.108 **A MINIATURE HARVESTER OF VERTICAL VIBRATORY CAPACITVE TYPE ACHIVING SEVERAL TENS MICROWATT FOR BROAD FREQUENCY OF 20-40 HZ**
T. Takahashi[1], M. Suzuki[1], T. Nishida[2], Y. Yoshikawa[2], and S. Aoyagi[1]
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T3P.109 **AN IMPACT BASED FREQUENCY UP-CONVERSION MECHANISM FOR LOW FREQUENCY VIBRATION ENERGY HARVESTING**
B. Edwards, M. Xie, K.C. Aw, A.P. Hu, and W. Gao
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T3P.110 **HARVESTING ENERGY FROM LOW FREQUENCY VIBRATION USING MSMA/MFC LAMINATE COMPOSITE**
S. Ju[1], S.H. Chae[1], Y. Choi[1], S. Jun[1], S.M. Park[1], S. Lee[1], H.W. Lee[2], and C.-H. Ji[1]
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T3P.111 **WIDE TUNING-RANGE RESONANT-FREQUENCY CONTROL BY COMBINING ELECTROMECHANICAL SOFTENING AND HARDENING SPRINGS**
C.P. Le and E. Halvorsen
Vestfold University College, NORWAY

Magnetic Sensors/Voltage Sensors

T3P.112 **ANTI-ELECTROMAGNETIC INTERFERENCE AND CALIBRATION SCHEMES OF FLEXIBLE CURRENT SENSOR TAG FOR RELIABLE CURRENT DETECTION IN HOUSEHOLD APPLIANCE**
Y.C. Chen[1], W.H. Hsu[1], S.H. Cheng[2], and Y.T. Cheng[1]
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T3P.113 **ISOLATED VOLTAGE SENSING USING MICRO-RESONATOR**
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Piezo/Pyro Electric Energy Harvester

T3P.114 **A MODEL FOR MAGNETIC PLUCKING OF PIEZOELECTRIC BEAMS IN ENERGY HARVESTERS**
P. Pillatsch, E.M. Yeatman, and A.S. Holmes
Imperial College, UK

Thermoelectric Thermal Energy Harvesters

T3P.115 **MICROFLUIDIC HEAT TRANSFER SYSTEMS OPTIMIZED FOR THERMOELECTRIC HEAT EXCHANGERS**
N. Wojtas and C. Hierold
ETH Zürich, SWITZERLAND

T3P.116 **SOLAR THERMOPHOTOVOLTAIC ENERGY CONVERSION SYSTEMS WITH TANTALUM PHOTONIC CRYSTAL ABSORBERS AND EMITTERS**
Y. Nam[1,2], A. Lenert [1], Y.X. Yeng[1], P. Bermel[1], M. Soljačić[1], and E.N. Wang[1]
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T3P.117 **WEARABLE THERMOELECTRIC GENERATOR FOR HUMAN CLOTHING APPLICATIONS**
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RF MEMS, Resonators & Oscillators

Resonators Oscillators

T3P.118 **DEMONSTRATION OF SUB-HZ STRUCTURAL SYMMETRY IN MICRO-GLASSBLOWN WINEGLASS RESONATORS WITH INTEGRATED ELECTRODES**
D. Senkal, M.J. Ahamed, A.A. Trusov, and A.M. Shkel
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T3P.119 **ENHANCED PIEZORESISTIVE SENSING VIA SYNCHRONIZED OSCILLATIONS IN A MECHANICALLY COUPLED DISK ARRAY**
A. Iqbal, W. Zhang, and J.E.-Y. Lee
City University of Hong Kong, HONG KONG

T3P.120 **IMPACT ON FILM BULK ACOUSTIC RESONATOR TEMPCO AND QUALITY FACTOR FROM BORON DOPED SIO_2 TEMPERATURE COMPENSATION MATERIAL**
Q. Zou, M. Small, D. Lee, F. Bi, R. Snyder, T.L. Lamers, J. Choy, and R. Ruby
Avago Technologies Inc., USA

T3P.121 **MODE SELECTION BEHAVIOR OF VHF THERMAL-PIEZORESISTIVE SELF-SUSTAINED OSCILLATORS**
H.J. Hall[1], D.E. Walker[2], L. Wang[1], R.C. Fitch[2], J.S. Bunch[1], S. Pourkamali[3], and V.M. Bright[1]
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T3P.122 **SHEAR MODE RESONATORS BASED ON ALUMINUM NITRIDE ROUND MEMBRANES WITH A RING-SHAPED ELECTRODE**
A.T. Tran, T.S.Y. Moh, G. Pandraud, H. Schellevis, A. Akhnoukh, and P.M. Sarro
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RF MEMS Waveguides

T3P.123 **DIELECTRIC CHARGING IN MEMS WITH DIELECTRIC-DIELECTRIC CONTACTS**
D. Molinero[1], C. Shen[1], J.C.M. Hwang[1], A.K. Stamper[2], S.J. Cunningham[3], and A.S. Morris[3]
[1]Lehigh University, USA, [2]IBM Corporation, USA, and *[3]wiSpry Company, USA*

T3P.124 **LTCC-BASED THREE DIMENSIONAL INDUCTORS WITH NANO-FERRITE EMBEDDED CORE FOR ONE-CHIP TUNABLE RF SYSTEMS**
Y.-C. Lin[1], F. Gabler[2], Y.-C. Tsai[1], S. Tanaka[1], T. Gessner[1,2,3], and M. Esashi[1]
[1]Tohoku University, JAPAN, [2]Fraunhofer ENAS, GERMANY, and [3]Chemnitz University of Technology, GERMANY

Optical MEMS

Micro Lenses

T3P.125 **A SILICON-GLASS HYBRID LENS FOR SIMULTANEOUS COLOR-AND-THERMAL IMAGING**
T. Takahata, K. Matsumoto, and I. Shimoyama
University of Tokyo, JAPAN

Mirrors

T3P.126 **A CONFOCAL LASER SCANNING ENDOSCOPE USING A VARIFOCAL SCANNING MIRROR**
T. Sasaki and K. Hane
Tohoku University, JAPAN

T3P.127 **LOW-VOLTAGE-ACTUATED MEMS MIRROR ARRAY WITH HIGH FILL FACTOR FOR PHOTONIC SWITCH APPLICATIONS**
M. Nakajima, K. Kuwabara, T. Sakata, M. Usui, T. Ishihara, J. Kodate, K. Hadama, N. Nemoto, T. Yamamoto, and Y. Jin
NTT Microsystem Integration Laboratories, JAPAN

Optical Switches/Splitters

T3P.128 **A NEWLY DESIGNED CURVED BEAM MICROSHUTTER DISPLAY DEVICE WITH HIGH APERTURE RATIO**
K.-S. Lim and J.-B. Yoon
Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA

Ring Resonators

T3P.129 **A TUNABLE LASER WITH LOOP-BACK EXTERNAL CAVITY BASED ON DOUBLE RING RESONATORS**
M. Ren[1], H. Cai[2], J.F. Tao[1], J.M. Tsai[2], P. Kropelnicki[2], A.B. Randles[2], M. Tang[2], D.L. Kwong[2], and A.Q. Liu[1]
[1]*Nanyang Technological University, SINGAPORE and*
[2]*Agency for Science, Technology and Research (A*STAR), SINGAPORE*

Tera Hertz & Plasmonic Devices

T3P.130 **AN OPTICALLY TUNABLE TERAHERTZ PERFECT ABSORBER**
H.R. Seren[1], A.C. Strikwerda[1], L. Cao[1], G. Keiser[1], J. Zhang[1], K. Fan[1], G. Metcalfe[2], M. Wraback[2], R.D. Averitt[1], and X. Zhang[1]
[1]*Boston University, USA* and [2]*U.S. Army Research Laboratory, USA*

Actuators

T3P.131 **ALL-POLYMER OPTOTHERMAL-ACTUATED MOEMS VARIABLE OPTICAL ATTENUATOR**
A. Llobera[1,2], B. Hoxhold[1], S. Demming[1], A. Voigt[3], S. de Pedro[2], A. Waldschik[1], V.J. Cadarso[4], G. Gruetzner[3], and S. Büttgenbach[1]
[1]*Technische Universität Braunschweig, SPAIN,* [2]*Universitat Autonoma de Barcelona, SPAIN,*
[3]*micro resist technology GmbH, GERMANY, and* [4]*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*

T3P.132 **DUAL-BEAM, SIX-TERMINAL NANOELECTROMECHANICAL RELAYS**
K.L. Harrison[1], W.S. Lee[1], K. Shavezipur[2], J. Provine[1], S. Mitra[1], H.-S.P. Wong[1], and R.T. Howe[1]
[1]*Stanford University, USA* and [2]*Ohio State University, USA*

T3P.133 **MICRO HYDRAULIC BENDING ACTUATOR FOR MINIMALLY INVASIVE MEDICAL DEVICE**
M. Matsuo, K. Abe, S. Suda, T. Matsunaga, and Y. Haga
Tohoku University, JAPAN

T3P.134 **VISUAL SERVO OF MUSCLE-POWERED OPTOGENETIC BIOACTUATOR**
S.P. Beh[1], M. Hirooka[1], T. Hoshino[1], K. Hoshino[2], Y. Akiyama[1], H. Tsujimura[2], K. Iwabuchi[2], and K. Morishima[1]
[1]*Osaka University, JAPAN* and [2]*Tokyo University of Agriculture and Technology, JAPAN*

Theory, Design & Test Methodology

Fluidic Design & Test

T3P.135 **CHARACTERIZATION AND CALIBRATION OF U-SHAPED MASS DENSITY AND VISCOSITY SENSORS BY AN ANALYTICAL MODELING APPROACH**
M. Heinisch, E.K. Reichel, T. Voglhuber-Brunnmaier, and B. Jakoby
Johannes Kepler University Linz, AUSTRIA

Physical MEMS Design

T3P.136 **FINITE ELEMENT SIMULATIONS COMBINED WITH STATISTICAL ANALYSIS OF VARIANCE: EXPLORING THE POTENTIAL OF PIEZOELECTRIC MEMS MICROPHONES**
G. Schrag, T. Reutter, and G. Wachutka
Munich University of Technology, GERMANY

T3P.137 **PARTICLE SWARM OPTIMIZATION FOR DESIGN OF MEMS RESONATORS WITH LOW THERMOELASTIC DISSIPATION**
J. Lake[1], E. Ng[2], C.-H. Ahn[2], V. Hong[2], Y. Yang[2], J. Wong[1], and R. Candler[1]
[1]*University of California, Los Angeles, USA* and [2]*Stanford University, USA*

T3P.138 **STUDIES ON THINNED FLEXIBLE INTEGRATED CAPACITIVE PRESSURE SENSORS IN TACTILE SENSOR ARRAYS FOR THE USE IN ROBOTICS AND PROSTHETICS**
J.A. Müntjes[1], J. Häfner[1], M. Görtz[2], and W. Mokwa[1]
[1]*RWTH Aachen University, GERMANY* and
[2]*Fraunhofer Institute of Microelectronic Circuits and Systems, GERMANY*

Switch Design, Simulation & Test

T3P.139 **IN-LINE ADHESION MONITORING AND THE EFFECTS OF PROCESS VARIATIONS ON ADHESION IN MEMS**
M. Shavezipur[1,2], W. Gou[1,3], C. Carraro[1], Y. Tian[1,4], R. Maboudian[1], I. Gelmi[5], R. Campedelli[5], and M. Azpeitia[5]
[1]*University of California, Berkeley, USA,* [2]*Ohio State University, USA,* [3]*Hohai University, CHINA,*
[4]*Harbin Institute of Technology, CHINA, and* [5]*STMicroelectronics, ITALY*

Late News

T3P.140 **DEMONSTRATION OF INERTIAL FOCUSING IN STRAIGHT MICROFLUIDIC CHANNELS WITH HIGH REYNOLDS NUMBERS UP TO TURBULENCE ONSET**
A.T. Ciftlik and M.A.M. Gijs
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

T3P.141 **MONOLITHIC 2GHZ ELECTROSTATICALLY ACTUATED MEMS OSCILLATOR WITH OPTO-MECHANICAL FREQUENCY MULTIPLIER**
S. Tallur and S.A. Bhave
Cornell University, USA

T3P.142 **MULTIFUNTIONAL CHRONIC 3D ELECTRODE ARRAYS BASED ON A SIMPLE FOLDING PROCESS**
J.K. John, E. Kim, H. Tu, J. Zhang, J.A. Loeb, and Y. Xu
Wayne State University, USA

T3P.143 **NICKEL-OXIDE-BASED SUPERCAPACITORS WITH HIGH ASPECT RATIO CONCENTRIC CYLINDRICAL ELECTRODES**
A. Armutlulu, J.K. Kim, M.S. Kim, S.A. Bidstrup Allen, and M.G. Allen
Georgia Institute of Technology, USA

T3P.144 **SUB-MICRON GAP A-SI:H THIN FILM LAMÉ-MODE RESONATOR PROCESSED AT LOW TEMPERATURE ON A GLASS SUBSTRATE**
A. Gualdino[1], J. Gaspar[2], V. Chu[1], and J.P. Conde[1,3]
[1]Instituto de Engenharia de Sistemas e Computadores (INESC), PORTUGAL, [2]International Iberian Nanotechnology Laboratory (INL), PORTUGAL, and [3]Instituto Superior Técnico, PORTUGAL

16:00 - 16:30 **Break & Exhibit Inspection**

Session T4A - Physical Microsystems 2
Session Chairs: T. Kenny, *Stanford University, USA* and S. Franssila, *Aalto University, FINLAND*

16:30 - 17:00 **Invited Speaker**
T4A.001 **INTERROGATING AND MANIPULATING AT THE NANOMETRE SCALE - FROM SCIENTIFIC INSTRUMENTATION TO INDUSTRIAL APPLICATIONS**
U. Staufer[1], T. Akiyama[2], S. Gautsch[2], D. Parrat[2], N.F. de Rooij[2], and R. Imer[3]
[1]Delft University of Technology, THE NETHERLANDS, [2]École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND, and [3]Centredoc, SWITZERLAND

17:00 - 17:15
T4A.002 **HIGH SPEED AND PARALLEL NANOIMAGING USING AN ARRAY OF HEATED ATOMIC FORCE MICROSCOPE CANTILEVERS**
S. Somnath, H. Kim, H. Hu, and W.P. King
University of Illinois, Urbana-Champaign, USA

17:15 - 17:30
T4A.003 **DESIGN OF MICRO-FABRICATED TRANSPARENT OPTICAL SENSORS FOR ACCURATE LINE-OF-SIGHT DETECTION AND THEIR APPLICATIONS IN INFORMATION COMMUNICATION TECHNOLOGY**
M. Ozawa[1], A. Oikawa[1], K. Sampei[1], and N. Miki[1,2]
[1]Keio University, JAPAN and *[2]Japan Science and Technology Agency (JST), JAPAN*

17:30 - 17:45
T4A.004 **MULTI-AXIAL CONFOCAL DISTANCE SENSOR USING VARIFOCAL LIQUID LENS**
K. Noda, N. Binh-Khiem, Y. Takei, T. Takahata, K. Matsumoto, and I. Shimoyama
University of Tokyo, JAPAN

17:45 - 18:00
T4A.005 **MEMS HIGH-DOSES RADIATION SENSOR**
I. Augustyniak[1], J. Dziuban[1], P. Knapkiewicz[1], M. Matusiak[2], M. Olszacki[2], and P. Pons[3,4]
[1]Wroclaw University of Technology, POLAND, [2]National Center for Nuclear Research, POLAND, [3]Laboratoire d'Analyse et d'Architecture des Systémes (LAAS), FRANCE, and [4]University of Toulouse, FRANCE

18:00 - 18:15

T4A.006 **SERPENTINE GEOMETRY FOR ENHANCED PERFORMANCE OF NANOMETER-THIN PLATINUM BOLOMETERS**

F. Purkl[1,2], T.S. English[3], G. Yama[2], J. Provine[3], A.K. Samarao[3], A. Feyh[3], B. Kim[3], G. O'Brien[3], O. Ambacher[1], R.T. Howe[3], and T.W. Kenny[3]
[1]University of Freiburg - IMTEK, GERMANY, [2]Robert Bosch LLC, USA, and *[3]Stanford University, USA*

18:15 - 18:30

T4A.007 **A NOVEL TRANSDUCER FOR PHOTON ENERGY DETECTION VIA NEAR-FIELD CAVITY OPTOMECHANICS**

J.F. Tao[1,2], H. Cai[2], W.X. Zhang[2], J.M. Tsai[2], P. Kropelnicki[2], A.B. Randles[2], M. Tang[2], and A.Q. Liu[1,2]
*[1]Nanyang Technological University, SINGAPORE and [2]Agency for Science, Technology and Research (A*STAR), SINGAPORE*

Session T4B - Microfluidics with Cells

Session Chairs: D. Juncker, *McGill University, CANADA* and Y.-K. Lee, *Hong Kong University of Science and Technology, HONG KONG*

16:30 - 17:00 **Invited Speaker**

T4B.001 **CELL-LADEN HYDROGEL BEADS, FIBERS AND PLATES FOR 3D TISSUE CONSTRUCTION**

S. Takeuchi
Tokyo University, JAPAN and Japan Science and Technology Agency (JST), JAPAN

17:00 - 17:15

T4B.002 **QUANTITATIVE ESTIMATION OF THE LIPID PRODUCTIVITY OF SINGLE ALGAE CELLS IN ALGINATE HYDROGEL MICROBEADS**

D.-H. Lee, C.Y. Bae, J.-I. Han, and J.-K. Park
Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA

