



18 - 20 April 2011

Prague Congress Ctr.
Prague Czech Republic

Conference 8066

Smart Sensors, Actuators and MEMS

Available in print as *Proceedings of SPIE Volume: 8066*

Dates: **Monday-Wednesday 18 - 20 April 2011**

Location: **220**

Conference Chair

[Ulrich Schmid](#), Technische Univ. Wien (Austria)

Conference Co-Chairs

[José Luis Sánchez-Rojas](#), Univ. de Castilla-La Mancha (Spain); [Monika Leester-Schaedel](#), Technische Univ. Braunschweig (Germany)

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[Show All Abstracts](#)

Monday 18 April

Opening Remarks

Date: **Monday 18 April**

Time: **10:30 - 10:40**

Ulrich Schmid, Technische Univ. Wien (Austria)

Session 1: High Temperature Sensors

Date: **Monday 18 April**

Time: **10:40 - 12:30**

Session Chairs: [Ulrich Schmid](#), Technische Univ. Wien (Austria); [Pietro Siciliano](#), Consiglio Nazionale delle Ricerche (Italy)

Wireless SAW sensor for high temperature applications: material point of view (*Invited Paper*)

Paper 8066-1

Author(s): Omar Elmazria, Univ. Henri Poincaré Nancy (France)

[Show Abstract](#)

Design and fabrication of piezoresistive p-SOI wheatstone bridges for high-temperature applications

Paper 8066-2

Author(s): Julian Kähler, Technische Univ. Braunschweig (Germany); Lutz Döring, Physikalisch-Technische Bundesanstalt (Germany); Stephan Merzsch, Andrej Stranz, Andreas Waag, Erwin Peiner, Technische Univ. Braunschweig (Germany)

No abstract available

Microthruster with integrated heater and platinum thin film resistance temperature detector (RTD) investigated up to 1000°C

Paper 8066-3

Author(s): Natsuki Miyakawa, Wolfgang Legner, Thomas Ziemann, EADS Deutschland GmbH (Germany); Dimitri Telitschkin, EADS Astrium GmbH (Germany); Hans-Jörg Fecht, Univ. Ulm (Germany); Alois Friedberger, EADS Deutschland GmbH (Germany)

[Show Abstract](#)

Miniaturized piezoelectric structures for application temperatures up to 1000 °C

Paper 8066-4

Author(s): Denny Richter, Jan Sauerwald, Silja Schmidtchen, Holger Fritze, Technische Univ. Clausthal (Germany)

[Show Abstract](#)

Thin film electrodes and passivation coatings for harsh environment microwave acoustic sensors

Paper 8066-5

Author(s): Robert J. Lad, Scott C. Moulzolf, David J. Frankel, George P. Bernhardt, Bryn Nugent, Univ. of Maine (United States)

[Show Abstract](#)

Lunch Break 12:30 - 14:00

Session 2: Materials

Date: **Monday 18 April**

Time: **14:00 - 16:00**

Session Chairs: [José Luis Sánchez de Rojas Aldavero](#), Univ. de Castilla-La Mancha (Spain); [Achim Bittner](#), Technische Univ. Wien (Austria)

Smart ultrasonic sensors systems: investigations on aluminium nitride thin films for the excitation of high frequency ultrasound

Paper 8066-6

Author(s): Susan Walter, Thomas Herzog, Henning Heuer, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany)

[Show Abstract](#)

Measurement of Young's modulus and residual stress of thin SiC layers for MEMS high temperature applications

Paper 8066-7

Author(s): Ha-Duong Ngo, Technische Univ. Berlin (Germany); Oliver Pabst, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Tolga Tekin, Technische Univ. Berlin (Germany); Michael Schiffer, EPCOS AG

(Germany); Ernst Obermeier, Klaus-Dieter Lang, Technische Univ. Berlin (Germany)

[Show Abstract](#)

Mechanical properties of 1 μm -thick metallic freestanding coatings measured by in-plane uniaxial stress

Paper 8066-8

Author(s): Thibaut Fourcade, NOVA MEMS (France) and Univ. de Toulouse (France); Cedric Segueineau, NOVA MEMS (France); Jean-Michel Desmarres, Ctr. National d'Études Spatiales (France); Talal Masri, Joël Alexis, Olivier Dalverny, Ecole Nationale d'Ingénieurs de Tarbes (France); Julien Martegoutte, Ctr. National d'Études Spatiales (France) and Institut National des Sciences Appliquées de Lyon (France); Xavier Lafontan, NOVA MEMS (France)

[Show Abstract](#)

Fabrication process and characterization of micromechanical sensors based on SU-8 resist

Paper 8066-9

Author(s): Alexa Jordan, Stephanus Büttgenbach, Technische Univ. Braunschweig (Germany)

[Show Abstract](#)