17:15 - 17:30

T4B.003 **INERTIAL SEPARATION OF PARTICLES WITH SMALL SIZE-VARIATIONS USING SELF-RELEASING MICROVORTEX**

X. Wang, J. Zhou, and I. Papautsky
University of Cincinnati, USA

17:30 - 17:45

T4B.004 **REAL-TIME MULTI-PARAMETER MONITORING OF IMMOBILIZED SINGLE YEAST CELLS VIA ELECTRICAL IMPEDANCE SPECTROSCOPY**

Z. Zhu, O. Frey, N. Haandbæk, D.S. Ottoz, F. Rudolf, and A. Hierlemann
ETH Zürich, SWITZERLAND

17:45 - 18:00

T4B.005 **NOVEL MICROFLUIDIC PLATFORM WITH THROUGH-POLYDIMETHYLSILOXANE MICROTIP ELECTRODE ARRAY FOR ON-CHIP CELL ANALYSIS**

J.-G. Ha[1], S.-K. Lee[2], S.-J. Bai[2], Y.-S. Song[2], Y.-K. Kim[1], and J.-H. Park[2]
[1]Seoul National University, SOUTH KOREA and *[2]Dankook University, SOUTH KOREA*

18:00 - 18:15

T4B.006 **COMPLETE CELL SEPARATION BY MODULATING INERTIAL FORCE**

J. Zhou, P.V. Giridhar, S. Kasper, and I. Papautsky
University of Cincinnati, USA

18:15 - 18:30

T4B.007 **A MICROFLUIDIC WHOLE-PLANT PHENOTYPING DEVICE**

H. Jiang, Z. Xu, M.R. Aluru, and L. Dong

Iowa State University, USA

Session T4C - Polymer MEMS

Session Chairs: J. Gardner, *University of Warwick, UK* and R. Syms, *Imperial College London, UK*

16:30 - 17:00 **Invited Speaker**

T4C.001 **PROGRAMMING STRUCTURAL COLOR AND MAGNETIC ANISOTROPY IN POLYMER COMPOSITE MICROSTRUCTURE FOR NOVEL BIOSYSTEMS**

J. Kim, H. Lee, J. Kim, H. Kim, and S. Kwon

Seoul National University, SOUTH KOREA

17:00 - 17:15

T4C.002 **PARYLENE ORIGAMI STRUCTURE FOR INTROCULAR IMPLANTATION**

Y. Liu[1], J. Park[1], R.J. Lang[2], A. Emami-Neyestanak[1], S. Pellegrino[1], M.S. Humayun[2], and Y.-C. Tai[1]

[1]*California Institute of Technology, USA,* [2]*Robert J. Lang Origami, USA,* and

[3]*University of Southern California, Los Angeles, USA*

17:15 - 17:30

T4C.003 **CHARACTERISTIC OF SINGLE-FIBER PVDF NANO-HARVESTER VIA NEW HOLLOW CYLINDRICAL NEAR-FIELD ELECTROSPINNING PROCESS**

Y.L. Lin[1], Z.H. Liu[1,3], C.T. Pan[1], L.W. Lin[2], C.K. Yen[1], Z.Y. Ou[1], and C.H. Taso[1]

[1]*National Sun Yat-Sen University, TAIWAN,* [2]*University of California, Berkeley, USA,* and

[3]Industrial Technology Research Institute (ITRI), TAIWAN

17:30 - 17:45

T4C.004 **DESIGN AND FABRICATION OF MAGNETICALLY TUNABLE MICROSTRUCTURED SURFACES**

Y. Zhu, R. Xiao, and E.N. Wang

Massachusetts Institute of Technology, USA

17:45 - 18:00

T4C.005 **DEVELOPMENT OF A FABRICATION PROCESS FOR A PIEZOELECTRIC ENERGY HARVESTING FILM USING A REEL-TO-REEL CONTINUOUS FIBER PROCESS**

T. Yamashita[1], S. Takamatsu[2], T. Kobayashi[2], and T. Itoh[2]

[1]*Macro BEANS Center, JAPAN* and

[2]*National Institute of Advanced Industrial Science and Technology (AIST), JAPAN*

18:00 - 18:15

T4C.006 **INTEGRATION OF PDMS-INFILTRATED CNTS AND SI BULK-MICROMACHINING FOR MONOLITHIC PHYSICAL SENSORS APPLICATION**

C.-F. Hu, C.-M. Lin, and W. Fang

National Tsing Hua University, TAIWAN

18:15 - 18:30

T4C.007 **ALL-POLYMER HIGH-ASPECT-RATIO SPRING WITH EMBEDDED ELECTRODE**

Y. Feng and Y. Suzuki

University of Tokyo, JAPAN

Session T4D - Physical Actuator & Thrusters
Session Chairs: U. Varshney, *National Science Foundation (NSF), USA* and W. Lang, *University of Bremen, GERMANY*

16:30 - 17:00 **Invited Speaker**

T4D.001 **PROGRESS IN THIN-FILM SHAPE-MEMORY-ALLOY ACTUATORS**
A. Ishida
National Institute for Materials Science, JAPAN

17:00 - 17:15

T4D.002 **MULTIARTICULAR MANIPULATOR AND ITS MULTI DEGREE OF FREEDOM MOTION BY DISTRIBUTED THIN PISTON-CYLINDER ACTUATORS**
T. Chishiro and S. Konishi
Ritsumeikan University, JAPAN

17:15 - 17:30

T4D.003 **A 6-DOF PIEZOELECTRIC MICRO VIBRATORY STAGE BASED ON MULTI-AXIS DISTRIBUTED-ELECTRODE EXCITATION OF PZT/SI UNIMORPH T-BEAMS**
E.E. Aktakka, R.L. Peterson, and K. Najafi
University of Michigan, USA

17:30 - 17:45

T4D.004 **LARGE IN-PLANE DISPLACEMENT MICROACTUATORS BASED ON ELECTRO-THERMAL BIMORPHS WITH FOLDED MULTIPLE SEGMENTS**
S. Pal, S.R. Samuelson, X. Zhang, and H. Xie
University of Florida, USA

17:45 - 18:00

T4D.005 **DISPLACEMENT ENHANCEMENT OF 1-AXIS LORENTZ FORCE ACTUATOR**
S.-J. Lin, C.-C. Lee, W.-L. Sung, F.-Y. Lee and W. Fang
National Tsing Hua University, TAIWAN

18:00 - 18:15

T4D.006 **HIGH-SPEED AIR MICROJET ARRAYS PRODUCED USING ACOUSTIC STREAMING FOR MICRO PROPULSION**
S.Y. Yee, R.L. Peterson, L.P. Bernal, and K. Najafi
University of Michigan, USA

18:15 - 18:30

T4D.007 **ON-CHIP POROUS SILICON MICROTHRUSTER FOR ROBOTIC PLATFORMS**
W.A. Churaman[1], C.J. Morris[2], L.J. Currano[2], and S. Bergbreiter[1]
[1]*University of Maryland, USA* and [2]*U.S. Army Research Laboratory, USA*

18:30 **Adjourn for the Day**

20:15 - 21:45 **"Universitate de Barcelona" Reception**

Wednesday 19 June 2013

Session W1A - Fabrication Technology 1
Session Chairs: K. Böhringer, *University of Washington, USA* and J. Brugger, *École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*

08:30 - 09:00 **Invited Speaker**
W1A.001 **TRENDS IN DRUG DELIVERY SYSTEM MICROFABRICATION AND A NEW SCALABLE TECHNOLOGY USING X-RAY SYNCHROTRON IRRADIATION**
D.I. Cho, H.J. Yoo, S. Lee, S.J. Hong, J.M. Seo, T.Y. Kim, and S.J. Kim
Seoul National University, SOUTH KOREA

09:00 - 09:15
W1A.002 **MICROSTRUCTURED SIO_2 SURFACE REPELLANT TO LIQUIDS WITHOUT COATING**
T. Liu and C.-J. Kim
University of California, Los Angeles, USA

09:15 - 09:30
W1A.003 **INTEGRATION OF POLYMER MICROFLUIDIC CHANNELS, VIAS, AND CONNECTORS WITH SILICON PHOTONIC SENSORS BY ONE-STEP COMBINED PHOTOPATTERNING AND MOLDING OF OSTE**
C. Errando-Herranz[1,2], F. Saharil[1], A. Mola Romero[1,3], N. Sandström[1], R.Z. Shafagh[1], W. van der Wijngaart[1], T. Haraldsson[1], and K.B. Gylfason[1]
[1]*KTH Royal Institute of Technology, SWEDEN,* [2]*Polytechnic University of Valencia, SPAIN, and* [3]*University of Barcelona, SPAIN*

09:30 - 09:45
W1A.004 **HIGHLY-RELIABLE ELECTROSTATIC ACTUATOR USING FILLETED ELECTRODE MADE WITH PHOTORESIST SOLVENT REFLOW**
S.Y. Yee, R.L. Peterson, L.P. Bernal, and K. Najafi
University of Michigan, USA

09:45 - 10:00
W1A.005 **UV-ASSISTED INTERMITTENTLY-SPINNING OZONE STEAM ETCHING OF SU-8 FOR MICROMOLDING PROCESS**
S. Yoshida, K. Suzuki, M. Esashi, and S. Tanaka
Tohoku University, JAPAN

10:00 - 10:15
W1A.006 **AUTOMATIC PROCESS DESIGN FOR 3D THICK-FILM GRAYSCALE PHOTOLITHOGRAPHY**
F.C.M. van Kempen[1], Y. Hirai[2], F. van Keulen[1], and O. Tabata[2]
[1]*Delft University of Technology, THE NETHERLANDS* and [2]*Kyoto University, JAPAN*

Session W1B - Gas Sensors
Session Chairs: C. Di Natale, *University of Rome Tor Vergata, ITALY* and E. Llobet, *University Rovira i Virgili, SPAIN*

08:30 - 09:00 **Invited Speaker**
W1B.001 **DESIGN CRITERIA FOR PORTABLE POINT-OF-CARE BREATH ANALYSIS SYSTEMS**
Y. Zrodnikov, K. Zamuruyev, J.D. Pedersen, A.G. Fung, D.J. Peirano, M.J. Schirle, A. Panigrahy, A. Pasamontes, W.H.K. Cheung, A.A. Aksenov, M. Schivo, N.J. Kenyon, J.-P. Delplanque, and C.E. Davis
University of California, Davis, USA

09:00 - 09:15

W1B.002 **CARBON DIOXIDE GAS SENSOR WITH IONIC GEL**

K. Ishizu[1], Y. Takei[1], M. Honda[2,3], K. Noda[1], A. Inaba[1], T. Itoh[4], R. Maeda[4], K. Matsumoto[1], and I. Shimoyama[1]
[1]University of Tokyo, JAPAN, [2]NMEMS Technology Research Organization, JAPAN, [3]OMRON, JAPAN, and
[4]National Institute of Advanced Industrial Science and Technology (AIST), JAPAN

09:15 - 09:30

W1B.003 **HYSTERESIS-FREE, SUSPENDED PRISTINE CARBON NANOTUBE GAS SENSORS**

K. Chikkadi, M. Muoth, and C. Hierold
ETH Zürich, SWITZERLAND

09:30 - 09:45

W1B.004 **HIGHLY SENSITIVE NO_2 GAS SENSOR BASED ON ZINC OXIDE/COPPER OXIDE HYBRID-NANOSTRUCTURES**

M.K. Fuadi, D. Yang, C. Park, and I. Park
Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA

09:45 - 10:00

W1B.005 **SEEBECK OZONE SENSORS**

M. Mischo[1], M. Bitterling[1], M. Himmerlich[2], S. Krischok[2], O. Ambacher[1], and V. Cimalla[1]
[1]Fraunhofer Institute for Applied Solid State Research, GERMANY and
[2]Ilmenau University of Technology, GERMANY

10:00 - 10:15

W1B.006 **A LOW-POWER CMOS INTEGRATED SENSOR FOR CO_2 DETECTION IN THE PERCENTAGE RANGE**

A. Humbert[1], B.J. Tuerlings[2], R.J.O.M. Hoofman[1], Z. Tan[3], D. Gravesteijn[1], M.A.P. Pertijs[3], C.W.M. Bastiaansen[4], and D. Soccol[1]
[1]NXP Semiconductors N.V., BELGIUM, [2]Polymer Technology Group Eindhoven B.V., THE NETHERLANDS, [3]Delft University of Technology, THE NETHERLANDS, and
[4]Eindhoven University of Technology, THE NETHERLANDS

Session W1C - Medical Microsystems

Session Chairs: A. Llobera, *Spanish Council for Scientific Research (CSIC), SPAIN* and M. Shikida, *Nagoya University, JAPAN*

08:30 - 09:00 **Invited Speaker**

W1C.001 **NOVEL MEDICAL WIRED PALPATION DEVICE; A VALIDATION STUDY OF MATERIAL PROPERTIES**

X. Wang[1], C. Di Natali[2], M. Beccani[2], M. Kern[1], P. Valdastri[2], and M. Rentschler[1]
[1]University of Colorado, USA and [2]Vanderbilt University, USA

09:00 - 09:15

W1C.002 **IMPLANTABLE ACCELEROMETER FOR DETERMINATION OF BLOOD PRESSURE**

M. Theodor[1], J. Fiala[1], D. Ruh[1], K. Förster[2], C. Heilmann[2], F. Beyersdorf[2], H. Zappe[1], and A. Seifert[1]
[1]University of Freiburg - IMTEK, GERMANY and *[2]University Medical Center Freiburg, GERMANY*

09:15 - 09:30

W1C.003 **STIMULATING AUDITORY NERVE WITH MEMS HARVESTERS FOR FULLY IMPLANTABLE AND SELF-POWERED COCHLEAR IMPLANTS**

L. Beker[1], Ö. Zorlu[1], N. Göksu[2], and H. Külah[1]
[1]Middle East Technical University (METU), TURKEY and *[2]Gazi University, TURKEY*

09:30 - 09:45

W1C.004 **MAGNETIC SENSOR FOR MONITORING OF ARTERIAL STRAIN**

J. Ruhhammer[1], T. Herbstritt[1], K. Foerster[2], C. Heilmann[2], F. Beyersdorf[2], A. Seifert[1], F. Goldschmidtboeing[1], and P. Woias[1]
[1]*University of Freiburg - IMTEK, GERMANY* and [2]*University Medical Center Freiburg, GERMANY*

09:45 - 10:00

W1C.005 **A MEMS-BASED PASSIVE HYDROCEPHALUS SHUNT WITH ADAPTIVE FLOW CHARACTERISTICS**

S.B. Johansson[1], A. Eklund[2], J. Malm[2], G. Stemme[1], and N. Roxhed[1]
[1]*KTH Royal Institute of Technology, SWEDEN* and [2]*Umeå University, SWEDEN*

10:00 - 10:15

W1C.006 **CHARACTERIZATION OF LIQUID JET INJECTION INTO TISSUE BASED ON OPTICAL COHERENCE TOMOGRAPHY**

K. Mutschler[1], L. Tanguy[2], N. Weber[1], A. Ernst[1], R. Zengerle[1,2], and P. Koltay[1]
[1]*University of Freiburg - IMTEK, GERMANY and*
[2]*Institute for Micromachining and Information Technology (HSG-IMIT), GERMANY*

Session W1D - Actuators for Bioapplications

Session Chairs: S. Bergbreiter, *University of Maryland, USA* and N. Miki, *Keio University, JAPAN*

08:30 - 09:00 **Invited Speaker**

W1D.001 **PNEUMATICALLY ACTUATED DEVICES FOR CELL MANIPULATION**

Y. Sun
University of Toronto, CANADA

09:00 - 09:15

W1D.002 **A HYDROGEL-BASED INTRAVASCULAR MICROGRIPPER MANIPULATED USING MAGNETIC FIELDS**

J.-C. Kuo, S.-W. Tung, and Y.-J. Yang
National Taiwan University, TAIWAN

09:15 - 09:30

W1D.003 **FLEXIBLE PNEUMATIC TWISTING ACTUATORS**

B. Gorissen[1,2], T. Chishiro[1], S. Shimomura[1], M. De Volder[2], D. Reynaerts[2], and S. Konishi[1]
[1]*Ritsumeikan University, JAPAN* and [2]*Katholieke Universiteit Leuven, BELGIUM*

09:30 - 09:45

W1D.004 **NEMATIC OPTO-MECHANICAL ACTUATORS FOR THE FABRICATION OF REFRESHABLE TACTILE SYSTEMS**

N. Torras[1], K.E. Zinoviev[1], C.J. Camargo[1], E.M. Campo[1], H. Campanella[1], J. Esteve[1], J.E. Marshall[2], E.M. Terentjev[2], M. Omastova[3], I. Krupa[3], P. Teplický[4], B. Mamojka[4], P. Burns[5], B. Röder[5], M. Vallribera[1], R. Malet[1], S. Zuffanelli[1], V. Soler[1], J. Roig[1], N. Walker[6], D. Wenn[7], F. Vossen[8], and F.M.H. Crompvoets[8]
[1]*Universitat Antònoma de Barcelona (UAB), SPAIN,* [2]*University of Cambridge, UK,* [3]*Slovak Academy of Science, SLOVAKIA,* [4]*Unia Nevidiacich a Slabozrakych Slovenska, SLOVAKIA,* [5]*Universität Hamburg, GERMANY,*
[6]*Microsharp Corporation Ltd, UK,* [7]*iXscient Ltd, UK,* and [8]*Philips Research, THE NETHERLANDS,*

09:45 - 10:00

W1D.005 **PHOTO-PATTERNING OF IONOGEL MICROSTRUCTURES FOR ON-CHIP MICROVALVE APPLICATIONS CONTROLLED BY FIBER OPTICS**

M. Czugala[1], C. O'Connell[1], A. McKeon[1], C. Fernández Sánchez[2], X. Munoz-Berbel[2], A. Llobera[2], D. Diamond[1], and F. Benito-Lopez[1,3]
[1]Dublin City University, IRELAND, [2]Spanish Council for Scientific Research (CSIC), SPAIN, and [3]CIC microGUNE, SPAIN