On-device extraction of thermal thin-film properties in calorimetric flow sensors

Paper 8066-10

Author(s): Almir Talic, Roman Beigelbeck, Institute for Integrated Sensor Systems (Austria); Samir Cerimovic, Technische Univ. Wien (Austria); Franz Kohl, Institute for Integrated Sensor Systems (Austria); Franz Keplinger, Technische Univ. Wien (Austria)

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Thin catalyst layers based on carbon nanotubes for PEM-fuel cell applications

Paper 8066-11

Author(s): Timo Bohnenberger, Jovan Matovic, Ulrich Schmid, Technische Univ. Wien (Austria)

No abstract available

Posters--Monday

Date: **Monday 18 April**

Time: **16:15 - 17:30**

Poster Session and Reception

Conference attendees are invited to attend the EMT Poster Session and Reception on Monday afternoon. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/x30965.xml>.

Energy harvesting circuit for special purpose generator power management

Paper 8066-46

Author(s): Pavel J. Fiala, Brno Univ. of Technology (Czech Republic)

[Show Abstract](#)

MEMS-microfabricated folded waveguide circuit for THz TWT

Paper 8066-47

Author(s): Yajun Wang, Zhang Chen, Yang Gao, Zhigui Shi, Chinese Academy of Engineering Physics (China)

[Show Abstract](#)

Multilayer gold-based thin films for ohmic contacts in RF-MEMS switches

Paper 8066-48

Author(s): Viviana Mulloni, Jacopo Iannacci, Ruben Bartali, Sabrina Colpo, Nadira Bensaada, Benno Margesin, Fondazione Bruno Kessler (Italy)

[Show Abstract](#)

Micromirror with enlarged static deflection based on aluminum nitride springs

Paper 8066-49

Author(s): Stefan Weinberger, Eric Markweg, Tobias Polster, Martin Hoffmann, Technische Univ. Ilmenau (Germany)

[Show Abstract](#)

Aluminum nitride based piezoelectric bimorph microgenerator utilizing low-level non-resonant excitation

Paper 8066-50

Author(s): Stefan Hampl, Technische Univ. Ilmenau (Germany); Volker Cimalla, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Tobias Polster, Martin Hoffmann, Technische Univ. Ilmenau (Germany)

[Show Abstract](#)

Airborne particle generation for optical tweezers by thermo-mechanical membrane actuators

Paper 8066-51

Author(s): Tobias Polster, Steffen Leopold, Martin Hoffmann, Technische Univ. Ilmenau (Germany)

[Show Abstract](#)

Characterization of the first in-plane mode of AlN-actuated microcantilevers

Paper 8066-52

Author(s): Víctor Ruiz, Jorge Hernando-García, Univ. de Castilla-La Mancha (Spain); Abdallah Ababneh, Yarmouk Univ. (Jordan); Helmut Seidel, Univ. des Saarlandes (Germany); Ulrich Schmid, Technische Univ. Wien (Austria); James K. Gimzewski, Univ. of California, Los Angeles (United States); José Luis Sánchez de Rojas Aldavero, Univ. de Castilla-La Mancha (Spain)

[Show Abstract](#)

Growth and characterization of uniform ZnO film as piezoelectric material using a hydrothermal growth technique

Paper 8066-53

Author(s): Eleni Makarona, Claudia Fritz, Georgios Niarchos, Christos Tsamis, National Ctr. for Scientific Research Demokritos (Greece)

[Show Abstract](#)

Piezoelectric AlN-actuated micro-tuning forks for sensing applications

Paper 8066-54

Author(s): Marta Gil Barba, Tomas Manzaneque, Jorge Hernando-Garcia, Univ. de Castilla-La Mancha (Spain); Abdallah Ababneh, Yarmouk Univ. (Jordan); Helmut Seidel, Univ. des Saarlandes (Germany); José Luis Sánchez de Rojas Aldavero, Univ. de Castilla-La Mancha (Spain)

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Improved load-deflection method for the extraction of elastomechanical properties of circularly-shaped thin-film diaphragms

Paper 8066-55

Author(s): Johannes Schalko, Roman Beigelbeck, Michael Stifter, Institute for Integrated Sensor Systems (Austria); Michael Schneider, Achim Bittner, Ulrich Schmid, Technische Univ. Wien (Austria)

[Show Abstract](#)

The impact of substrate properties on the electromigration resistance of sputter-deposited Cu thin films

Paper 8066-56

Author(s): Achim Bittner, Technische Univ. Wien (Austria); Natalie Pagel, Helmut Seidel, Univ. des Saarlandes (Germany); Ulrich Schmid, Technische Univ. Wien (Austria)

[Show Abstract](#)

Microfabricated self-resonant structure as a passive wireless chemical sensor

Paper 8066-57

Author(s): Sheng P. Zhang, Praveenkumar Pasupathy, Dean P. Neikirk, The Univ. of Texas at Austin (United States)

[Show Abstract](#)

In incubator live cell imaging platform

Paper 8066-58

Author(s): Nicola Moscelli, Technische Univ. Wien (Austria); Wojciech Witarski, Institute of Virology (Slovakia); Sander van den Driesche, Michael J. Vellekoop, Technische Univ. Wien (Austria)

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Analytical investigation of the pull-in voltage in capacitive mechanical sensors

Paper 8066-59

Author(s): Joseph Lardies, Marc Berthillier, Univ. de Franche-Comté (France)

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Biomimetic MEMS to assist, enhance and expand human sensory perceptions: survey on state-of-the-art developments

Paper 8066-60

Author(s): Teresa Makarczuk, Ulrich Schmid, Technische Univ. Wien (Austria); Tina R. Matin, Univ. Kebangsaan Malaysia (Malaysia); Mark O. Macqueen, Aramis Technologies (Malaysia); Ille C. Gebeshuber, Univ. Kebangsaan Malaysia (Malaysia)

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System modeling of a piezoelectric energy harvesting module for environments with high dynamic forces

Paper 8066-61

Author(s): Alexander Frey, Matthias Schreiter, Julian Seidel, Ingo Kuehne, Siemens AG (Germany)

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3D capacitive vibrational micro-harvester using isotropic charging of electrets deposited on vertical sidewalls

Paper 8066-62

Author(s): Antwi Nimo, Ulrich Mescheder, Bernhard Müller, Hochschule Furtwangen Univ. (Germany)

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Vibration energy harvester optimization using artificial intelligence

Paper 8066-63

Author(s): Hadas Zdenek, Cestmir Ondrusek, Jiri Kurfurst, Vladislav Singule, Brno Univ. of Technology (Czech Republic)

[Show Abstract](#)

Modified thermopile structure for THz detection

Paper 8066-64

Author(s): Béla Szentpáli, Research Institute for Technical Physics and Materials Science (Hungary); Gábor Matyi, EnerSys GmbH (Hungary); Péter Fürjes, Research Institute for Technical Physics and Materials Science (Hungary); Endre László, Research Institute for Technical Physics and Materials Science (Hungary) and Pázmány Péter Catholic Univ. (Hungary); Gábor Battistig, István Bársony, Research Institute for Technical Physics and Materials Science (Hungary); Gergely Károlyi, Tibor Bercei, Budapest Univ. of Technology and Economics (Hungary)

[Show Abstract](#)

Microfabricated ultrashort cantilever probes for high speed AFM

Paper 8066-65

Author(s): Christoph Richter, Oliver Krause, Wolfgang Engl, Thomas Sulzbach, Nanoworld Services GmbH (Germany); Sebastian Schade, Christian Penzkofer, Bernd Irmer, nanotools GmbH (Germany); Philipp Weinzierl, Nanoworld Services GmbH (Germany)

No abstract available

Tactile refreshable screen based on magneto-rheological fluids for map exploration and navigation tasks

Paper 8066-66

Author(s): Gwénaél Changeon, Virginie Plaud, Samuel Roselier, Christian Bolzmacher, Moustapha Hafez, Commissariat à l'Énergie Atomique (France)

[Show Abstract](#)

Robust pressure sensor for measurements in boundary layers of liquid fluids with medium total pressures

Paper 8066-67

Author(s): Tobias T. Beutel, Nelson J. Ferreira, Monika Leester-Schädel, Stephanus Büttgenbach, Technische Univ. Braunschweig (Germany)

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Non-electrical-power temperature-time integrating sensor for RFID based on micro fluidics

Paper 8066-68

Author(s): Mike Schneider, Martin Hoffmann, Technische Univ. Ilmenau (Germany)

[Show Abstract](#)

Investigation on micromachining technologies for the realization of LTCC devices and systems

Paper 8066-69

Author(s): Thomas Haas, Christian Zeilmann, Micro Systems Engineering GmbH (Germany); Achim Bittner, Technische Univ. Wien (Austria); Ulrich Schmid, Technische Univ. Wien (Germany)

[Show Abstract](#)

IR thermocycler for centrifugal microfluidic platform with direct on-disk temperature measurement system

Paper 8066-70

Author(s): Jürgen Burger, André Gross, Albert-Ludwigs-Univ. Freiburg (Germany); Daniel Mark, Hahn Schickard Gesellschaft HSG-IMIT (Germany); Günter Roth, Felix von Stetten, Roland Zengerle, Albert-Ludwigs-Univ. Freiburg (Germany)

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Microneedle integrated carbon nanotube sheet electrode-based non-enzymatic glucose sensor for painless diabetes testing application