10:00 - 10:15

W1D.006 **MICROFLUIDIC CELLULAR VALVE POWERED BY LINEAR BIOACTUATOR**

M. Nagai, K. Tanizaki, Y. Hayasaka, T. Kawashima, and T. Shibata
Toyohashi University of Technology, JAPAN

10:15 - 10:45 **Break & Exhibit Inspection**

Session W2A - Resonance Phenomena

Session Chairs: C.-W. Baek, *Chung-Ang University, SOUTH KOREA* and M. Tabib-Azar, *National Science Foundation (NSF), USA*

10:45 - 11:00

W2A.001 **BI-STATE CONTROL OF A DUFFING MICRORESONATOR ON THE FALLING EDGE OF THE INSTABILITY**

C. Guo and G.K. Fedder
Carnegie Mellon University, USA

11:00 - 11:15

W2A.002 **STOCHASTIC RESONANCE IN A VOLTAGE-CONTROLLED MEMS-SLIDER: INCREASING THE SIGNAL-TO-NOISE RATIO WITH NOISE**

H. Droogendijk, M.J. de Boer, R.A. Brookhuis, R.G.P. Sanders, and G.J.M. Krijnen
MESA+, University of Twente, THE NETHERLANDS

11:15 - 11:30

W2A.003 **INVESTIGATING VIBRATION DYNAMICS OF CROSS-COUPLED MEMS RESONATORS FOR REDUCED MOTIONAL RESISTANCE**

A. Erbes, P. Thiruvenkatanathan, J. Yan, and A.A. Seshia
University of Cambridge, UK

11:30 - 11:45

W2A.004 **SURFACE EFFECT INFLUENCE ON THE QUALITY FACTOR OF MICRORESONATORS**

B. Shiari and K. Najafi
University of Michigan, USA

11:45 - 12:00

W2A.005 **VISCOTHERMAL ACOUSTIC WAVE IN MICRO SCALE RESONATORS.**

H.C. Qiu[1,2], P. Schwarz[1], D. Feili[1], X.Z. Wu[2], and H. Seidel[1]
[1]Saarland University, GERMANY and *[2]National University of Defense Technology, CHINA*

12:00 - 12:15

W2A.006 **GEOMETRIC COMPENSATION OF (100) SINGLE CRYSTAL SILICON DISK RESONATING GYROSCOPE FOR MODE-MATCHING**

C.H. Ahn, E.J. Ng, V.A. Hong, Y. Yang, B.J. Lee, M.W. Ward, and T.W. Kenny
Stanford University, USA

12:15 - 12:30

W2A.007 **A MICROMECHANICAL RESONANT CHARGE PUMP**

Y. Lin, R. Liu, W.-C. Li, M. Akgul, and C.T.-C. Nguyen
University of California, Berkeley, USA

Session W2B - Liquid Chemical Sensing

Session Chairs: I. Barsony, *Hungarian Academy of Sciences, HUNGARY* and S. Tadigadapa, *Pennsylvania State University, USA*

10:45 - 11:00

W2B.001 **HIGH-SPEED CHEMICAL IMAGING INSIDE A MICROFLUIDIC CHANNEL**

A. Itabashi[1], K. Miyamoto[1], T. Wagner[1], M.J. Schöning[2,3], and T. Yoshinobu[1]
[1]*Tohoku University, JAPAN,* [2]*Aachen University of Applied Sciences, GERMANY,* and
[3]Peter-Grünberg Institute, GERMANY

11:00 - 11:15

W2B.002 **A WIRELESS CHEMICAL SENSOR USING FERROPARTICLES EMBEDDED HYDROGEL**

J.H. Park[1], S.H. Song[1], G. Chitnis[1], R.A. Siegel[2], and B. Ziaie[1]
[1]*Purdue University, USA* and [2]*University of Minnesota, USA*

11:15 - 11:30

W2B.003 **MULTIDIMENSIONAL METAMATERIAL FLUID SENSOR**

R. Lucklum[1], M. Zubtsov[1], A. Oseev[1], A. Omar[1], and A. Martinez[2]
[1]*Otto-von-Guericke-University Magdeburg, GERMANY* and [2]*Universidad Politécnica de Valencia, SPAIN*

11:30 - 11:45

W2B.004 **DEVELOPMENT OF A 64×64-PIXEL ION CAMERA CHIP FOR IONIC IMAGING USING AN UNMODIFIED 0.35 µM CMOS TECHNOLOGY**

B. Nemeth, A. Streklas, A.G. Boulay, M. Symes, C. Busche, L. Cronin, and D.R.S. Cumming
University of Glasgow, UK

11:45 - 12:00

W2B.005 **A 7µW PH-TO-DIGITAL CONVERTER FOR QUALITY MONITORING OF PERISHABLE PRODUCTS**

S.H. Shalmany[1], M. Merz[2], A. Fekri[1], Z. Chang[1], R. Hoofman[2], and M.A.P. Pertijs[1]
[1]*Delft University of Technology, THE NETHERLANDS and* [2]*NXP Semiconductors, BELGIUM*

12:00 - 12:15

W2B.006 **SILICON NANOWIRE ION-SENSITIVE FIELD-EFFECT TRANSISTOR ARRAY INTEGRATED WITH A CMOS-BASED READOUT CHIP**

P. Livi[1], M. Wipf[2], A. Tarasov[2], R. Stoop[2], K. Bedner[3], J. Rothe[1], Y. Chen[1], A. Stettler[1], C. Schönenberger[2], and A. Hierlemann[1]
[1]*ETH Zürich, SWITZERLAND,* [2]*University of Basel, SWITZERLAND,* and [3]*Paul Scherrer Institute, SWITZERLAND*

12:15 - 12:30

W2B.007 **NANOPOROUS SENSOR FOR THE DETECTION OF NITROGEN TRICHLORIDE IN SWIMMING POOLS. FROM THE LABORATORY TO THE MARKET**

T.-H. Nguyen[1,2], C. Rivron[1], T.-H. Tran-Thi[1], E. Chevallier[2], P. Karpe[1,2], and C. Beaubestre[3]
[1]*Commissariat à l'énergie Atomique (CEA),* [2]*Etherae R&D, FRANCE, and* [3]*Laboratoire d'Hygiéne, FRANCE*

Session W2C - Pressure Sensors
Session Chairs: B. Jakoby, *Johannes Kepler University Linz, AUSTRIA* and X. Li, *Chinese Academy of Sciences, CHINA*

10:45 - 11:00
W2C.001 **NOVEL TPMS SENSING CHIP WITH PRESSURE SENSOR EMBEDDED IN ACCELEROMETER**
W.-C. Yeh[1], C.-K. Chan[1], J. Hsieh[1], C.-F. Hu[2], F.-M. Hsu[2], and W. Fang[2]
[1]Asia Pacific Microsystems, Inc., TAIWAN and *[2]National Tsing Hua University, TAIWAN*

11:00 - 11:15
W2C.002 **PIEZORESISTIVE PRESSURE SENSOR WITH DUAL-UNIT CONFIGURATION FOR ON-CHIP SELF-COMPENSATION AND SUPPRESSION OF TEMPERATURE DRIFT**
J.C. Wang[1], X.Y. Xia[1], H.S. Zou[1], F. Song[2], and X. Li[1]
[1]Chinese Academy of Sciences, CHINA and [2]Shanghai University of Engineering Science, CHINA

11:15 - 11:30
W2C.003 **ULTRA-COMPACT ABSOLUTE PRESSURE SENSOR BASED ON MECHANICAL AMPLIFICATION COUPLED TO SUSPENDED PIEZORESISTIVE NANOGAUGE**
Y. Deimerly[1,2], P. Robert[1], G. Jourdan[1], P. Rey[1], and T. Bourouina[2]
[1]Commissariat à l'énergie Atomique (CEA), FRANCE and [2]Université Paris-Est, FRANCE

11:30 - 11:45
W2C.004 **MICROFABRICATED SPHERICAL PRESSURE SENSING PARTICLES FOR PRESSURE AND FLOW MAPPING**
Y. Xie, N. Banerjee, and C.H. Mastrangelo
University of Utah, USA

11:45 - 12:00
W2C.005 **PIEZOELECTRIC PRESSURE MICROSENSOR ARRAYS**
G. Mirshekari, M. Brouillette, and L.G. Frechette
Universite de Sherbrooke, CANADA

12:00 - 12:15
W2C.006 **A NEW INTRACRANIAL PRESSURE SENSOR ON POLYIMIDE LAB-ON-A-TUBE USING EXCHANGED POLYSILICON PIEZORESISTORS**
Z.Z. Wu[1], N. Bhattacharjee[1], C.Y. Li[1,2], J.A. Hartings[3], R.K. Narayan[2], and C.H. Ahn[1]
[1]University of Cincinnati, USA, [2]Feinstein Institute for Medical Research, USA, and [3]University of Cincinnati College of Medicine, USA

12:15 - 12:30
W2C.007 **MICRO PIRANI PRESSURE SENSOR FABRICATED BY INKJET PRINTING OF SILVER NANOPARTICLES**
D. Sette[1], D. Mercier[1], P. Brunet-Manquat[1], C. Poulain[1], and A. Blayo[2]
[1]Commissariat à l'énergie Atomique (CEA), FRANCE and *[2]Grenoble Institute of Technology, FRANCE*

Session W2D - Optofluidics
Session Chairs: C. Bergaud, *Laboratoire d'Analyse et d'Architecture des Systémes (LAAS-CNRS), FRANCE* and S. Takeuchi, *University of Tokyo, JAPAN*

10:45 - 11:00
W2D.001 **MICROFLUDICALLY TUNABLE LENTICULAR LENS**
Y. Iimura[1], T. Teshima[1], Y.J. Heo[1,2], Y. Morimoto[1], S. Yoshida[1], H. Onoe[1,2], and S. Takeuchi[1,2]
[1]University of Tokyo, JAPAN and [2]Japan Science and Technology Agency (JST), JAPAN

11:00 - 11:15

W2D.002 **A NANO-OPTOFLUIDIC WAVEGUIDE COUPLER WITH SUPER-RESOLUTION VIA CONCURRENT DEAN FLOWS**

L.K. Chin, Y. Yang, L. Lei, and A.Q. Liu

Nanyang Technological University, SINGAPORE

11:15 - 11:30

W2D.003 **TRANSPORTATION OF MONO-DISPERSED MICRO-PLASMA BUBBLE IN MICROFLUIDIC CHIP UNDER ATMOSPHERIC PRESSURE**

Y. Yamanishi, S. Sameshima, H. Kuriki, S. Sakuma, and F. Arai

Nagoya University, JAPAN

11:30 - 11:45

W2D.004 **A MICROFLUIDIC SURFACE ENHANCED RAMAN SPECTROSCOPIC BIOSENSOR USING APTAMER FUNCTIONALIZED NANOPILLARS**

J. Yang[1], M. Palla[1], F.G. Bosco[2], M.S. Schmidt[2], T. Rindzevicius[2], A. Boisen[2], J. Ju[1], and Q. Lin[1]

[1]*Columbia University, USA* and [2]*Technical University of Denmark, DENMARK*

11:45 - 12:00

W2D.005 **ELECTROPHORETIC PRECONCENTRATION ON PLASMONIC NANOPILLAR ARRAYS FOR HIGHLY INTENSE SURFACE-ENHANCED RAMAN SCATTERING**

M. Park, Y.-J. Oh, and K.-H. Jeong

Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA

12:00 - 12:15

W2D.006 **SERS CHARACTERIZATION BASED ON SILVER NANOPARTICLE DIMER IN MICROFLUIDIC LAMINAR FLOW FOR MOLECULE TRACE DETECTION**

K. Sugano[1], H. Katayama[2], Y. Hirai[2], T. Tsuchiya[2], and O. Tabata[2]

[1]*Kobe University, JAPAN and* [2]*Kyoto University, JAPAN*

12:15 - 12:30

W2D.007 **PHOTOPROCESSIBLE THERMO-SENSITIVE GEL ACTUATOR FOR FUNCTIONAL MICROFLUIDIC DEVICES**

K. Ito[1], S. Sakuma[1], Y. Yokoyama[2], and F. Arai[1]

[1]*Nagoya University, JAPAN* and [2]*Toyama Industrial Technology Center, JAPAN*

12:30 - 14:15 **Lunch on Own & Exhibit Inspection**

14:15 - 16:30 **Poster Session W3P**

Mechanical/Physical Sensors and Microsystems

Accelerometer

W3P.001 **A SENSING DEVICE FOR FORCE AND INERTIAL MEASUREMENTS OF HAND WRITING BEHAVIOR**

M. Attari, A. Touchen, Y. Remram, and S. Boukhenous

Université des Sciences et de la Technologie, ALGERIA

W3P.002 **DESIGN AND IMPLEMENTATION OF A NOVEL POLY-SI SINGLE PROOF-MASS DIFFERENTIAL CAPACITIVE-SENSING 3-AXIS ACCELEROMETER**

S.-C. Lo[1], C.-K. Chan[2], W.-C. Lai[1], M. Wu[3], Y.-C. Lin[4], and W. Fang[1]
[1]National Tsing Hua University, TAIWAN, [2]Asia Pacific Microsystems Inc., TAIWAN, [3]Domintech Co. Ltd., TAIWAN, and *[4]National Cheng Kung University, TAIWAN*

W3P.003 **HIGH-SENSITIVITY DIFFERENTIAL FRINGE-FIELD MEMS ACCELEROMETERS**

G. Langfelder[1], A. Caspani[1], A. Tocchio[1,2], S. Zerbini[2], and A.F. Longoni[1]
[1]Politecnico di Milano, ITALY and [2]ST Microelectronics, ITALY

W3P.004 **PERFORMANCE ENHANCEMENT OF A DUAL-AXIS MICRO-ACCELEROMETER USING COMPLIANT DISPLACEMENT-AMPLIFIERS**

S. Khan and G.K. Ananthasuresh
Indian Institute of Science, INDIA

Acoustic Sensors

W3P.005 **PIEZOELECTRIC MICROMACHINED ULTRASOUND TRANDUCER ARRAY FOR PHOTOACOUSTIC IMAGING**

W. Liao[1], W. Liu[2], J.E. Rogers[1], F. Usmani[1], Y. Tang[2], B. Wang[2], H. Jiang[1], and H. Xie[1]
[1]University of Florida, USA and *[2]Southeast University, CHINA*

W3P.006 **WIDE-BAND AERO-ACOUSTIC MICROPHONE WITH IMPROVED LOW-FREQUENCY CHARACTERISTICS**

Z.J. Zhou[1], L. Rufer[2], E. Salze[3], S. Ollivier[3], and M. Wong[1]
[1]Hong Kong University of Science & Technology, HONG KONG, [2]TIMA Laboratory, FRANCE, and *[3]École Centrale de Lyon, FRANCE*

Actuators & Characterization Tools

W3P.007 **IMPROVED MEMS-IN-TEM SETUP FOR HIGH SENSITIVITY THERMAL CHARACTERIZATION OF NANOWIRE USING A NEW TEM CRYO-HOLDER**

L. Jalabert[1], G. Valet[1], A. Chorosz[2], D. Guo[1], R. Kometani[1], H. Guillou[1], T. Sato[1], S. Volz[3], and H. Fujita[1]
[1]University of Tokyo, JAPAN, [2]ECAM, FRANCE, and [3]Ecole Centrale Paris, FRANCE

W3P.008 **SELF POWERED INERTIA SENSOR BASED ON VIBRATION ENERGY HARVESTER USING ELECTRET AND FERROELECTRIC PLATE**

M. Suzuki, T. Takahashi, and S. Aoyagi
Kansai University, JAPAN

Gyroscope

W3P.009 **A HIGH-Q BIRDBATH RESONATOR GYROSCOPE (BRG)**

J. Cho, J.-K. Woo, J. Yan, R. L. Peterson, and K. Najafi
University of Michigan, USA

W3P.010 **A Y-AXIS SOI-MEMS GYROSCOPE WITH A ZIGZAG-SHAPED Z-ELECTRODE SUPPORTED BY THREE-DIMENSIONALLY-INTERSECTED Z-BEAMS**

T. Akashi, Y. Omura, H. Funabashi, M. Fujiyoshi, Y. Nonomura, and Y. Hata
Toyota Central R&D Labs Inc., JAPAN

W3P.011 **MEMS GYROSCOPE BIAS DRIFT CANCELLATION USING CONTINUOUS-TIME MODE REVERSAL**
M.H. Kline[1], Y.-C. Yeh[1], B. Eminoglu[1], I.I. Izyumin[1], M. Daneman[3], D.A. Horsley[2], and B.E. Boser[1]
[1]University of California, Berkeley, USA, [2]University of California, Davis, USA, and *[3]Invensense, USA,*

Infrared & Magnetic

W3P.012 **CHARACTERIZATION AND MODEL VALIDATION OF A MICROMECHANICAL RESONANT MAGNETIC FIELD SENSOR**
W. Zhang and J.E.-Y. Lee
City University of Hong Kong, HONG KONG

W3P.013 **NOVEL CONCEPT AND TECHNOLOGY FOR A SELF RESONANT MAGNETIC FIELD SENSOR**
P. Simon and O. Paul
University of Freiburg - IMTEK, GERMANY

Pressure & Flow

W3P.014 **DETERMINATION OF THE THERMAL CONDUCTIVITY OF GASES UNDER FLOW CONDITIONS**
D.F. Reyes Romero, K. Kogan, A.S. Cubukcu, and G.A. Urban
University of Freiburg, GERMANY