Paper 8066-71

Author(s): Youngsam Yoon, Jae-Hak Kim, Han-Jung Song, Koangki Yoo, Gil Lee, Jeong-Bong Lee, The Univ. of Texas at Dallas (United States)

[Show Abstract](#)

Optical fiber waveguide sensor for the colorimetric detection of ammonia

Paper 8066-72

Author(s): Katrin Schmitt, Jonas Rist, Carolin Peter, Fraunhofer-Institut für Physikalische Messtechnik (Germany); Jürgen Wöllenstein, Univ. of Freiburg (Germany)

[Show Abstract](#)

Sensor for mechanical liquid properties utilizing pressure waves

Paper 8066-73

Author(s): Hannes Antlinger, Johannes Kepler Univ. Linz (Austria); Roman Beigelbeck, Institute for Integrated Sensor Systems (Austria); Samir Cerimovic, Franz Keplinger, Technische Univ. Wien (Austria); Bernhard Jakoby, Johannes Kepler Univ. Linz (Austria)

No abstract available

Non-contact volume determination of free-flying nanoliter droplets using an adjustable capacitive measurement bridge

Paper 8066-74

Author(s): Andreas Ernst, Albert-Ludwigs-Univ. Freiburg (Germany); Bernhard Vondenbusch, Hochschule Furtwangen Univ. (Germany); Roland Zengerle, Peter Koltay, Albert-Ludwigs-Univ. Freiburg (Germany)

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Micro-electro discharge machining: an innovative method for the fabrication of 3D microdevices

Paper 8066-75

Author(s): Claudia Lesche, Thomas Krah, Stephanus Büttgenbach, Technische Univ. Braunschweig (Germany)

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Optimization of an impedance sensor for droplet-based microfluidic systems

Paper 8066-76

Author(s): Brian P. Cahill, Institut für Bioprozess- und Analysenmesstechnik e.V. (Germany)

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Wafer bonding for MEMS and CMOS integration

Paper 8066-77

Author(s): Viorel Dragoi, Jürgen Burggraf, Gerald Mittendorfer, EV Group (Austria); Eric Pabo, EV Group Inc. (United States)

[Show Abstract](#)

Use of self-sensing piezoresistive Si cantilever sensor for determining carbon nanoparticles mass

Paper 8066-78

Author(s): Hutomo Suryo Wasisto, Stephan Merzsch, Andrej Stranz, Andreas Waag, Technische Univ. Braunschweig (Germany); Ina Kirsch, Erik Uhde, Tunga Salthammer, Fraunhofer-Wilhelm-Klauditz-Institut Holzforschung (Germany); Erwin Peiner, Technische Univ. Braunschweig (Germany)

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Experimental setup for the coating of chlorosilane based self assembling monolayers to reduce stiction in MEMS devices

Paper 8066-79

Author(s): Harald Steiner, Matthias Sachse, Johannes Schalko, Wilfried Hortschitz, Franz Kohl, Integrated Microsystems Austria GmbH (Austria); Artur Jachimowicz, Technische Univ. Wien (Austria)

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Impedance spectroscopy on a digital microfluidic platform

Paper 8066-80

Author(s): Thomas Lederer, Stefan Clara, Bernhard Jakoby, Johannes Kepler Univ. Linz (Austria); Wolfgang Hilber, Johannes Kepler Univ. Linz (United States)

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Determining the acoustical resistance of small sound holes for MEMS microphones

Paper 8066-81

Author(s): Matthias Winter, Christian Siegel, EPCOS AG (Germany); Elmar Schroeder, Müller-BBM VibroAkustik Systeme GmbH (Germany); Peter Iskra, Fraunhofer-Einrichtung für Modulare Festkörper-Technologien EMFT (Germany); Mustafa Yusufi, Hochschule München (Germany) and EPCOS AG (Germany); Gregor Feiertag, Hochschule München (Germany)

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A comb-drive scanning-head array for fast SPM measurements

Paper 8066-82

Author(s): Sai Gao, Konrad Herrmann, Uwe Brand, Physikalisch-Technische Bundesanstalt (Germany); Karla Hiller, Susann Hahn, Alexander Sorger, Jan Mehner, Technische Univ. Chemnitz (Germany)

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A MEMS-based thermal infrared emitter for an integrated NDIR spectrometer

Paper 8066-83

Author(s): Carlos A. Calaza, Marc Salleras, Neus Sabaté, Joaquin Santander, Carles Cané, Luis Fonseca, Instituto de Microelectrónica de Barcelona (Spain)

[Show Abstract](#)

Flexible and large area pressure sensors for human-neuroprostheses and human-neurobotic interface assessment

Paper 8066-84

Author(s): Jaime Herrán, Iván Fernández, Estibalitz Ochoteco, Germán Cabañero, Hans Grande, CIDETEC (Spain); José Luis Pons, Consejo Superior de Investigaciones Científicas (Spain)

[Show Abstract](#)

A study on tunable resonators for rheological measurements

Paper 8066-85

Author(s): Martin Heinisch, Johannes Kepler Univ. Linz (Austria); Erwin K. Reichel, Katholieke Univ. Leuven (Belgium); Bernhard Jakoby, Johannes Kepler Univ. Linz (Austria)

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BinärZeroPowerSensors: an alternative solution for power-free energy-autonomous sensor systems

Paper 8066-86

Author(s): Thomas Frank, CiS Institut für Mikrosensorik und Photovoltaik GmbH (Germany); Gerald Gerlach, Technische Univ. Dresden (Germany); Arndt Steinke, CiS Institut für Mikrosensorik und Photovoltaik GmbH (Germany)

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Fabrication process for the electrode structure of a dielectric elastomer bending tube actuator

Paper 8066-87

Author(s): Frank Wehrheim, Helmut F. Schlaak, Richard Wolf GmbH (Germany)

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Evaluation of sensor arrays for engine oils using artificial oil alteration

Paper 8066-88

Author(s): Sedat Sen, Christoph Schneidhofer, Nicole Dörr, AC2T Research GmbH (Austria); Michael J. Vellekoop, Technische Univ. Wien (Austria)

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Integrated microsystems based on intrinsically active polymers

Paper 8066-89

Author(s): Andreas Richter, Stephan Klatt, Rinaldo Greiner, Georgi Paschew, Merle Allerdissen, Willy Haas, Technische Univ. Dresden (Germany)

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A MEMS viscosity and density sensor with Lorentz force actuation and integrated piezoresistive readout

Paper 8066-90

Author(s): Samir Cerimovic, Technische Univ. Wien (Austria); Roman Beigelbeck, Institute for Integrated Sensor Systems (Austria); Hannes Antlinger, Johannes Kepler Univ. Linz (Austria); Johannes Schalko, Technische Univ. Wien (Austria) and Institute for Integrated Sensor Systems (Austria); Bernhard Jakoby, Johannes Kepler Univ. Linz (Austria); Franz Keplinger, Technische Univ. Wien (Austria)

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Fabrication and characterization of artificial hair cell sensor based on MWCNT-PDMS composite

Paper 8066-91

Author(s): Chi Yeon Kim, Pohang Univ. of Science and Technology (Korea, Republic of); Hyun Sup Lee, Samsung Electronics Co., Ltd. (Korea, Republic of); Yo Han Cho, Cheeyoung Joh, Agency for Defense Development (Korea, Republic of); Pyung Choi, Kyungpook National Univ. (Korea, Republic of); Seong Jin Park, Pohang Univ. of Science and Technology (Korea, Republic of)

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Comparison among performance of strain sensors based on different semiconductor thin films

Paper 8066-92

Author(s): Mariana A. Fraga, Instituto de Estudos Avançados (Brazil); Humber Furlan, Faculdade de Tecnologia de São Paulo (Brazil); Rodrigo S. Pessoa, Instituto Tecnológico de Aeronáutica (Brazil)

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Polyimide/PDMS flexible thermoelectric generator for ambient assisted living applications

Paper 8066-93

Author(s): Luca Francioso, Chiara De Pascali, Isabella Farella, Concetta Martucci, Pasquale Cretì, Pietro Siciliano, Consiglio Nazionale delle Ricerche (Italy)

[Show Abstract](#)

Nanostructured silicon for thermoelectrics

Paper 8066-94

Author(s): Andrej Stranz, Julian Kähler, Andreas Waag, Erwin Peiner, Technische Univ. Braunschweig (Germany)

[Show Abstract](#)

Variable isotropy deep RIE process for through wafer via holes manufacturing

Paper 8066-95

Author(s): Dan Vasilache, Sabrina Colpo, Flavio Giacomozzi, Sabina Ronchin, Abdul Qader Ahsan Qureshi, Benno Margesin, Fondazione Bruno Kessler (Italy)

[Show Abstract](#)

Development of a new technological MEMS process for AC voltage standards

Paper 8066-96

Author(s): Francois Blard, Alexandre Bounouh, Lab. National de Metrologie et d'Essais (France); Samuel Charlot, David Bourrier, Henri Camon, Lab. d'Analyse et d'Architecture des Systèmes (France)

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Hysteresis correction of tactile sensor response with a generalized Prandtl-Ishlinskii model

Paper 8066-97

Author(s): José Antonio Sánchez-Durán, Óscar Oballe-Peinado, Julián Castellanos-Ramos, Fernando Vidal-Verdú, Univ. de Málaga (Spain)