W3P.015 **HYBRID CONTACT LENS CAPABLE OF INTRAOCULAR PRESSURE MONITORING IN NONINVASIVE WAY**
V. Laukhin[1,2,3], V. Lebedev[2], E. Laukhina[3], R. Martin[4], J.C. Pastor[4], R. Villa[2], J. Aguilo[2], C. Rovira[2,3], and J. Veciana[2,3]
[1]Institució Catalana de Recerca I Estidis Avançats (ICREA), SPAIN, [2]Spanish Council for Scientific Research (CSIC), SPAIN, [3]Biomedical Research Networking Centre on Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN), SPAIN, and [4]Universidad de Valladolid, SPAIN

W3P.016 **THREE DIMENSIONAL THERMAL SENSOR FOR INTRAVASCULAR FLOW MONITORING**
R. Tang[1], H. Huang[1], Y.M. Yang[2], J. Oiler[1], M. Liang[1], and H. Yu[1]
[1]Arizona State University, USA and [2]Intel, USA

Resonant Sensors

W3P.017 **ENHANCED PERFOMANCE OF SENSOR/ACTUATOR INTEGRATED PIEZOELECTRIC MICROCANTILEVER BY USING TETRAGONAL COMPOSITON PZT THIN FILMS**
T. Kobayashi[1], N. Makimoto[1], H. Funakubo[2], T. Oikawa[2], A. Wada[2], T. Itoh[1], and R. Maeda[1]
[1]National Institute of Advanced Industrial Science and Technology (AIST), JAPAN, and
[2]Tokyo Institute of Technology, JAPAN

W3P.018 **THIN FILM CONDUCTIVITY SENSOR BASED ON ACOUSTOELECTRIC INTERACTION IN 36° YX LITHIUM TANTALATE**
D. Čiplys, R. Rimeika, and A. Sereika
Vilnius University, LITHUANIA

W3P.019 **VERTICAL CARBON NANOFIBER ARRAYS AND NANOMECHANICAL RESONATORS WITH POTENTIAL FOR RADIATION SENSING**
J. Lee[1], A.B. Kaul[2], and P.X.-L. Feng[1]
[1]Case Western Reserve University, USA and *[2]California Institute of Technology, USA*

Tactile Sensors

W3P.020 **A DOME SHAPED PIEZOELECTRIC TACTILE SENSOR ARRAY USING CONTROLLED INFLATION TECHNIQUE**
M.S. Kim, S.E. Jo, D.H. Kang, H.R. Ahn, and Y.J. Kim
Yonsei University, SOUTH KOREA

W3P.021 **CMOS-BASED TACTILE SENSORS USING OXIDE AS SACRIFICIAL LAYER**
Y.-C. Lin, C.-J. Hsieh, C.-T. Sun, J.-C. Liou, and W.-C. Tian
National Taiwan University, TAIWAN

W3P.022 **HYPER-FLEXIBLE 1-D SHAPE SENSOR**
M.K. Dobrzynski, H. Vanderparre, R. Pericet-Camara, G. L'Eplattenier, S. Lacour, and D. Floreano
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

Thermometers

W3P.023 **A MONOLITHIC POLYIMIDE MICRO CRYOGENIC COOLER**
Y.D. Wang[1], R. Lewis[1], R. Radebaugh[2], and Y.C. Lee[1]
[1]*University of Colorado, USA* and [2]*National Institute of Standards and Technology (NIST), USA*

W3P.024 **HIGH TEMPERATURE MICRO-HOTPLATES ON POROUS SILICON SUBSTRATES**
F. Lucklum[1], A. Schwaiger[2], and B. Jakoby[1]
[1]*Johannes Kepler University Linz, AUSTRIA* and [2]*E+E Elektronik Ges.m.b.H, AUSTRIA*

W3P.025 **SILICON ON INSULATOR THERMODIODE WITH EXTREMELY WIDE WORKING TEMPERATURE RANGE**
A. De Luca[1], V. Pathirana[1,2], S.Z. Ali[2], and F. Udrea[1,2]
[1]*University of Cambridge, UK* and [2]*Cambridge CMOS Sensors, UK*

Materials, Fabrication & Packaging Technologies

3-D Structures

W3P.026 **3-LAYER-COPPER MICROCOILS TRANSFORMED INTO 3-D CYLINDRICAL STATOR WINDINGS FOR MICROMOTORS**
V. Biefeld[1], S. Springmann[2], and W. Lang[1]
[1]*University of Bremen, GERMANY* and [2]*Kählig Antriebstechnik GmbH, GERMANY*

W3P.027 **FABRICATION OF 3D STRUCTURES USING SELF-ASSEMBLY AT AIR-WATER INTERFACE**
K.S. Park[1], Ç. Varel[1], R. Baskaran[2], and K.F. Böhringer[1]
[1]*University of Washington, USA* and [2]*Intel Corporation, USA*

W3P.028 **OPTIMAL ARTICULATION STRATEGY FOR A MICROFABRICATED GECKO-INSPIRED CONTROLLABLE ADHESIVE**
J. Tamelier, S. Chary, and K.L. Turner
University of California, Santa Barbara, USA

W3P.029 **THE SIZE LIMIT OF AL/NI MULTILAYER RECTANGULAR CUBOIDS FOR GENERATING SELF-PROPAGATING EXOTHERMIC REACTION ON A SI WAFER**
S. Ito[1], S. Inoue[1], and T. Namazu[1,2]
[1]*University of Hyogo, JAPAN* and [2]*Japan Science and Technology Agency (JST), JAPAN*

Films & Nanostructures

W3P.030 **ULTRA-THIN ATOMIC LAYER DEPOSITION FILMS FOR CORROSION RESISTANCE**
A.J. Haemmerli, J.C. Doll, J. Provine, R.T. Howe, D. Goldhaber-Gordon, and B.L. Pruitt
Stanford University, USA

W3P.031 **DEVELOPMENT OF SUSPENDED 2D CARBON NANOSTRUCTURES: NANOWIRES TO NANOMESHES**
Y. Lim[1], J. Heo[1], M.J. Madou[2], and H. Shin[1]
[1]*Ulsan National Institute of Science and Technology (UNIST), SOUTH KOREA,* and
[2]*University of California, Irvine, USA*

W3P.032 **LOW THERMAL BUDGET LOW STRESS THICK POLYSILICON FILMS FOR MEMS USING ULTRA-HIGH VACUUM E-BEAM EVAPORATION**
A. Michael, C.Y. Kwok, O. Kazuo, and S. Varlamov
University of New South Wales, AUSTRALIA

W3P.033 **STABLE DRIE-PATTERNED SiO_2/Si_3N_4 ELECTRETS**
S. Boisseau, J.J. Chaillout, J.S. Danel, J.B. Legras, and G. Despesse
Commissariat à l'énergie Atomique (CEA), FRANCE

Materials Characterization

W3P.034 **EFFECT OF SURFACE MORPHOLOGY AND CRYSTAL ORIENTATIONS ON FRACTURE STRENGTH OF THIN FILM (110) SINGLE CRYSTAL SILICON**
A. Uesugi, Y. Hirai, K. Sugano, T. Tsuchiya, and O. Tabata
Kyoto University, JAPAN

W3P.035 **MATERIAL STRENGTH EXAMINATION OF THIN FILM PDMS FOR RELIABLE PNEUMATIC BALLOON ACTUATOR**
Y. Matsushita, C. Nakagami, T. Toriyama, and S. Konishi
Ritsumeikan University, JAPAN

W3P.036 **TENSION-TORSION-BENDING COMBINED LOADING TEST TECHNIQUE FOR THE RELIABILITY OF MEMS STRUCTURES**
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Packaging

W3P.037 **MEMS MIXER AS AN EXAMPLE OF A NOVEL CONSTRUCTION METHOD OF MICROFLUIDICS BY DISCRETE MICROPARTS**
Y. Murakami, K. Araki, R. Ohashi, H. Honma, K. Takahashi, K. Sawada, and M. Ishida
Toyohashi University of Technology, JAPAN

W3P.038 **STRESS-MINIMIZED PACKAGING OF INERTIAL SENSORS USING WIRE BONDING**
S. Schröder[1], A. Nafari[2], K. Persson[2], E. Westby[3], A.C. Fischer[1], G. Stemme[1], F. Niklaus[1], and S. Haasl[1]
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W3P.039 **WAFER LEVEL SANDWICH PACKAGING TECHNOLOGY FOR THREE-AXIS PIEZORESISTIVE ACCELEROMETER**
T. Aono, A. Kazama, R. Okada, S. Hata, and E. Sakamoto
Hitachi, Ltd., JAPAN

Patterning Printing & Etching

W3P.040 **A PDMS/METAL-FILM PHOTO-MASK FOR LARGE-AREA CONTACT PHOTOLITHOGRAPY AT SUB-MICROMETR SCALE**
Y.C. Lee and Y.T. Hsieh
National Cheng Kung University, TAIWAN

W3P.041 **MICRO-RELAY RELIABILITY IMPROVEMENT BY INKJET-PRINTED MICROSHELL ENCAPSULATION**
Y. Chen, E.S. Park, I.-R. Chen, L. Hutin, V. Subramanian, and T.-J. King Liu
University of California, Berkeley, USA

W3P.042 **PERFECT ADSORPTION OF PPB-LEVEL SURFACTANT IN 5%KOH WATER SOLUTION ON A SILICON SURFACE CHANGING ANISOTROPIC ETCHING PROPERTIES**
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Nanoscale Materials, Devices & Fabrication

Bio/Chemical Sensor

W3P.043 **A DESIGN OF HIGH PERFORMANCE GAS SENSOR ARRAY WITH DISCRETE ISLANDS OF AU CATALYST FOR INCREASING OF ZINC OXIDE NANOWIRE JUNCTIONS**
H. Nguyen[1], C.T. Quy[2], N.D. Hoa[2], and N.V. Hieu[2]
[1]*Uppsala University, SWEDEN* and [2]*Hanoi University of Science and Technology, VIETNAM*

W3P.044 **HIGHLY EFFICIENT SURFACE IONIZATION GAS DETECTORS USING MICROFABRICATED PLATFORMS WITH INTEGRATED SURFACE ELECTRODES**
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W3P.045 **LABEL-FREE AND REAL-TIME DNA DETECTOR BASED ON AS-GROWN CVD GRAPHENE**
W.R. Wang, A.R. Gao, N. Lu, C. Liang, H. Yang, T. Li, and Y.L. Wang
Chinese Academy of Sciences, CHINA

Fabrication

W3P.046 **A ELECTROSTATIC CONTROLLED NEAR-FIELD NANO-OPTO-PROBE FOR NANO MANIPULATION**
M. Ren[1], H. Cai[2], Y. Yang[1], J.M. Tsai[2], P. Kropelnicki[2], A.B. Randles[2], M. Tang[2], D.L. Kwong[2], and A.Q. Liu[1,2]
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W3P.047 **INTEGRATRION OF UNIFORM POROUS SHELL LAYERS IN MICROFABRICATED PILLAR ARRAY COLUMNS BY ELECTROCHEMICAL ANODIZATION**

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W3P.048 **MULTIPLE ANTIWEAR PROBES FOR STABLE AND HIGH THROUGHPUT SCANNING PROBE MICROSCOPE NANOLITHOGRAPHY**

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Nanodevices

W3P.049 **245 MHZ GRAPHENE-ALUMINUM NITRIDE NANO PLATE RESONATOR**

Z. Qian, Y. Hui, F. Liu, S. Kar, and M. Rinaldi
Northeastern University, USA

W3P.050 **FABRICATION OF CNFETS WITH LOW-RESISTANCE ELECTRICAL CONTACTS**

W. Liu, K. Chikkadi, S.W. Lee, C. Hierold, and M. Haluska
ETH Zürich, SWITZERLAND

W3P.051 **SYNCHRONIZATION OF STOCHASTIC RESONANCE USING COUPLED NONLINEAR SILICON RESONATORS**

Y. Mitsui, Y. Kawai, and T. Ono
Tohoku University, JAPAN

Nanomaterial & Characterization

W3P.052 **EVALUATION OF NANO DEFORMATION MECHANISMS OF MWCNT BY MEMS-BASED TENSILE TEST AND MOLECULAR DYNAMICS SIMULATION**

H. Ohmori, K. Yamauchi, H.-J. Oh, K. Yashiro, and Y. Isono
Kobe University, JAPAN

W3P.053 **PREPARATION OF NICKEL, NICKEL-IRON, AND SILVER-COPPER NANOPARTICLES IN IONIC LIQUIDS**

P. Lobotka[1], G. Radnoczi[2], Z. Czigany[2], I. Vavra[1], M. Drzik[3], M. Micusik[4], E. Dobrocka[1], and P. Kunzo[1]
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Chemical Sensors & Microsystems

Chemical Sensors

W3P.054 **BATCH FABRICATION OF MICRO PRECONCENTRATOR WITH THIN FILM MICROHEATER USING TOLLEN'S REACTION**

Y.-S. Lin[1], C.-Y. Kuo[1], W.-C. Tian[1], T.-H. Wu[1], H.-J. Sheen[1], H.-Y. Kuo[2], and C.-J. Lu[2]
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W3P.055 **DEVELOPMENT OF PH SENSOR WITH ENHANCED SENSITIVITY USING VOLUME OF BUBBLES GENERATED BY ELECTROLYSIS**

J. Sim, D.-S. Kwon, and J. Kim
Yonsei University, SOUTH KOREA

W3P.056 **PERMEABLE-MEMBRANE SEPARATING DETECTION OF VAPORIZED LIQUID WITH NANOPARTICLE FUNCTIONALIZED RESONANT CANTILEVER FOR SOLUTION-NOISE SUPPRESSION**

H. Yu, P. Xu, and X.X. Li
Chinese Academy of Sciences, CHINA

Environmental Sensors

W3P.057 **DETECTION OF CHLORIDE ION CONCENTRATION USING CHRONOPOTENTIOMETRY**

Y. Abbas, W. Olthuis, and A. van den Berg
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FET Based Gas Sensors

W3P.058 **COMBINATION OF TEMPERATURE CYCLED AND GATE BIAS CYCLED OPERATION TO ENHANCE THE SELECTIVITY OF SiC-FET GAS SENSORS**

C. Bur[1], M. Bastuck[1], A. Schütze[1], A. Lloyd Spetz[2], and M. Andersson[2]
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Gas Sensors

W3P.059 **AN ACTIVE TEMPERATURE MODULATION OF GAS SENSOR BASED ON SELF-ADAPTIVE STRATEGY**

E. Martinelli, A. Catini, and C. Di Natale
University of Rome Tor Vergata, ITALY

W3P.060 **CO_2 SENSING BY WORK FUNCTION READOUT OF ZNO BASED SCREEN PRINTED FILMS**

R. Pohle, A. Tawil, C. Mrotzek, and M. Fleischer
Siemens AG, GERMANY

W3P.061 **DEVELOPMENT OF EGFET-BASED MICROSENSORS WITH HIGH-SENSITIVITY AND HIGH-LINEARITY FOR DISSOLVED OXYGEN AND CARBON DIOXIDE DETECTION**

C.-H. Hsieh, P.-H. Chen, R.-H. Chen, and I.-Y. Huang
National Sun Yat-Sen University, TAIWAN

W3P.062 **GRAPHENE SOI CMOS SENSORS FOR DETECTION OF PPB LEVELS OF NO2 IN AIR**

J.W. Gardner[1], M.T. Cole[2], A. De Luca[2], P. Clément[3], E. Llobet[3], S.Z. Ali[4], and F. Udrea[2]
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W3P.063 **NOVEL GASEOUS PHASE ETHANOL SENSOR IMPLEMENTED WITH UNDERLOADED RF RESONATOR FOR SENSOR-EMBEDDED PASSIVE CHIPLESS RFIDS**

W.T. Chen[1], K.M.E. Stewart[1], J. Carroll[2], R. Mansour[1], E. Abdel-Rahman[1], and A. Penlidis[1]
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W3P.064 **ULTRA HIGH PERFORMANCE GAS SENSOR BASED ON IC COMPATIBLE FUSION OF MICROMACHINED HOTPLATFORM AND NANOSTRUCTURED POROUS FILM**

L. Xu, Z. Dai, T. Li, G. Duan, W. Cai, and Y. Wang
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W3P.065 **WORK FUNCTION BASED GAS SENSING WITH BENZENE TRICARBOXYLATE LINKED METAL ORGANIC FRAMEWORKS - A COMPARISON STUDY**

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Humidity Sensors

W3P.066 **DEVELOPMENT OF AN ELECTROCHEMICAL MICROSENSOR BASED ON ALGAL METABOLISM FOR THE DETECTION OF WATER POLLUTANTS**

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Hydrogen Gas Sensors

W3P.067 **GAS SENSING PROPERTIES OF NANOSTRUCTURED MIXED OXIDE FILM PREPARED BY ANODIZING Zr-W ALLOY THROUH THE ALUMINA NANOPORES**

R.M. Vázquez[1], R. Calavia[1], F. Gispert-Guirado[1], E. Llobet[1], J. Hubálek[2], and A. Mozalev[2]
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Nanowire Based Sensors

W3P.068 **DEVELOPMENT OF A HYDROGEN GAS SENSOR BASED ON A SUSPENDED MONOLITHIC CARBON NANOWIRE PLATFORM**

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Ulsan National Institute of Science and Technology (UNIST), SOUTH KOREA

Bio-Sensors & Bio-Microsystems

Cell Sensing & Manipulation

W3P.069 **A CONTINUOUSLY TUNABLE SIZE-BASED FILTER**

H.L. Chang[1], F.L. Chen[1], F. Ye[1], S.J. Hong[1], W.Z. Yuan[1], and Y.C. Tai[2]
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W3P.070 **DETECTION OF IMATINIB RESISTANCE IN K562 LEUKEMIA CELLS BY 3D-ELECTRODE CONTACTLESS DIELECTROPHORESIS**