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Tuesday 19 April

Session 3: Bio-MEMS

Date: **Tuesday 19 April**

Time: **10:10 - 12:00**

Session Chairs: [Jeong-Bong Lee](#), The Univ. of Texas at Dallas (USA); [Dean P. Neikirk](#), The Univ. of Texas at Austin (USA)

Poly(dimethylsiloxane) photonic microreactors and multiple internal reflection systems for real-time cell screening (*Invited Paper*)

Paper 8066-12

Author(s): Pedro Ortiz, Ctr. Nacional de Microelectrónica (Spain); Stefanie Demming, Technische Univ. Braunschweig (Germany); Elisabet Fernández-Rosas, Univ. Autònoma de Barcelona (Spain); Bergoi Ibarlucea, Jordi Vila-Planas, Ctr. Nacional de Microelectrónica (Spain); Stephanus Büttgenbach, Technische Univ. Braunschweig (Germany); Andreu Llobera, Ctr. Nacional de Microelectrónica (Spain) and Technische Univ. Braunschweig (Germany)

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Mid-infrared CH₂-stretch ratio sensor system for suspended mammalian cells

Paper 8066-13

Author(s): Sander van den Driesche, Christoph Haiden, Technische Univ. Wien (Austria); Wojciech Witarski, Institute of Virology (Slovakia); Michael J. Vellekoop, Technische Univ. Wien (Austria)

[Show Abstract](#)

Resonant piezoelectric AlN-actuated microcantilevers for detection Of antigen/antibody interactions

Paper 8066-14

Author(s): Maria Jesús Oliver-Gomez, Jorge Hernando-García, Univ. de Castilla-La Mancha (Spain); Abdallah Ababneh, Yarmouk Univ. (Jordan); Helmut Seidel, Univ. des Saarlandes (Germany); Ulrich Schmid, Technische Univ. Wien (Austria); Jimena Olivares, Enrique Iborra, Univ. Politécnica de Madrid (Spain); Paulius Pobedinskas, Ken Haenen, Univ. Hasselt (Belgium); José Luis Sánchez-Rojas, Univ. de Castilla-La Mancha (Spain)

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Microfluidic cartridges for DNA purification and genotyping processed in standard laboratory instruments

Paper 8066-15

Author(s): Maximilian Focke, Albert-Ludwigs-Univ. Freiburg (Germany); Daniel Mark, Fabian Stumpf, Hahn Schickard Gesellschaft HSG-IMIT (Germany); Martina Müller, Günter Roth, Roland Zengerle, Albert-Ludwigs-Univ. Freiburg (Germany); Felix von Stetten, Hahn Schickard Gesellschaft HSG-IMIT (Germany)

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Investigation of enzyme kinetics based on a fluidic microprocessor

Paper 8066-16

Author(s): Merle Allerdissen, Rinaldo Greiner, Andeas Richter, Technische Univ. Dresden (Germany)

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Lunch/Exhibition Break 12:00 - 13:20

Session 4: Gas Sensors

Date: **Tuesday 19 April**

Time: **13:20 - 15:20**

Session Chairs: [Alois Friedberger](#), EADS Deutschland GmbH (Germany); **Robert J. Lad**, Univ. of Maine (USA)

New method for selectivity enhancement of SiC field effect gas sensors for quantification of NO_x

Paper 8066-17

Author(s): Christian Bur, Peter Reimann, Univ. des Saarlandes (Germany); Mike Andersson, Linköping Univ. (Sweden); Andreas Schuetze, Univ. des Saarlandes (Germany); Anita Lloyd Spetz, Linköping Univ. (Sweden)

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Fabrication of a miniaturized ionization gas sensor with polyimide spacer

Paper 8066-18

Author(s): Thomas H. Walewyns, Gilles Scheen, Ester Tooten, Lamia El Fissi, Pascal Dupuis, Laurent A. Francis, Univ. Catholique de Louvain (Belgium)

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Fabry-Perot-based thin film structure used as IR-emitter of a NDIR gas sensor: ray tracing simulations and measurements

Paper 8066-19

Author(s): Johann Mayrwöger, Johannes Kepler Univ. Linz (Austria); Wolfgang Reichl, E+E Elektronik (Austria); Christian Krutzler, Integrated Microsystems Austria GmbH (Austria); Bernhard Jakoby, Johannes Kepler Univ. Linz (Austria)

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Metallo-porphyrine as gas sensing material for colorimetric gas sensors on planar optical waveguides

Paper 8066-20

Author(s): Carolin Peter, Katrin Schmitt, Martin Schiel, Jürgen Wöllenstein, Fraunhofer-Institut für Physikalische Messtechnik (Germany)

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Nanostructured ZnO based field effect transistors for enhanced gas sensing applications

Paper 8066-21

Author(s): Nikolaos Kelaidis, Matthias Widmann, Eleni Makarona, National Ctr. for Scientific Research Demokritos (Greece); Michalis G. Kompitsas, National Hellenic Research Foundation (Greece); Thanassis Speliotis, National Ctr. for Scientific Research Demokritos (Greece); Filippos V. Farmakis, Demokritos Univ. of Thrace (Greece); Piotr T. Jedrasik, Chalmers Univ. of Technology (Sweden); Christos Tsamis, National Ctr. for

Scientific Research Demokritos (Greece)

ZnO has gained a leading role among the materials which have been widely used as the functional core of gas sensors. Its prominent role is mainly due to an inherent combination of attractive properties that include high electron mobility, enhanced sensing capabilities and most importantly, deposition at lower temperatures, a fact that will enable its integration onto cheaper flexible substrates. In this work, field effect transistors (FETs) with an active sensing layer of ZnO enriched with Au nanoparticles, deposited at various conditions, have been fabricated and tested as bottom gate FET gas sensors of enhanced capabilities. For their fabrication, a combination of e-beam lithography and conventional microfabrication techniques has been applied. Electrical characterization of the devices was performed in order to evaluate the response of the sensors as FET devices and the effect of different deposition conditions and materials on I-V characteristics. The effect of temperature was examined by performing characterisation measurements at temperatures ranging from room temperature to 200C. The characterization of ZnO-FET structures as gas sensors was performed in CO ambient at the same temperature range. It was observed that the presence of Au nanoparticles within the ZnO nanostructured layers significantly enhanced the performance of the gas sensors. Surface morphology and structural characterization by AFM and XRD were used to investigate the factors that lead to the observed sensor performance enhancement. From the analysis of the results and with the aid of a device simulator (Synopsis), the physical mechanisms underlying device operation were investigated. *Device development and fabrication was financed by the European Community - FP6 translational access MC2ACCESS, contract No 026029.

Gas sensors based on MEMS structures made of ceramic ZrO_2/Y_2O_3 material

Paper 8066-22

Author(s): Alexey A. Vasiliev, Russian Research Ctr. Kurchatov Institute (Russian Federation); Alexandr Lipilin, Institute of Electrophysics (Russian Federation); Alexandr Pislakov, Nikolay Samotaev, Andrey Sokolov, Alexandr Lagutin, Russian Research Ctr. Kurchatov Institute (Russian Federation)

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Session 5: Optical Devices and Systems

Date: **Tuesday 19 April**

Time: **15:50 - 17:50**

Session Chairs: [Pavel J. Fiala](#), Brno Univ. of Technology (Czech Republic); **Jacopo Iannacci**, Fondazione Bruno Kessler (Italy)

Closed-loop synchronization scheme of resonant MOEMS-mirrors with two axes

Paper 8066-23

Author(s): Andreas Tortschanoff, Albert Frank, Carinthian Tech Research AG (Austria); Michael Wildenhain, Thilo Sandner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Andreas Kenda, Carinthian Tech Research

AG (Austria)

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Design of a (non-)linear hybrid optical MEMS displacement sensor

Paper 8066-24

Author(s): Wilfried F. Hortschitz, Franz Kohl, Harald Steiner, Matthias Sachse, Michael Stifter, Integrated Microsystems Austria GmbH (Austria); Johannes Schalko, Artur Jachimowicz, Franz Keplinger, Technische Univ. Wien (Austria)

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Miniaturized multi-channel infrared optical gas sensor system

Paper 8066-25

Author(s): Jürgen Wöllenstein, Sven Rademacher, Andre Eberhardt, Fraunhofer-Institut für Physikalische Messtechnik (Germany)

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Polyvinylidene fluoride (PVDF) based bimorph actuator for high-speed laser beam manipulation

Paper 8066-26

Author(s): Ricardo Pérez Suárez, Miroslav Král, Hannes Bleuler, Reymond Clavel, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

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A systems engineering approach to structural health monitoring of composites using embedded optical fibre Bragg sensors for aeronautical applications

Paper 8066-27

Author(s): Albertus J. van Wyk, C. Roberson, Univ. of Johannesburg (South Africa)

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Impact damage detection of composite materials by fiber bragg gratings

Paper 8066-28

Author(s): Zoran V. Djinovic, Integrated Microsystems Austria GmbH (Austria); Michael Scheerer, Aerospace & Advanced Composites (Austria); Milos C. Tomic, Univ. of Belgrade (Serbia)

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Wednesday 20 April

Session 6: High-Frequency MEMS

Date: **Wednesday 20 April**

Time: **10:10 - 12:00**

Session Chairs: [Monika Leester-Schaedel](#), Technische Univ. Braunschweig (Germany); **Bernhard Jakoby**, Johannes Kepler Univ. Linz (Austria)

Electro-acoustic sensors based on AlN thin film: possibilities and limitations (*Invited Paper*)