Y. Demircan, A. Koyuncuoğlu, M. Erdem, E. Özgür, U. Gündüz, and H. Külah
Middle East Technical University (METU), TURKEY

W3P.071 **LIGHT-ADDRESSABLE MEASUREMENTS OF CELLULAR OXYGEN CONSUMPTION RATES IN MICROWELL ARRAYS BASED ON PHASE-BASED PHOSPHORESCENCE LIFETIME DETECTION**

H.T. Chu[1], Y.S. Lin[1], K.Y. Hung[2], and S.H. Huang[1]
[1]*National Taiwan Ocean University, TAIWAN* and [2]*Ming Chi University of Technology, TAIWAN*

W3P.072 **MICROFLUIDIC CELL CULTURING BY HYDROGEL-BASED DIFFUSION/PERFUSION**

D. Puchberger-Enengl[1], S. van den Driesche[2], C. Krutzler[3], F. Keplinger[1], and M.J. Vellekoop[2]
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W3P.073 **A DISPOSABLE POLYMER LAB-ON-A-SLIDE FOR POINT-OF-CARE DIAGNOSTICS OF METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS (MRSA)***

M. Bu[1], I.R. Perch-Nielsen[1], J. Skov[1], K.S. Sørensen[1], Y. Sun[2], M.E. Perdersen[1], M.F. Hansen[2], K.W. Harlow[1], and A. Wolff[2]
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Fluid Manipulation in Microsystems

W3P.074 **A BIOLOGICAL/ELECTROCHEMICAL RESERVIORS INTEGRATED MICROSENSOR FOR THE DETERMINATION OF BIOCHEMICAL OXYGEN DEMAND**

J.F. Wang, C. Bian, J.H. Tong, J.Z. Sun, Y. Li, H. Zhang, and S.H. Xia
Chinese Academy of Sciences, CHINA

W3P.075 **AN INTERVENTIONAL FLEXIBLE MICRONEEDLE WITH THREE-ELECTRODE SYSTEM ON THE CAPILLARY FOR CONTINUOUS GLUCOSE MONITORING AND DRUG DELIVERY**

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[2]*Meltex Incorporation, JAPAN*

W3P.076 **ELECTROCHEMICAL GATING ON CMOS: INTERPLAY OF FIELD, ACIDITY AND SALINITY ON AN ELECTROLYTE-INSULATOR INTERFACE**

K. Jayant[1], K. Auluck[1], S. Anwar[2], and E.C. Kan[1]
[1]*Cornell University, USA* and [2]*City College New York, USA*

W3P.077 **HIGHLY SENSITIVE AND RAPID DETECTION OF SHIGELLA FLEXNERI IN LIQUID SAMPLE BY AN IMMUNOMAGNETIC ASSAY WITH SHEAR HORIZONTAL SURFACE ACOUSTIC WAVE SENSORS**

H.C. Hao and D.J. Yao
National Tsing Hua University, TAIWAN

W3P.078 **MICRO-NMR PROBE FEATURING DISPOSABLE, SELF- PRIMING SAMPLE-INSERTS, TOWARDS HIGH-TROUGHPUT PROFILING**

N. Spengler, R.Ch. Meier, A. Moazenzadeh, V. Badilita, J.G. Korvink, and U. Wallrabe
University of Freiburg - IMTEK, GERMANY

W3P.079 **OPTOFLUIDICS NANOPARTICLES SORTING BY HYDRODYNAMIC OPTICAL FORCE**

Y. Yang[1], Y.Z. Shi[1,2], L.K. Chin[1], J.B. Zhang[3], D.P. Tsai[4], and A.Q. Liu[1,2,3]
[1]*Nanyang Technological University, SINGAPORE,* [2]*Xi'an Jiao Tong University, CHINA,* [3]*Agency for Science, Technology and Research (A*STAR)* and [4]*National Taiwan University, TAIWAN*

W3P.080 **THE INFLUENCE OF MOLECULAR CHARGES ON MICROTUBULE CURVATURES IN AN ELECTRICAL FIELD**

N. Isozaki[1], T. Nakahara[1], S. Ando[1], N. Kamisetty[1], H. Shintaku[1], H. Kotera[1], E. Meyhofer[2], and R. Yokokawa[1,3]
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Manipulation & Detection of Bacteria

W3P.081 **ARTIFICIAL BACTERIAL FLAGELLA FUNCTIONALIZED WITH TEMPERATURE-SENSITIVE LIPOSOMES FOR BIOMEDICAL APPLICATIONS**

F. Qiu[1], R. Mhanna[1], L. Zhang[2], Y. Ding[1], K. Sugihara[1], M. Zenobi-Wong[1], and B.J. Nelson[1]
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W3P.082 **PHASEGUIDE-CHIP FOR POINT-OF-CARE DIAGNOSTIC OF BACTERIA WITH INTEGRATED ENRICHMENT, LYSIS, AND NUCLEIC ACID PURIFICATION**

H. Hubbe, S. Hakenberg, G. Dame, and G.A. Urban
University of Freiburg - IMTEK, GERMANY

Sensing in Biosystems

W3P.083 **A MICROFLUIDIC MAGNETIC BEAD-BASED PROXIMITY LIGATION ASSAY DEVICE FOR THE QUANTIFICATION OF TNF-α IN HUMAN PLASMA**

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W3P.084 **ACUTE HIV DETECTION BY VIRAL LYSATE IMPEDANCE SPECTROSCOPY ON A MICROCHIP**

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[2]*Harvard Medical School, Massachusetts General Hospital, USA*

W3P.085 **DEVELOPMENT OF A NEURAL PROBE TO MEASURE POTASSIUM DURING A CORTICAL SPREADING DEPRESSION IN-VIVO**

E.J. van der Wouden[1], E.A. Tolner[2], M. Odijk[1], W. Olthuis[1], A.M.J.M. van den Maagdenberg[2], M.D. Ferrari[2], and A. van den Berg[1]
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W3P.086 **LABEL-FREE IDE-BASED IMPEDANCE SPECTROSCOPY FOR THE INVESTIGATION OF RECEPTOR-PROTEIN AFFINITY**

L. Colella[1], J. Deuquet[1], C. Beyer[2], J. Fröhlich[2], G. van der Goot[1], and P. Renaud[1]
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W3P.087 **PRODUCTION OF 16 K PIXEL HYDROGEN ION IMAGE SENSORS WITH 0.01PH RESOLUTION**

R. Otake[1], M. Futagawa[1], F. Dasai[1], D. Suzuki[1], M. Ishida[1], and K. Sawada[1,2]
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Medical Microsystems

W3P.088 **A MICROCHIP FOR IN VITRO PARAMETER DETERMINATION OF CANCER ELECTROCHEMOTHERAPY**

M. Wu, Y. Xiao, D. Zhao, Z. Liang, and Z. Li
Peking University, CHINA

W3P.089 **A WIRELESS INTERSTITIAL PRESSURE SENSOR WITH A GUYTON CHAMBER**

S.H. Song, M. Brown, T. Maleki, and B. Ziaie
Purdue University, USA

W3P.090 **DEVELOPMENT OF HEMATOCRIT MONITORING SENSOR USING SCREEN PRINTED CARBON ELECTRODE**

S.-R. Lee and C.-M. Kyung
Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA

W3P.091 **FLEXIBLE TACTILE SENSOR ATTACHED TO LAPAROSCOPE FOR MECHANICAL CHARACTERISTICS OF SOFT MATERIALS AND TISSUES**

C.H. Chuang, K.F. Lu, and J.L. Mu
Southern Taiwan University of Science and Technology, TAIWAN

W3P.092 **MEMS BASED MULTISPECTRAL CONFOCAL PROBE**

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W3P.093 **PLATE READER COMPATIBLE MEMBRANE-INTEGRATED MICROFLUIDIC PLATFORM FOR HIGH-THROUGHPUT CELLULAR ASSAYS**

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Microfluidics

Droplet Based Microfluidics

W3P.094 **DROPLET BISULFITE CONVERSION PLATFORM FOR EPIGENETIC CANCER BIOMARKER DETECTION**

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W3P.095 **TRANSPORTATION OF A LIQUID DROPLET AT ULTRA-LOW VOLTAGES BY TUNABLE WETTING ON CONJUGATED POLYMER ELECTRODES**

W. Xu, Y. Tian, H. Bisaria, P. Ahn, C.-H. Choi, and E.-H. Yang
Stevens Institute of Technology, USA

Microfluidics

W3P.096 **AUTO-ACTUATED SEQUENTIAL RELEASE VALVES FOR LAB-ON-A-DISC SYSTEMS**

D.J. Kinahan, S.M. Kearney, and J. Ducrée
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W3P.097 **FABRICATION METHOD OF BASED-PARAFFIN RECONFIGURABLE MICROFLUIDIC CHIPS USING LIQUID DIELECTROPHORESIS AND ELECTROWETTING TRANSDUCTIONS**

R. Renaudot[1], V. Agache[1], Y. Fouillet[1], M. Kumemura[2], L. Jalabert[2], D. Collard[2], and H. Fujita[2]
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W3P.098 **MULTI-SCALE PORE MEMBRANE FOR CONTINUOUS, PASSIVE FLUID TRANSPORT IN A MICRO COOLING DEVICE**

H. So, J.C. Cheng, and A.P. Pisano
University of California, Berkeley, USA

W3P.099 **SINGLE-LAYER MICROFLUIDIC "SPRING" DIODES *VIA* OPTOFLUIDIC LITHOGRAPHY FOR ULTRA-LOW REYNOLDS NUMBER APPLICATIONS**

R.D. Sochol, C.C. Glick, A. Lu, M. Wah, T. Brubaker, K.Y. Lee, K. Iwai, L.P. Lee, and L. Lin
University of California, Berkeley, USA

W3P.100 **VISUALISATION OF SUSPENDED NANOPARTICLES BY LIGHT SCATTERING IN A MICROFLUIDIC CHIP AND MANUAL 2-D TRACKING FOR SIZE DETERMINATION**

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Microfluidics with Cells

W3P.101 **CELLULAR AGGREGATE CATCHER USING FLUIDIC MANIPULATION IN HIGH COMPATIBILITY WITH WIDESPREAD MICRO-WELL-PLATE**

Y. Teramachi[1], S. Shimomura[1], W. Tonomura[1], S. Tajima[2], Y. Tabata[2], and S. Konishi[1]
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W3P.102 **STABLE CELLULAR FORCE MEASUREMENT BY ON-CHIP ROBOTIC PROBE BY EMPLOYING SURFACE-DIRECTED LIQUID FLOW**

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Composite Materials/Polymers, Devices & Fabrication

W3P.103 **A LOW-TEMPERATURE PARYLENE-C-TO-SILICON BONDING USING PHOTO-PATTERNABLE ADHESIVES AND ITS APPLICATIONS**

J.H.-C. Chang, Y. Liu, and Y.-C. Tai
California Institute of Technology, USA

W3P.104 **FABRICATION AND CHARACTERIZATION OF COMPOSITE HYDROGEL PARTICLES WITH X-RAY ATTENUATING MEDIA**

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W3P.105 **FLEXIBLE AND TUNABLE METAMATERIALS AT TERAHERTZ FREQUENCIES**

K. Fan[1], X. Zhao[1], J. Zhang[1], G.D. Metcalfe[2], R.D. Averitt[1], and X. Zhang[1]
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W3P.106 **STRETCHABLE THIN-FILM METAL STRUCTURES ON A STIMULI-RESPONSIVE POLYMER NANOCOMPOSITE FOR MECHANICALLY-DYNAMIC MICROSYSTEMS**

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Energy & Power MEMS

Electro Chemical Energy Storage

W3P.107 **FLEXIBLE THIN-FILM RECHARGEABLE LITHIUM BATTERY**

J.F. Ribeiro[1], R. Sousa[1], J.A. Sousa[1], L.M. Goncalves[1], M.M. Silva[1], L. Dupont[2], and J.H. Correia[1]
[1]*University of Minho, PORTUGAL* and [2]*Université de Picardie Jules Verne, FRANCE*

Electro Static/Electret Harvesters

W3P.108 **ELECTROSTATIC ENERGY HARVESTING DEVICE WITH OUT-OF-PLANE GAP CLOSING SCHEME**
F. Wang[1] and O. Hansen[1,2]
[1]Technical University of Denmark, DENMARK and
[2]Center for Individual Nanoparticle Functionality, (CINF), DENMARK

W3P.109 **X-SHAPED-SPRING ENHANCED MEMS ELECTRET GENERATOR FOR ENERGY HARVESTING**
Y. Minakawa, R. Chen, and Y. Suzuki
University of Tokyo, JAPAN

Harvesting Energy from Mechanical Vibrations

W3P.110 **A NOVEL MEMS ELECTROMAGNETIC ENERGY HARVESTER WITH SERIES COILS**
Z.L. Li, M.D. Han, and H.X. Zhang
Peking University, CHINA

W3P.111 **AUTONOMOUS SENSOR MODULE POWERED BY IMPACT-ENHANCED ENERGY HARVESTER FROM BROADBAND LOW-FREQUENCY VIBRATIONS**
M. Ferrari, F. Cerini, and V. Ferrari
University of Brescia, ITALY

W3P.112 **MULTIPLE AXES VIBRATION ENERGY HARVESTER BASED ON PTFE AND METAL BALLS**
W. Bian[1,2], X. Wu[1,2], L. Bu[1,2], X. Wang[1,2], and L. Liu[1,2]
[1]Tsinghua University, CHINA and [2]Tsinghua National Laboratory for Information Science and Technology, CHINA

Magnetic Sensors/Voltage Sensors

W3P.113 **A FULLY MONOLITHIC INTEGRATED ANISOTROPIC MAGNETORESISTANCE BASED ANGLE SENSOR FOR AUTOMOTIVE**
H. Witschnig[1], A. Morici[1], B. Schaffer[1], and J. Zimmer[2]
[1]Infineon Technologies Austria AG, AUSTRIA and [2]Infineon Technologies AG, GERMANY

W3P.114 **FLEXIBLE PARYLENE-BASED FOLDED INDUCTORS WITH MAGNETIC CORE**
Y. Zheng[1], X. Sun[1], X. Li[2], and H. Zhang[1]
[1]Peking University, CHINA and *[2]Beijing Jiaotong University, CHINA*

Energy & Power MEMS - Microfuel Cells

W3P.115 **CHARACTERISATION OF MICRO DIRECT METHANOL FUEL CELLS WITH SILICON PLATE SUPPORTED INTEGRATED IONOMER MEMBRANES**
J.V. Larsen[1], B.T. Dalslet[1], C. Kallesøe[2], and E.V. Thomsen[1]
[1]Techinical University of Denmark, DENMARK and *[2]Danish Technical Institute, DENMARK*

Piezo/Pyro Electric Energy Harvester

W3P.116 **HIGH-TEMPERATURE STABLE PIEZOELECTRIC ALUMINUM NITRIDE ENERGY HARVESTERS UTILIZING ELASTICALLY SUPPORTED DIAPHRAGMS**
Y.-J. Lai[1], W.-C. Li[1], C.-M. Lin[1], V.V. Felmetsger[2], and A.P. Pisano[1]
[1]University of California, Berkeley, USA and *[2]OEM Group Incorporated, USA*

Thermoelectric Thermal Energy Harvesters

W3P.117 **ENHANCED BOILING HEAT TRANSFER WITH COPPER OXIDE HIERARCHICAL SURFACES**
K.-H. Chu[1], Y. Zhu[1], N. Miljkovic[1], Y. Nam[2], R. Enright[3], and E.N. Wang[1]
[1]Massachusetts Institute of Technology, USA, [2]Kyung Hee University, SOUTH KOREA, and
[3]Bell Labs Ireland, Alacatel-Lucent, IRELAND

W3P.118 **PERFORMANCE OF A LOW TEMPERATURE ENERGY HARVESTING DEVICE FOR POWERING WIRELESS SENSOR NODES IN AIRCRAFTS APPLICATIONS**
A. Elefsiniotis[1], N. Kokorakis[1], Th. Becker[1], and U. Schmid[2]
[1]EADS Innovation Works, GERMANY and *[2]Vienna University of Technology, AUSTRIA*

W3P.119 **THERMOELECTRIC POWER GENERATOR BASED ON A FERROELECTRIC MATERIAL COMBINED WITH A BIMETAL THERMOSTAT**
T. Saito, Y. Kawai, and T. Ono
Tohoku University, JAPAN

RF MEMS, Resonators & Oscillators

Resonators Oscillators

W3P.120 **A CMOS-MEMS RESONANT GATE FIELD EFFECT TRANSISTOR**
C.-H. Chin, C.-S. Li, M.-H. Li, and S.-S. Li
National Tsing Hua University, TAIWAN

W3P.121 **DESIGN AND CHARACTERIZATION OF MECHANICALLY-COUPLED CMOS-MEMS FILTERS**
C.-Y. Chen, M.-H. Li, C.-S. Li, and S.-S. Li
National Tsing Hua University, TAIWAN

W3P.122 **FULLY DIFFERENTIAL CMOS-MEMS SQUARE-PLATE OXIDE RESONATORS WITH EMBEDDED POLY-SILICON ELECTRODES**
W.-C. Chen[1], M.-H. Li[1], Y.-C. Liu[1], D. Weinstein[2], W. Fang[1], and S.-S. Li[1]
[1]National Tsing Hua University, TAIWAN and *[2]Massachusetts Institute of Technology, USA*

W3P.123 **MAGNETO-ELASTIC RESONATING 'μ-DIVER' MICROFLUIDIC-SYSTEM FOR WIRELESS BIO-SENSING IN LIQUID**
C. Xue, X. Li, T. Xu, B. Xu, and C. Yang
Chinese Academy of Sciences, CHINA

W3P.124 **PROCESS TOLERANT DESIGN OF A BAW RESONATOR VIA HOLE ENGINEERING**
B. Figeys[1,2], R. Jansen[1], B. Nauwelaers[2], H.A.C. Tilmans[1], and X. Rottenberg[1]
[1]imec, BELGIUM and [2]Katholieke Universiteit Leuven, BELGIUM

W3P.125 **THE EFFECTS OF TIGHT CAPACITIVE COUPLING ON PHASE NOISE PERFORMANCE: A LAMÉ-MODE MEMS OSCILLATOR STUDY**

H. Zhu[2], C.-H. Chuang[1], C.-S. Li[1], M.-H. Li[1], J. E.-Y. Lee[2], and S.-S. Li[1]
[1]National Tsing Hua University, TAIWAN and [2]City University of Hong Kong, HONG KONG

RF MEMS Waveguides

W3P.126 **INVESTIGATION OF BORON AND NITROGEN ION BEAM IMPLANTATION IN GOLD THIN FILMS FOR OHMIC MEMS SWITCH CONTACT IMPROVEMENT**

B. Arrazat[1,2], K. Inal[3], and P. Gergaud[2]
[1]Ecole Nationale Supérieure des Mines de Saint-Etienne, FRANCE, [2]Commissariat à l'Energie Atomique, FRANCE and [3]Mines ParisTech, FRANCE

Optical MEMS

Infrared Devices

W3P.127 **A NOVEL INFRARED DETECTOR USING NONLINEAR VIBRATION FOR HIGH SENSITIVITY**

T. Yamazaki, S. Ogawa, S. Kumagai, and M. Sasaki
Toyota Technological Institute, JAPAN

Micro Lenses

W3P.128 **PIEZO-ACTUATED TUNABLE DIAMOND/AlN MICRO LENSES**

V. Zuerbig[1,2], D. Paetz[3], W. Pletschen[1], J. Hees[1], R.E. Sah[1], L. Kirste[1], N. Heidrich[1], V. Cimalla[1], C. Nebel[1], O. Ambacher[1,2], and V. Lebedev[1]
[1]Fraunhofer Institut für Angewandte Festkörperphysik (IAF), GERMANY, [2]University of Freiburg – IMTEK, GERMANY and [3]Ilmenau University of Technology, GERMANY

Mirrors

W3P.129 **A RASTER-OUTPUT 2D MEMS SCANNER WITH AN 8 X 4 MM MIRROR FOR AN AUTOMOTIVE TIME-OF-FLIGHT IMAGE SENSOR**

I. Aoyagi, K. Hamaguchi, Y. Nonomura and T. Akashi
Toyota Central R&D Labs. Inc., JAPAN

Optical Devices

W3P.130 **ABSOLUTE FIBER-OPTIC PRESSURE SENSING FOR HIGH-TEMPERATURE APPLICATIONS USING WHITE LIGHT INTERFEROMETRY**

G. Keulemans, F. Ceyssens, and R. Puers
Katholieke Universiteit Leuven, BELGIUM

Optical Switches/Splitters

W3P.131 **OPTOFLUIDIC MULTIPLEXING AND SWITCHING DEVICE**

L. Brandhoff[1], E. Weber[1], S. Van den Driesche[1], M. Bülters[2], R.B. Bergmann[2], and M.J. Vellekoop[1]
[1]Universität Bremen, GERMANY and *[2]Bremer Institut für Angewandte Strahltechnik (BIAS), GERMANY*

Ring Resonators

W3P.132 **NANO-OPTO-MECHANICAL (NOM) ACOUSTIC WAVEFRONT SENSOR VIA RING RESONATORS**
B. Dong[1,2], H. Cai[2], J.M. Tsai[2], P. Kropelnicki[2], A.B. Randles[2], M. Tang[2], D.L. Kwong[2], and A.Q. Liu[1,2]
[1]*Nanyang Technological University, SINGAPORE and*
[2]*Agency for Science, Technology and Research (A*STAR), SINGAPORE*

Tera Hertz & Plasmonic Devices

W3P.133 **WAVELENGTH-SELECTIVE SILICON NEAR INFRARED PHOTODETECTOR USING SURFACE PLASMON RESONANCE ENHANCEMENT**
W.J. Chen[1], T. Kan[1], Y. Ajiki[2], K. Matsumoto[1], and I. Shimoyama[1]
[1]*University of Tokyo, JAPAN and* [2]*Olympus Corporation, JAPAN*

Actuators

W3P.134 **ELECTROSTATIC MICROACTUATORS IN A FLEXIBLE SHEET - SMART MEMS SHEET #2 -**
M. Ataka[1], M. Mita[2], H. Toshiyoshi[1], and H. Fujita[1]
[1]*University of Tokyo, JAPAN* and [2]*Japan Aerospace Exploration Agency, JAPAN*

W3P.135 **APPLICATIONS OF NANONEWTON DIELECTROPHORETIC FORCES USING ATOMIC LAYER DEPOSITED OXIDES FOR MICROFLUIDIC SAMPLE PREPARATION AND PROTEOMICS**
S. Emaminejad[1], M. Javanmard[2], C. Gupta[1], R.W. Dutton[1], R.W. Davis[2], and R.T. Howe[1]
[1]*Stanford University, USA* and [2]*Stanford Genome Technology Center, USA*

W3P.136 **NITROGEN INCORPORATED ULTRANANOCRYSTALLINE DIAMOND THERMAL ACTUATORS: DESIGN, FABRICATION AND ACTUATION**
F. Buja[1], A.V. Sumant[2], and W.M. van Spengen[1,3]
[1]*Delft University of Technology, THE NETHERLANDS,* [2]*Argonne National Laboratory, USA and* [3]*Falco Systems, THE NETHERLANDS*

Theory, Design & Test Methodology

Fluidic Design & Test

W3P.137 **A FULLY DECOUPLED DESIGN METHOD FOR MEMS MICROTHRUSTER BASED ON ORTHOGONAL ANALYSIS**
Q. Shen, W.Z. Yuan, X.P. Li, Y.C. Hao, J.B. Xie, and H.L. Chang
Northwestern Polytechnical University, CHINA

Physical MEMS Design

W3P.138 **ACTIVE CONTROL OF SILICON NANOTWEEZERS DETECTS ENZYMATIC REACTION AT THE MOLECULAR LEVEL**
N. Lafitte[1], Y. Haddab[2], Y. Le Gorrec[2], H. Guillou[1], M. Kumemura[1], L. Jalabert[1], D. Collard[1], and H. Fuijta[1]
[1]*University of Tokyo, JAPAN,* and
[2]*École Nationale Supérieure de Mécanique et des Microtechniques (ENSMM), FRANCE*

Physical MEMS Design

W3P.139 **HIGH-UNIFORMITY POST-CMOS UNCOOLED MICROBOLOMETER FOCAL PLANE ARRAY INTEGRATED WITH ACTIVE MATRIX CIRCUIT**

G. Kim[1,2], S. Lim[2], Y. Kim[2], H. Kim[2], B. Lim[2], T. Kim[2], J.H. Park[2], H. Lee[2], H. Kim[2], J. Seo[2], K. Lim[1], C. Seok[1], and H. Ko[1]
[1]Chungnam National University, SOUTH KOREA and [2]National Nanofab Center, SOUTH KOREA

Physical MEMS Design

W3P.140 **PHOTONIC THERMOCOUPLE DESIGN BASED ON AN ULTRA-COMPACT MICHELSON INTERFEROMETER**

J.F. Tao[1,2], H. Cai[2], Q.X. Zhang[2], J.M. Tsai[2], P. Kropelnicki[2], A.B. Randles[2], M. Tang[2], and A.Q. Liu[1,2]
[1]Nanyang Technological University, SINGAPORE and
*[2]Agency for Science, Technology and Research (A*STAR), SINGAPORE*

Switch Design, Simulation & Test

W3P.141 **COMPACT NEMS FPGA DESIGN FOR HARSH ENVIRONMENT AND LOW POWER REQUIREMENT**

S. Han[1], V. Sirigiri[1], D.G. Saab[1], F.K. Chowdhury[2], and M. Tabib-Azar[2]
[1]Case Western Reserve, USA and *[2]University of Utah, USA*

W3P.142 **NEW SIMULATION AND EXPERIMENTAL METHODOLOGY FOR ANALYZING PULL-IN AND RELEASE IN MEMS SWITCHES**

M. Kamon[1], S. Maity[1], D. DeReus[2], Z. Zhang[3], S. Cunningham[2], S. Kim[2], J. McKillop[2], A. Morris[2], G. Lorenz[1], and L. Daniel[3]
[1]Coventor, Inc., USA, [2]Wispry, Inc., USA, and [3]Massachusetts Institute of Technology, USA

Late News

W3P.143 **A NOVEL FABRICATION METHOD OF MICROCAPILLARIES VIA SILICON SURFACE MIGRATION AND THEIR APPLICATION TO SINGLE CELL ANALYSIS**

Y. Luo, F. Zeng, L. Yobas, and M. Wong
Hong Kong University of Science and Technology, HONG KONG

W3P.144 **A NOVEL INERTIAL SWITCH BASED ON NONLINEAR-SPRING SHOCK STOP**

K.F. Deng, W.G. Su, S. Li, Y.T. Zhang, G.Z. Chen, W. Zhang, S. Wan, L. Li, S.B. Jiang, H. Zheng, and W. Xia
Peking University, CHINA

W3P.145 **BALLISTIC AEROSOL MARKING**

A.R. Völkel, G.B. Anderson, F.J. Endicott, E.M. Chow, and A.V. Pattekar
PARC – a Xerox Company, USA

W3P.146 **BLOOD PRESSURE MEASUREMENT DEVICE BASED ON THE ARTERIAL TONOMETRY METHOD WITH MICRO TRIAXIAL FORCE SENSOR**

K. Shioya and T. Dohi
Chuo University, JAPAN

W3P.147 **FABRICATION AND PERFORMANCE OF THE LIGHT SWITCHABLE MICROELECTRODE ARRAY FOR RETINAL PROSTHESIS**

X. Zhang[1], T. Wang[1], P.-Y. Chiou[2], and Z. Li[1]
[1]Peking University, CHINA and [2]University of California, Los Angeles, USA

16:00 - 16:30 **Break & Exhibit Inspection**

Session W4A - Fabrication Technology 2

Session Chairs: K. Jackson, *A.M. Fitzgerald and Associates, USA* and X. Wang, *Tsinghua University, CHINA*

16:30 - 17:00 **Invited Speaker**

W4A.001 **ADVANCES IN SILICON CARBIDE MICRO- AND NANO-ELECTRO-MECHANICAL SYSTEMS FABRICATION TECHNOLOGY AND APPLICATIONS**

M. Mehregany
Case Western Reserve University, USA

17:00 - 17:15

W4A.002 **CHARACTERIZATION OF REACTIVELY SPUTTERED IRON OXIDE THIN FILMS FOR DEVELOPING MAGNETIC RESONANCE IMAGING CONTRAST AGENTS**

X. Wang[1], C. Wang[1], S. Anderson[2], and X. Zhang[1]
[1]Boston University, USA and *[2]Boston University Medical Center, USA*

17:15 - 17:30

W4A.003 **FABRICATION AND INTEGRATION OF HORIZONTALLY ALIGNED CARBON NANOTUBE–C60 FILMS FOR UV SENSORS**

M. De Volder[1], E. Meshot[2], S. Tawfick[3], and A.J. Hart[3]
[1]Katholieke Universiteit Leuven, BELGIUM, [2]imec, BELGIUM, and *[3]University of Michigan, USA*

17:30 - 17:45

W4A.004 **GLOW-DISCHARGE ION-SORPTION MICROPUMP FOR VACUUM MEMS**

T. Grzebyk[1], A. Górecka-Drzazga[1], A. Zawada[2], and J.A. Dziuban[1]
[1]Wroclaw University of Technology, POLAND and *[2]Institute of Tele- and Radiotechniques, POLAND*

17:45 - 18:00

W4A.005 **MICROMACHINED POLYCRYSTALLINE DIAMOND HEMISPHERICAL SHELL RESONATORS**

A. Heidari[1], M.-L. Chan[1], H.-A. Yang[2], G. Jaramillo[1], P. Taheri-Tehrani[1], P. Fonda[1], H. Najar[1], K. Yamazaki[1,2], L. Lin[2], and D.A. Horsley[1]
[1]University of California, Davis, USA and *[2]University of California, Berkeley, USA*

18:00 - 18:15

W4A.006 **LOCALIZED, DEGENERATELY DOPED EPITAXIAL SILICON FOR TEMPERATURE COMPENSATION OF RESONANT MEMS SYSTEMS**

E.J. Ng, C.H. Ahn, Y. Yang, V.A. Hong, C.-F. Chiang, E. Ahadi, M.W. Ward, and T.W. Kenny
Stanford University, USA

18:15 - 18:30

W4A.007 **EXPERIMENTAL EVALUATION OF HIGH VOLTAGE HOLD-OFF CAPABILITY OF POST-PROCESS MESA-ISOLATED SERIES STANDARD CMOS TRANSISTORS**

A. Hirakawa, S. Morishita, I. Mori, M. Kubota, and Y. Mita
University of Tokyo, JAPAN

Session W4B - Nano-Biosensors
Session Chairs: P. Dittrich, *ETH Zürich, SWITZERLAND* and Z. Li, *Peking University, CHINA*

16:30 - 17:00 **Invited Speaker**
W4B.001 **HIGH-THROUGHPUT AND LOW-COST NANOPHOTONIC BASED DIAGNOSTICS TECHNOLOGIES**
H. Altug[1,2], M. Huang[1], and A.E. Cetin[1]
[1]Boston University, USA and [2]École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

17:00 - 17:15
W4B.002 **NANOPLASMONIC BIOSENSING PLATFORM FOR MULTIPLE PATHOGEN DETECTION**
F. Inci[1], O. Tokel[1], S. Wang[1], U.A. Gurkan[1], D.R. Kuritzkes[2], and U. Demirci[1,2,3]
[1]Brigham and Women's Hospital, Harvard Medical School, USA and [2]Harvard-MIT Health Sciences and Technology, USA

17:15 - 17:30
W4B.003 **MASS-PRODUCIBLE LOW-COST AU NANOSTRUCTURE NANOPLASMONIC BIOSENSOR ON OPTOFLUIDIC-PORTABLE PLATFORM**
Z.X. Geng[1,2], Q. Kan[1], J. Yuan[1], H.S. Gao[1], C.X. Wang[1], and H.D. Chen[1]
[1]Chinese Academy of Sciences, CHINA and [2]Minzu University of China, CHINA

17:30 - 17:45
W4B.004 **LABEL-FREE AND ULTRASENSITIVE DETECTION OF MICRORNA BIOMARKERS IN LUNG CANCER CELLS BASED ON SILICON NANOWIRE FET BIOSENSORS**
A. Gao, N. Lu, P. Dai, T. Li, and Y. Wang
Chinese Academy of Sciences, CHINA

17:45 - 18:00
W4B.005 **SILK STABILIZED GRAPHENE FET ENZYMATIC GLUCOSE BIOSENSOR**
X.Q. You and J.J. Pak
Korea University, SOUTH KOREA

18:00 - 18:15
W4B.006 **MOTOR PROTEIN BASED TAU PROTEIN DETECTION DEVICE**
Y. Orazov[1], M.C. Tarhan[1], R. Yokokawa[2], S.L. Karsten[3], and H. Fujita[1]
[1]University of Tokyo, JAPAN, [2]Kyoto University, JAPAN, and *[3]NeuroInDx Inc., USA*

18:15 - 18:30
W4B.007 **CELL ARRAY FLUIDIC CHANNEL INTEGRATED WITH ELECTRODES FOR CELL-BASED MULTIPLE CHEMICAL SENSING**
N. Misawa[1], H.J. Lee[1], H. Mitsuno[2], R. Kanzaki[2], and K. Sawada[1,3]
[1]Toyohashi University of Technology, JAPAN, [2]University of Tokyo, JAPAN, and [3]Japan Science and Technology Agency (JST), JAPAN

Session W4C - RF MEMS
Session Chairs: N. Barniol, *Universitat Autónoma de Barcelona, SPAIN* and G. Fedder, *Carnegie Mellon University, USA*

16:30 - 17:00 **Invited Speaker**
W4C.001 **RF MEMS FOR CHANNELIZING LOW POWER RADIOS**
C.T.-C. Nguyen
University of California, Berkeley, USA

17:00 - 17:15

W4C.002 **SWITCHABLE PIEZOELECTRIC TRANSDUCTION IN ALGAN/GAN MEMS RESONATORS**

L.C. Popa and D. Weinstein

Massachusetts Institute of Technology, USA

17:15 - 17:30

W4C.003 **LARGE FREQUENCY TUNING OF LIHTIUM NIOBATE LATERALLY VIBRATING MEMS RESONATORS VIA ELECTRIC BOUNDARY RECONFIGURATION**

S. Gong and G. Piazza

Carnegie Mellon University, USA

17:30 - 17:45

W4C.004 **METAL MICROMECHANICAL FILTER-POWER AMPLIFIER UTILIZING A DISPLACEMENT-AMPLIFYING RESONANT SWITCH**

W.-C. Li, Y. Lin, and C.T.-C. Nguyen

University of California, Berkeley, USA

17:45 - 18:00

W4C.005 **EXPERIMENTAL STUDY ON THE IMPACT OF ANCHOR LOSSES ON THE QUALITY FACTOR OF CONTOUR MODE ALN RESONATOR**

J. Segovia-Fernandez[1], M. Cremonesi[2], C. Cassella[1], A. Frangi[2], and G. Piazza[1]

[1]Carnegie Mellon University, USA and [2]Politecnico of Milano, ITALY

18:00 - 18:15

W4C.006 **TOPOLOGY OPTIMIZED RF MEMS SWITCHES**

M.A. Philippine[1], H. Zareie[2], O. Sigmund[3], G.M. Rebeiz[2], and T.W. Kenny[1]

[1]Stanford University, USA, [2]University of California, San Diego, USA, and *[3]Technical Institute of Denmark, DENMARK*