Paper 8066-29

Author(s): Gunilla Wingqvist, Linköping Univ. (Sweden)

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Development of capacitive RF MEMS switches with TaN and Ta₂O₅ thin films

Paper 8066-30

Author(s): Anna Persano, Fabio Quaranta, Adriano Cola, Giorgio De Angelis, Romolo Marcelli, Pietro Siciliano, Istituto per la Microelettronica e Microsistemi (Italy)

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Effect of electro-thermo-mechanical coupling on the short-circuit in RF microswitch operation

Paper 8066-31

Author(s): Eugenio G. M. Brusa, Politecnico di Torino (Italy); Mircea G. Munteanu, Univ. degli Studi di Udine (Italy)

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A reconfigurable impedance matching network entirely manufactured in RF-MEMS technology

Paper 8066-32

Author(s): Jacopo Iannacci, Fondazione Bruno Kessler (Italy); Diego Masotti, Univ. degli Studi di Bologna (Italy)

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Mechanical contact in system-level models of electrostatically actuated RF-MEMS switches: experimental analysis and modeling

Paper 8066-33

Author(s): Martin Niessner, Technische Univ. München (Germany); Jacopo Iannacci, Fondazione Bruno Kessler (Italy); Gabriele Schrag, Technische Univ. München (Germany)

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Lunch/Exhibition Break 12:00 - 13:20

Session 7: Modelling

Date: **Wednesday 20 April**

Time: **13:20 - 15:20**

Session Chairs: [Gabriele Schrag](#), Technische Univ. München (Germany); [Jürgen Wöllenstein](#), Fraunhofer-Institut für Physikalische Messtechnik (Germany)

Modeling of gold microbeams for characterizing MEMS packages

Paper 8066-34

Author(s): Alessandro Faes, Alena Repchankova, Francesco Solazzi, Fondazione Bruno Kessler (Italy); Benno Margesin, Univ. degli Studi di Trento (Italy)

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Hardware implementation of an electrostatic MEMS-actuator linearization

Paper 8066-35

Author(s): Florian Mair, Markus Egretzberger, Andreas Kugi, Technische Univ. Wien (Austria)

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Utilising constitutive relationships to model folded dielectric elastomer actuators

Paper 8066-36

Author(s): Benny Lassen, Richard W. Jones, Univ. of Southern Denmark (Denmark)

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Modeling and analysis of a micromachined piezoelectric energy harvester stimulated by ambient random vibrations

Paper 8066-38

Author(s): Ali Badar M. Alamin Dow, David Koo, Univ. of Toronto (Canada); Michael Schneider, Achim Bittner, Ulrich Schmid, Technische Univ. Wien (Austria); Nazir P. Kherani, Univ. of Toronto (Canada)

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Modeling of thermal response of bimorph electromechanical sensor

Paper 8066-39

Author(s): Valeriy A. Fedirko, D. A. Zenyuk, E. A. Fetisov, Moscow Institute of Electronic Technology (Russian Federation)

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Session 8: Energy Scavengers

Date: **Wednesday 20 April**

Time: **15:50 - 17:50**

Session Chairs: [Christos Tsamis](#), National Ctr. for Scientific Research Demokritos (Greece); [Erwin Peiner](#), Technische Univ. Braunschweig (Germany)

Modeling and characterization of a circular-shaped energy scavenger in MEMS surface micromachining technology

Paper 8066-40

Author(s): Francesco Solazzi, Jacopo Iannacci, Alessandro Faes, Flavio Giacomozzi, Benno Margesin, Fondazione

Bruno Kessler (Italy); Augusto Tazzoli, Gaudenzio Meneghesso, Univ. degli Studi di Padova (Italy)

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Issues in validation of performances of piezoelectric vibration-based energy harvesters

Paper 8066-41

Author(s): David Blažević, Saša Zelenika, Univ. of Rijeka (Croatia)

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Plucked piezoelectric bimorphs for energy harvesting applications

Paper 8066-42

Author(s): Michele Pozzi, Meiling Zhu, Cranfield Univ. (United Kingdom)

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A novel MEMS design of a piezoelectric generator for fluid-actuated energy conversion

Paper 8066-43

Author(s): Ingo Kuehne, Matthias Schreiter, Siemens AG (Germany); Helmut Seidel, Univ. des Saarlandes (Germany); Alexander Frey, Siemens AG (Germany)

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Piezoelectric power generation for sensor applications: design of a battery-less wireless tire pressure sensor

Paper 8066-44

Author(s): Noaman Makki, Univ. of Ontario Institute of Technology (Canada)

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Smart energy management and low-power design of sensor and actuator nodes on algorithmic level for self-powered sensorial materials and robotics

Paper 8066-45

Author(s): Stefan Bosse, Thomas Behrmann, Univ. Bremen (Germany)

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