18:15 - 18:30

W4C.007 **MICROFLUIDIC TUNABLE METAMATERIAL FOR GIGAHERTZ FILTER ARRAY**

A.Q. Liu[1,2], W.M. Zhu[2], Q.H. Song[1], R.F. Huang[3], S.K. Ting[3], J.H. Teng[4], and X.H. Zhang[4]

[1]Xi'an Jiaotong University, CHINA, [2]Nanyang Technological University, SINGAPORE, [3]Temasek Laboratories, SINGAPORE, and [4]Institute of Materials Research and Engineering, SINGAPORE

Session W4D - Optical Micro Scanners & Systems

Session Chairs: R. Puers, *Katholieke Universiteit Leuven, BELGIUM* and K. Sato, *Aichi Institute of Technology, JAPAN*

16:30 - 17:00 **Invited Speaker**

W4D.001 **MEMS SCANNERS AND EMERGING 3D AND INTERACTIVE AUGMENTED REALITY DISPLAY APPLICATIONS**

H. Urey[1], S. Holmstrom[1], U. Baran[1,2], K. Aksit[1], M.K. Hedili[1], and O. Eldes[1]

[1]Koç University, TURKEY and [2]University of Washington, USA

17:00 - 17:15

W4D.002 **DESIGN, FABRICATION AND CHARACTERIZATION OF LOW-VOLTAGE PIEZOELECTRIC TWO-AXIS GIMBAL-LESS MICROSCANNERS**

S. Gu-Stoppel, J. Janes, H.J. Quenzer, U. Hofmann, D. Kaden, B. Wagner and W. Benecke

Fraunhofer Institut for Silicon Technology (ISIT), GERMANY

17:15 - 17:30

W4D.003 **METALLIC GLASS MICRO-MIRROR INTEGRATED WITH PZT ACTUATION FOR LOW RESONANT FREQUENCY AND LARGE EXCITING ANGLE**

Y.-C. Tsai[1], J.-W. Lee[1], T. Naono[2], Y.-C. Lin[1], M. Esashi[1], T. Fujii[2], and T. Gessner[1,4,5]
[1]Tohoku University, JAPAN, [2]Fujifilm Corporation, JAPAN, [3]Fraunhofer Institute for Electronic Nano Systems (ENAS), GERMANY and [4]Chemnitz University of Technology, GERMANY

17:30 - 17:45

W4D.004 **A BIO-INSPIRED HEMISPHERICAL LENS BASED ON REFLECTING SUPERPOSITION COMPOUND EYE OPTICS**

C.-C. Huang, B. Aldalali, X. Wu, and H. Jiang
University of Wisconsin, USA

17:45 - 18:00

W4D.005 **15μM AIR GAP 8×8/4×4 PIXELS SINGLE CRYSTAL SILICON CONTINUOUS MEMBRANE DEFORMABLE MIRROR**

T. Wu, T. Sasaki, M. Akiyama, and K. Hane
Tohoku University, JAPAN

18:00 - 18:15

W4D.006 **32X32 OPTICAL PHASED ARRAY WITH ULTRA-LIGHTWEIGHT HIGH-CONTRAST-GRATING MIRRORS**

B.W. Yoo[1], M. Megens[1], T.K. Chan[2], T. Sun[1], W. Yang[1], D.A. Horsley[2], C.J. Chang-Hasnain[1], and M.C. Wu[1]
[1]University of California, Berkeley, USA and *[2]University of California, Davis, USA*

18:15 - 18:30

W4D.007 **MINIATURE FOURIER TRANSFORM INFRARED SPECTROMETER FOR MIDDLE INFRARED WAVELENGTH RANGE**

T. Tanahashi, M. Toda, H. Miyashita, and T. Ono
Tohoku University, JAPAN

18:30 **Adjourn for the Day**

20:15 - 23:00 **Conference Banquet**

Thursday 20 June 2013

Session Th1A - Physical Microsystems 3
Session Chairs: T. Kenny, *Stanford University, USA* and M. Wong, *Hong Kong University of Science and Technology, CHINA*

08:30 - 09:00 **Invited Speaker**
Th1A.001 **CMOS MEMS: A KEY TECHNOLOGY TOWARDS THE "MORE THAN MOORE" ERA**
W. Fang, S.-S. Li, C.-L. Cheng, C.-I. Chang, W.-C. Chen, Y.-C. Liu, M.-H. Tsai, and C. Sun
National Tsing Hua University, TAIWAN

09:00 - 09:15
Th1A.002 **A HIGH PERFORMANCE AUTOMATIC MODE-MATCHED MEMS GYROSCOPE WITH AN IMPROVED THERMAL STABILITY OF THE SCALE FACTOR**
S. Sonmezoglu, S.E. Alper, and T. Akin
Middle East Technical University (METU), TURKEY

09:15 - 09:30
Th1A.003 **A HIGH PERFORMANCE MEMS BASED DIGITAL-OUTPUT GYROSCOPE**
A. Ismail, B. George, A. Elmallah, A. Mokhtar, M. Abdelazim, M. Elmala, A. Elshennawy, A. Omar, M. Saeed, I. Mostafa, and A. Elsayed
Si-ware Systems, EGYPT

09:30 - 09:45
Th1A.004 **INTERACTION EFFECTS OF TEMPERATURE AND STRESS ON MATCHED-MODE GYROSCOPE FREQUENCIES**
E. Tatar, C. Guo, T. Mukherjee, and G.K. Fedder
Carnegie Mellon University, USA

09:45 - 10:00
Th1A.005 **1 PPM PRECISION SELF-CALIBRATION OF SCALE FACTOR IN MEMS CORIOLIS VIBRATORY GYROSCOPES**
A.A. Trusov[1,2], I.P. Prikhodko[1], D.M. Rozelle[2], D. Meyer[2], and A.M. Shkel[1]
[1]*University of California, Irvine, USA* and [2]*Northrop Grumman Electronic Systems, USA*

10:00 - 10:15
Th1A.006 **ELECTRONIC SENSING SYSTEM WITH FLEXIBLE BIOMECHANICAL GROUND REACTION SENSOR ARRAY ACHIEVING 100 µm/sec GAIT GROUND VELOCITY RESOLUTION**
Q. Guo[1], M.A. Suster[2], R. Surapaneni[1], C.H. Mastrangelo[1], and D.J. Young[1]
[1]*University of Utah, USA* and [2]*Case Western Reserve University, USA*

Session Th1B - Bio-Microsystems in Diagnostics
Session Chairs: Z. Brzózka, *Warsaw University of Technology, POLAND* and A. Herr, *University of California, Berkeley, USA*

08:30 - 09:00 **Invited Speaker**
Th1B.001 **BIOMEDICAL MICRO AND NANOTECHNOLOGY: FROM LAB-ON-CHIP TO BUILDING SYSTEMS WITH CELLS**
U. Hassan, P. Bajaj, G. Damhorst, and R. Bashir
University of Illinois, Urbana-Champaign, USA

09:00 - 09:15

Th1B.002 **A MICROFLUIDIC APTASENSOR INTEGRATED WITH NANODROP GENERATOR FOR MALDI-TOF MS ANALYSIS IN CLINICAL APPLICATIONS**

J. Yang, J. Zhu, and Q. Lin

Columbia University, USA

09:15 - 09:30

Th1B.003 **AUTOMATED ON-DISC TOTAL RNA EXTRACTION FROM WHOLE BLOOD TOWARDS POINT-OF-CARE FOR EARLY-STAGE DIAGNOSTICS**

N. Dimov[1], J. Gaughran[1], E. Clancy[2], T. Barry[2], T.J. Smith[2], and J. Ducrée[1]

[1]*Dublin City University, IRELAND* and [2]*National University of Ireland, IRELAND*

09:30 - 09:45

Th1B.004 **A COMPACT, OPTOFLUIDIC SYSTEM FOR MEASURING RED BLOOD CELL CONCENTRATION**

M.N. Gulari, M. Ghannad-rezaie, and N. Chronis

University of Michigan, USA

09:45 - 10:00

Th1B.005 **MULTICOLOR ULTRA HIGH THROUGHPUT PARALLEL MICROFLUIDIC FLOW CYTOMETER**

Y.J. Fan[1,2], Y. Chen[1], Y.C. Wu[1], Y.C. Kung[1], T.H. Wu[1], H.J. Sheen[2], and P.Y. Chiou[1]

[1]*University of California, Los Angeles, USA and* [2]*National Taiwan University, TAIWAN*

10:00 - 10:15

Th1B.006 **LIVE IMAGING OF CELL APOPTOSIS USING FRET-BASED BIOPROBES IN MEMS FABRICATED MICROCULTURE DISH**

R. Kajiyama[1], Y. Edagawa[2], M. Suzuki[3], A. Nakahara[1], D.H. Yoon[1], T. Sekiguchi[1], and S. Shoji[1]

[1]*Waseda University, JAPAN,* [2]*Teikyo Heisei University, JAPAN,* and [3]*Saitama University, JAPAN*

Session Th1C - MEMS & NEMS

Session Chairs: G. Skidmore, *DRS Technologies RSTA, USA* and T. Tsuchiya, *Kyoto University, JAPAN*

08:30 - 09:00 **Invited Speaker**

Th1C.001 **SUCCESSFUL IMPLEMENTATION OF A MEMS MICROMIRROR ARRAY IN A LITHOGRAPHY ILLUMINATION SYSTEM**

W. Endendijk, B.P. van Drieënhuizen, and H.M. Mulder

ASML, THE NETHERLANDS

09:00 - 09:15

Th1C.002 **PIRANI GAUGE BASED ON ALTERNATIVE SELF-HEATING OF SILICON NANOWIRE**

J. Ruellan, J. Arcamone, D. Mercier, C. Dupré, and L. Duraffourg

Commissariat à l'énergie Atomique (CEA), FRANCE

09:15 - 09:30

Th1C.003 **DUAL-LAYER NANOPOROUS ANODIC ALUMINUM OXIDE WITH EMBEDDED ELECTRODES FOR CAPACITIVE RELATIVE HUMIDITY SENSOR**

C.-L. Hsieh, P.-H. Lo, and W. Fang

National Tsing Hua University, TAIWAN

09:30 - 09:45

Th1C.004 **MICRO-CHEMO-MECHANICAL HYDROGEN SENSOR BASED ON CONTACT RESISTANCE OF CARBON NANOTUBES ARRAY**

M.-O. Kim, K. Lee., H. Na, D.-S. Kwon, J. Choi, J.-I. Lee, D. Baek, and J. Kim

Yonsei University, SOUTH KOREA

09:45 - 10:00

Th1C.005 **FACILE FABRATION OF HETEROGENEOUS NANOMATERIAL ARRAY TOWARDS LOW-POWER AND MULTIPLEXED GAS SESING APPLICATION**

D. Yang[1], M.K. Fuadi[1], Z. Li[2], and I. Park[1]
[1]*Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA* and
[2]*Hewlett Packard Laboratory, USA*

10:00 - 10:15

Th1C.006 **RESISTIVE GAS SENSORS FABRICATED BY WAFER-SCALE, IN-SITU INTEGRATION OF HORIZONTAL CARBON NANOTUBE MEMBRANES**

H. Le Poche[1], H. Guerin[2], R. Pohle[3], M. Fernández-Bolaños Badía[2], J. Dijon[1], and A.M. Ionescu[2]
[1]*Commissariat à l'énergie Atomique (CEA), FRANCE,*
[2]*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND,* and
[3]*Siemens AG Corporate Research, GERMANY*

Session Th1D - Photonics for Bio/Fluidic Applications

Session Chairs: A.Q. Liu, *Nanyang Technological University, SINGAPORE* and R. Puers, *Katholieke Universiteit Leuven, BELGIUM*

08:30 - 09:00 **Invited Speaker**

Th1D.001 **NANOPHOTONIC BIOSENSORS IN SILICON-ON-INSULATOR**

P. Bienstman[1], S. Werquin[1], C. Lerma Arce[1], D. Witters[2], R. Puers[2], J. Lammertyn[2], T. Claes[1], E. Hallynck[1], J.-W. Hoste[1], and D. Martens[1]
[1]*Ghent University - imec, BELGIUM and* [2]*Katholieke Universiteit Leuven, BELGIUM*

09:00 - 09:15

Th1D.002 **QUANTUM DOT BASED COMPACT SOLID-STATE SWEPT LIGHT SOURCE FOR HYPERSPECTRAL CELLULAR IMAGING**

K. Hoshino, G. Bhave, N. Triesault, P. Joshi, A. Zubieta, V. Wang, K.V. Sokolov, and X.J. Zhang
University of Texas, Austin, USA

09:15 - 09:30

Th1D.003 **VARIABLE MULTI-COLOR MICROFLUIDIC ORGANIC LIGHT EMITTING DEVICE BASED ON MIXING OF ELECTROCHEMILUMINESCENCE SOLUTIONS**

T. Kasahara[1], J. Mizuno[1], S. Matsunami[2], T. Edura[2], M. Tsuwaki[1], J. Oshima[3], C. Adachi[2], and S. Shoji[1]
[1]*Waseda University, JAPAN,* [2]*Kyushu University, JAPAN,* and [3]*Nissan Chemical Industries, Ltd., JAPAN*

09:30 - 09:45

Th1D.004 **CMOS-MEMS FABRY-PEROT OPTICAL INTERFERENCE DEVICE WITH TUNABLE RESONANT CAVITY**

G.-L. Luo, C.-C. Lee, C.-L. Cheng, M.-H. Tsai, and W. Fang
National Tsing Hua University, TAIWAN

09:45 - 10:00

Th1D.005 **THERMALLY ACTUATED LIQUID TUNABLE MICROLENS WITH EMBEDDED THERMOELECTRIC DRIVER AND SUB-SECOND RESPONSE TIME**

A.O. Ashtiani and H. Jiang
University of Wisconsin, USA

10:00 - 10:15

Th1D.006 **MICROFLUIDICS INTEGRABLE PLASMA SOURCE POWERED BY A SILICON THROUGH-SUBSTRATE SPLIT-RING RESONATOR**

M. Berglund, A. Persson, H. Kratz, and G. Thornell
Uppsala University, SWEDEN

10:15 - 10:45 **Break**

Session Th2A - Flexible Technology
Session Chairs: X. Wang, *Tsinghua University, CHINA* and L. Sarro, *Delft University of Technology, THE NETHERLANDS*

10:45 - 11:00
Th2A.001 **RELIABLE PACKAGING FOR PARYLENE-BASED FLEXIBLE RETINAL IMPLANT**
J.H.-C. Chang, Y. Liu, D. Kang, and Y.-C. Tai
California Institute of Technology, USA

11:00 - 11:15
Th2A.002 **CREATING PARTICULATE MICROSTRUCTURES FOR TWO- AND THREE- DIMENSIONAL CELL PATTERNING**
X. Zhang and Y. Zhao
Ohio State University, USA

11:15 - 11:30
Th2A.003 **HYDROCHLORIC ACID-IMPREGNATED PAPER FOR LIQUID METAL MICROFLUIDICS**
D. Kim[1], Y. Lee[1], D.-W. Lee[2], W. Choi[1], and J.-B. Lee[1]
[1]*University of Texas, Dallas, USA* and [2]*Chonnam National University, SOUTH KOREA*

11:30 - 11:45
Th2A.004 **STRETCHABLE STRAIN SENSOR BASED ON METAL NANOPARTICLE THIN FILM FOR HUMAN MOTION DETECTION & FLEXIBLE PRESSURE SENSING DEVICES**
J.H. Lee, D. Yang, S. Kim, and I. Park
Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA

11:45 - 12:00
Th2A.005 **A FLEXIBLE STRESS SENSOR USING A SUB-10µM SILICON CHIP TECHNOLOGY**
S. Ferwana, E.A. Angelopoulos, S. Endler, C. Harendt, and J.N. Burghartz
Institute for Microelectronics Stuttgart (IMS CHIPS), GERMANY

12:00 - 12:15
Th2A.006 **LOW-COST ROLL-TO-ROLL COLORIMETRIC GAS SENSOR SYSTEM FOR FIRE DETECTION**
C. Peter[1], S. Schulz[2], M. Barth[3], M. Gempp[2], S. Rademacher[1], and J. Wöllenstein[4]
[1]*Fraunhofer Institute for Physical Measurement Techniques (IPM), GERMANY,* [2]*A. Raymond, GERMANY,* [3]*HSG-IMAT, GERMANY* and [4]*University of Freiburg – IMTEK, GERMANY*

12:15 - 12:30
Th2A.007 **SILICON FABRIC FOR MULTI-FUNCTIONAL APPLICATIONS**
G. Torres Sevilla, J.P. Rojas, S. Ahmed, A. Hussain, S.B. Inayat, and M.M. Hussain
King Abdullah University of Science and Technology, SAUDI ARABIA

Session Th2B - Microfluidics
Session Chairs: Y.-C. Lin, *National Cheng Kung University, TAWAIN* and R. Zengerle, *University of Freiburg - IMTEK, GERMANY*

10:45 - 11:00
Th2B.001 **VALVE-ONLY PUMPING IN MECHANICAL GAS MICROPUMPS**
A. Besharatian, K. Kumar, R.L. Peterson, L.P. Bernal, and K. Najafi
University of Michigan, USA

11:00 - 11:15

Th2B.002 **HIGH-THROUGHPUT IONIC LIQUID ELECTROSPRAY SOURCES BASED ON DENSE MONOLITHIC ARRAYS OF EMITTERS WITH INTEGRATED EXTRACTOR GRID AND CARBON NANOTUBE FLOW CONTROL STRUCTURES**

F.A. Hill, P.J. Ponce de Leon, and L.F. Velásquez-García

Massachusetts Institute of Technology, USA

11:15 - 11:30

Th2B.003 **SELF-SENSING NANOPIPETTE FOR LIQUID DISPENSING AND AFM IMAGING**

H.H. Perez Garza, R. Stoute, M.K. Ghatkesar, and U. Staufer

Delft University of Technology, THE NETHERLANDS

11:30 - 11:45

Th2B.004 **FABRICATION OF JANUS HYDROGEL BEADS WITH MAGNETIC ANISOTROPY FOR ELECTRONIC PAPER USING SHRINKAGE-GELATION TECHNIQUE**

K. Aketagawa, H. Hirama, and T. Torii

University of Tokyo, JAPAN

11:45 - 12:00

Th2B.005 **MICRODROPLET-BASED SYNTHESIS AND CENTRIFUGE-FREE RETRIEVAL OF NANOPARTICLES *VIA* A CONTINUOUS FLOW MICROPOST ARRAY RAILING SYSTEM**

K. Iwai, E.Y. Erdem, R.D. Sochol, J.C. Cheng, F.M. Doyle, A.P. Pisano, and L. Lin

University of California, Berkeley, USA

12:00 - 12:15

Th2B.006 **NUMBER CONTROLLABLE ACTIVE MICRODROPLET MERGING WITH WIDE RANGE OF VOLUME FOR DIGITAL CHEMICAL SYNTHESIS**

D.H. Yoon[1], S. Numakunai[1], J. Ito[1], T. Fukuda[2], T. Sekiguchi[1], and S. Shoji[1]

[1]*Waseda University, JAPAN* and [2]*Saitama University, JAPAN*

12:15 - 12:30

Th2B.007 **CHARACTERIZATION OF DEPLETION LAYER FORMATION USING SELF-ASSEMBLED NANOPARTICLES IN MICROCHANNELS**

E. Choi, K. Kwon, D. Kim, and J. Park

Sogang University, SOUTH KOREA

Session Th2C - Composite Materials & Characterization

Session Chairs: C. Nguyen, *University of California, Berkeley, USA* and S. Tatic-Lucic, *Lehigh University, USA*

10:45 - 11:00

Th2C.001 **IMPROVED PERFORMANCE OF SELF-ASSEMBLED GRAPHENE BIOSENSORS INTEGRATED WITH SHRINK-INDUCED TUNABLE MORPHOLOGY OF SILVER NANOPARTICLES**

B. Zhang and T. Cui

University of Minnesota, USA

11:00 - 11:15

Th2C.002 **FORMATION AND INTEGRATION OF TUNABLE ANISOTROPIC MAGNETIC POLYMER COMPOSITES BY TWO STAGES SOLIDIFICATION PROCESS**

F.-M. Hsu, W.-C. Chen, C.-F. Hu, G.-Y. Liu, and W. Fang

National Tsing Hua University, TAIWAN

11:15 - 11:30

Th2C.003 **PUSHING THE LIMITS OF PHOTO-CURABLE SU-8-BASED SUPERPARAMAGNETIC POLYMER COMPOSITES**

C. Peters, O. Ergeneman, G.A. Sotiriou, S.E. Pratsinis, B.J. Nelson, and C. Hierold
ETH Zürich, SWITZERLAND

11:30 - 11:45

Th2C.004 **ULTRAFAST PHOTO-TRIGGERED FIELD EMISSION CATHODES USING MASSIVE, UNIFORM ARRAYS OF NANO-SHARP HIGH-ASPECT-RATIO SILICON STRUCTURES**

M.E. Swanwick[1], P.D. Keathley[1], F.X. Kärtner[2], and L.F. Velásquez-Garcia[1]
[1]*Massachusetts Institute of Technology, USA* and [2]*University of Hamburg, USA*

11:45 - 12:00

Th2C.005 **CHARACTERIZATION OF π-CONJUGATED METALLOPOLYMER'S MECHANICAL STIFFNESS BY USING SILICON NANOTWEEZERS**

J. Lee, K. Yagi, M. Kumemura, T. Sato, L. Jalabert, N. Lafitte, D. Collard, H. Houjou, and H. Fujita
University of Tokyo, JAPAN

12:00 - 12:15

Th2C.006 **TOP-DOWN BATCH-FABRICATION OF BOTTOM-UP SELF-ASSEMBLIES FOR REGION-SELECTIVE MULTI-FUNCTIONALIZATION OF MICROFLUIDIC CHIPS**

C. Chen, P. Xu, and X. Li
Chinese Academy of Sciences, CHINA

12:15 - 12:30

Th2C.007 **DEDICATED TEST STRUCTURE FOR THE MEASUREMENT OF ADHESION FORCES BETWEEN CONTACTING SURFACES IN MEMS DEVICES**

J. De Coster, F. Ling, A. Witvrouw, and I. De Wolf
Katholieke Universiteit Leuven, BELGIUM

Session Th2D - Optical and Fluidic Systems

Session Chairs: K. Böhringer, *University of Washington, USA* and T. Cui, *University of Minnesota, USA*

10:45 - 11:00

Th2D.001 **MICRO-OPTICAL 1D MOIRÉS AS ANTI-COUNTERFEITING FEATURES**

V.J. Cadarso, S. Chosson, K. Sidler, R.H. Hersch, and J. Brugger
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

11:00 - 11:15

Th2D.002 **3D RECONSTRUCTION AND FEATURE EXTRACTION FOR ANALYSIS OF NANOSTRUCTURES BY SEM IMAGING**

F.-Y. Zhu[1], Q.-Q. Wang[2], X.-S. Zhang[1], W. Hu[1], X. Zhao[2], and H.-X. Zhang[1]
[1]*Peking University, CHINA* and [2]*Nankai University, CHINA*

11:15 - 11:30

Th2D.003 **HIGH DETECTIVITY UNCOOLED THERMOPILE DETECTORS WITH SPECTRALLY SELECTIVE RESPONSIVITY**

A.S. Gawarikar, R.P. Shea, and J.J. Talghader
University of Minnesota, USA

11:30 - 11:45

Th2D.004 **A POWERLESS OPTICAL MICROSENSOR FOR MONITORING INTRAOCULAR PRESSURE WITH KERATOPROSTHETIC**

M. Ghannad-Rezaie, M.N. Gulari, R. de Melo Franco, S. I. Mian, and N. Chronis
University of Michigan, USA

11:45 - 12:00

Th2D.005 **A FLEXIBLE, LASER-DEFINED, PAPER PLATFORM FOR LOCALIZED OXYGEN GENERATION AND DELIVERY**

M. Ochoa[1], R. Rahimi[1], N. Alemdar[2], M.R. Dokmeci[2], A. Khademhosseini[2], and B. Ziaie[1]
[1]*Purdue University, USA* and [2]*Brigham and Women's Hospital, Harvard Medical School, USA*

12:00 - 12:15

Th2D.006 **A MICROFLUIDIC READ-OUT PLATFORM FOR MINIATURIZED RFID TAGS**

H.R. Seren, C. Wang, X. Zhao, C. Chen, and X. Zhang
Boston University, USA

12:15 - 12:30

Th2D.007 **FERROFLUID-ASSISTED LEVITATION MECHANISM FOR MICROMOTOR APPLICATIONS**

B. Assadsangabi, M.H. Tee, and K. Takahata
University of British Columbia, CANADA

12:30 - 14:15 **Lunch on Own**

Session Th3A - Tactile Sensors

Session Chairs: G. Fedder, *Carnegie Mellon University, USA* and G. Skidmore, *DRS Technologies RSTA, USA*

14:15 - 14:45 **Invited Speaker**

Th3A.001 **MICROSYSTEMS AND FUNCTIONAL ASSAYS FOR MECHANOBIOLOGY**

B.L. Pruitt, J.C. Doll, S.J. Park, N. Harjee, and B.C. Petzold
Stanford University, USA

14:45 – 15:00

Th3A.002 **A 1.7MM^3 MEMS-ON-CMOS TACTILE SENSOR USING HUMAN-INSPIRED AUTONOMOUS COMMON BUS COMMUNICATION**

M. Makihata[1], M. Muroyama[1], Y. Nakano[1], S. Tanaka[1], T. Nakayama[2], U. Yamaguchi[2], H. Yamada[2], Y. Nonomura[3], H. Funabashi[3], Y. Hata[3], and M. Esashi[1]
[1]*Tohoku University, JAPAN,* [2]*Toyota Motor Corp., JAPAN,* and [3]*Toyota Central R&D Labs., JAPAN*

15:00 – 15:15

Th3A.003 **LOW VOLTAGE ACTUATED PLATE FOR HAPTIC APPLICATIONS WITH PZT THIN-FILM**

F. Casset[1], J.S. Danel[1], C. Chappaz[2], Y. Civet[3], M. Amberg[4], M. Gorisse[3], C. Dieppedale[1], G. Le Rhun[1], S. Basrour[3], P. Renaux[1], E. Defay[1], A. Devos[5], B. Semail[4], P. Ancey[2], and S. Fanget[1]
[1]*Commissariat à l'énergie Atomique (CEA), FRANCE,* [2]*STMicroelectronics, FRANCE,* [3]*TIMA, FRANCE,* [4]*Université Lille 1 FRANCE,* and [5]*Menapic, FRANCE*

15:15 – 15:30

Th3A.004 **LARGE RANGE MULTI-AXIS FINGERTIP FORCE SENSOR**

R.A. Brookhuis, R.J. Wiegerink, T.S.J. Lammerink, K. Ma, and G.J.M. Krijnen
MESA+, University of Twente, THE NETHERLANDS

15:30 – 15:45

Th3A.005 **FABRICATION AND MECHANICAL CHARACTERIZATION OF RING-SHAPED LTCC/HTCC FINGER FORCE SENSORS USED FOR PERFORMANCE STUDIES IN CLARINET PLAYING**

M. Weilguni[1], A. Hofmann[2], W. Smetana[1], W. Goebl[2], J. Nicolics[1], and G. Radosavljevic[1]
[1]*Vienna University of Technology, AUSTRIA* and [2]*University of Music and Performing Arts Vienna, AUSTRIA*

15:45 – 16:00

Th3A.006 **3-AXIS FINGERTIP FORCE DURING PLAYING THE STRING INSTRUMENT**

M. Hori[1], M. Hosono[2], H. Takahashi[1], K. Matsumoto[1], and I. Shimoyama[1]
[1]*University of Tokyo, JAPAN and* [2]*Industrial Research Institute of Shizuoka Prefecture, JAPAN*

Session Th3B - Gas Chromatography

Session Chairs: W. Lang, *University of Bremen, GERMANY* and W. Wlodarski, *RMIT University, AUSTRALIA*

14:15 – 14:45 **Invited Speaker**

Th3B.001 **THE DEVELOPMENT OF MEMS MASS SPECTROMETERS**

R.R.A. Syms
Imperial College, UK

14:45 – 15:00

Th3B.002 **A FACILE, STANDARDIZED FABRICATION APPROACH AND SCALABLE ARCHITECTURE FOR A MICRO GAS CHROMATOGRAPHY SYSTEM WITH INTEGRATED PUMP**

Y. Qin and Y.B. Gianchandani
University of Michigan, USA

15:00 – 15:15

Th3B.003 **A MEMS-ENABLED INTEGRATED MICROGC PLATFORM FOR ON-SITE MONITORING OF WATER ORGANIC COMPOUNDS**

M. Akbar, D. Wang, H. Shakeel, J.R. Heflin, and M. Agah
Virginia Tech, USA

15:15 – 15:30

Th3B.004 **FIELDABLE MEMS GAS CHROMATOGRAPH FOR RAPID DETERMINATIONS OF EXPLOSIVE MARKER COMPOUNDS IN COMPLEX MIXTURES**

W. Collin, G. Serrano, L.K. Wright, H. Chang, N. Nuñovero, and E.T. Zellers
University of Michigan, USA

15:30 – 15:45

Th3B.005 **LOW VOLTAGE (<5V) ION-MOBILITY SPECTROMETER ARRAY FOR LABEL-FREE GAS DETECTION**

V. Gund, Y. Shi, S. Ardanuc, and A. Lal
Cornell University, USA

15:45 – 16:00

Th3B.006 **LARGE-CAPACITY-ON-CHIP PRECONCENTRATOR DEVICE FOR SELECTIVE ETHYLENE MEASUREMENT BELOW 400 PP*B*V**

S. Janßen, T. Teßmann, M. Nießen, A. Sklorz, and W. Lang
Universität Bremen, GERMANY

Session Th3C - Imunnoassays & Nucleic Acid Assays
Session Chairs: CJ Kim, *University of California, Los Angeles, USA* and A.Q. Liu, *Nanyang Technological University, SINGAPORE*

14:15 – 14:45 **Invited Speaker**
Th3C.001 **INTEGRATING APTAMERS INTO MICRO- AND NANOBIOSYSTEMS FOR DIAGNOSTICS**
D. Spasic[1], K.P. Janssen[1], F. Toffalini[1], D.T. Tran[2], K. Leirs[1], D. Decrop[1], and J. Lammertyn[1]
[1]Katholieke Universiteit Leuven, BELGIUM and [2]Hanoi University of Agriculture, VIETNAM

14:45 – 15:00
Th3C.002 **QUANTUM DOT LABELED IMMUNOASSAY USING ZINC OXIDE NANOWIRES**
J. Kim, S. Kwon, J.-K. Park, and I. Park
Korea Advanced Institute of Science and Technology (KAIST), SOUTH KOREA

15:00 – 15:15
Th3C.003 **DIGITIZING IMMUNOASSAY ON AN ANTIBODY NANOARRAY TO IMPROVE ASSAY SENSITIVITY**
G. Zhou[1,2], S. Bergeron[1,2], S. Ricoult[1,2], and D. Juncker[1,2]
[1]McGill University, CANADA and [2]McGill Genome Innovation Centre, CANADA

15:15 – 15:30
Th3C.004 **AUTONOMOUS CAPILLARY MICROFLUIDIC IMMUNOASSAY WITH INTEGRATED DETECTION USING MICROFABRICATED PHOTODIODES: TOWARDS A POINT-OF-CARE DEVICE**
P. Novo[1], F. Volpetti[1], V. Chu[1], and J.P. Conde[1,2]
[1]Instituto de Engenharia de Sistemas e Computadores (INESC), PORTUGAL and [2]Technical University of Lisbon, PORTUGAL

15:30 – 15:45
Th3C.005 **ISOTHERMAL REAL-TIME POLYMERASE CHAIN REACTION DETECTION OF HERPES SIMPLEX VIRUS TYPE 1 ON A LIGHT-ACTUATED DIGITAL MICROFLUIDICS PLATFORM**
S.N. Pei[1], Y.-L. Wang[2], C.-T. Lin[2], and M.C. Wu[1]
[1]University of California, Berkeley, USA and *[2]National Taiwan University, TAIWAN*

15:45 – 16:00
Th3C.006 **REAL-TIME MEASUREMENTS OF PNA:DNA HYBRIDIZATION KINETICS WITH SILICON NANOWIRE BIOSENSORS**
A. De, J. van Nieuwkasteele, E.T. Carlen, and A. van den Berg
MESA+, University of Twente, THE NETHERLANDS

Session Th3D - Energy Generation & Management
Session Chairs: E. Yeatman, *Imperial College London, UK* and P. Woias, *University of Freiburg - IMTEK, GERMANY*

14:15 – 14:45 **Invited Speaker**
Th3D.001 **INTEGRATING MICRO AND NANO: A ROUTE FOR ALL-SILICON THERMOELECTRICITY?**
L. Fonseca[1], D. Dávila[2], C. Calaza[2], A. Tarancón[3], A. Morata[3], M. Salleras[1], M. Fernández-Regúlez[1], and A. San Paulo[4]
[1]Instituto de Microelectrónica de Barcelona (IMB), SPAIN, [2]International Iberian Nanotechnology Laboratory (INL), PORTUGAL, [3]Catalonia Institute for Energy Research (IREC), SPAIN, and [4]Instituto de Microelectrónica de Madrid, (IMM), SPAIN

14:45 – 15:00

Th3D.002 **THERMAL ENERGY HARVESTING BASED ON FERROMAGNETIC SHAPE MEMORY ALLOY MICROACTUATION**

M. Gueltig[1], B. Haefner[1], M. Ohtsuka[2], and M. Kohl[1]
[1]*Karlsruhe Institute of Technology (KIT), GERMANY and* [2]*Tohoku University, JAPAN*

15:00 – 15:15

Th3D.003 **IMMERSION CONDENSATION ON SCALABLE OIL-INFUSED NANOSTRUCTURES FOR HIGH PERFORMANCE THERMAL MANAGEMENT**

R. Xiao[1], N. Miljkovic[1], R. Enright[2], and E.N. Wang[1]
[1]*Massachusetts Institute of Technology, USA* and [2]*Bell Labs-Ireland, IRELAND*

15:15 – 15:30

Th3D.004 **GOLD NANOPARTICLE-BASED BIOFUEL CELL USING INSECT BODY FLUID CIRCULATION**

K. Shoji[1], Y. Akiyama[1], M. Suzuki[2], N. Nakamura[2], H. Ohno[2], and K. Morishima[1]
[1]*Osaka University, JAPAN* and [2]*Tokyo University of Agriculture and Technology, JAPAN*

15:30 – 15:45

Th3D.005 **A PASSIVE VAPOR-FEED DIRECT METHANOL FUEL CELL BASED ON A COMPOSITE PERVAPORATION MEMBRANE**

Z. Wu[1], X. Wang[1,2], X. Wu[1], and L. Liu[1]
[1]*Tsinghua University, CHINA and* [2]*Chinese Academy of Sciences, CHINA*

15:45 – 16:00

Th3D.006 **ALL-SOLID-STATE LITHIUM METAL BATTERIES FOR NEXT GENERATION ENERGY STORAGE**

C.R. Stoldt and S.-H. Lee
University of Colorado, USA

16:00 - 16:15 **Awards Ceremony**

16:15 **Conference Adjourns**