



THE INSTITUTE OF ELECTRICAL
AND ELECTRONICS ENGINEERS, Inc.

445 Hoes Lane, P.O. Box 1331
Piscataway, NJ U.S.A. 08855-1331

ADVANCE PROGRAM



**The First IEEE International
Conference on
Sensors**

IEEE SENSORS 2002

June 11-14, 2002

**Hyatt Orlando
Orlando, Florida, U.S.A.**

Sponsored by the
IEEE Sensors Council

CONTENTS

Program Highlights	1
General Information	2

TUTORIALS

Tuesday, June 11

T-1: Technology, Principles, and Applications of Inertial Microelectromechanical Sensors	5
T-2: Electronic Noses: Towards a Smart Nose-on-a-Chip	6
T-3: Optical-Fiber Sensors	6
T-4: Magnetic Sensor Microsystems	7
T-5: Measurement System Design and Evolution	8
T-6: Low-Offset dc Amplifiers for Sensors	8
T-7: Technologies for Sensors and Microsystem Fabrication	9
T-8: Modeling and Simulation: Automatic Model Reduction	9

TECHNICAL SESSIONS

Wednesday, June 12

1: Plenary Session	10
2: Special Session: Integrated Optical Sensors I	11
3: Special Session: Molecular Self-Assembled Sensors	12
4: Special Session: Innovative Automotive Sensors	13
5: Special Session: Flexible Sensors in Smart Applications ..	14
6: Special Session: Harsh-Environment Microsystems and Nanosystems Technology I	15
7: Special Session: Sensors for Micro-Torque Measurements	16
8: Special Session: Integrated Optical Sensors II	17
9: Biological Sensing I	18
10: Applications: Automotive	19
11: Signal Processing I	20
12: Humidity Sensors	21
13: Sensor Phenomena	22
14: Chemical Sensing I	23
15: Biological Sensing II	24
16: Special Session: Fiber Bragg Gratings in Sensing Systems	25
17: Signal Processing II	26
18: Acoustic Sensing	27
19: Inertial Sensors I	28
• Poster Session I	29

Thursday, June 13

20: Special Session: Microfabricated Chemical and Biological Sensors I	36
21: Special Session: Developments in Quartz-Crystal Biosensing	37
22: Special Session: Integrated SOI Sensors I	38
23: Special Session: Tactile Sensors for Robotics Applications	39
24: Special Session: Harsh-Environment Microsystems and Nanosystems Technology II	40
25: Inertial Sensors II	41
26: Special Session: Microfabricated Chemical and Biological Sensors II	42
27: Biosensing III	43
28: Special Session: Integrated SOI Sensors II	44

CONTENTS

29: Signal Processing III.....	45
30: Applications: Aerospace.....	46
31: Thermal Sensing I.....	47
32: Special Session: Biosensor Development in Medical Applications I.....	48
33: Chemical Sensing II.....	49
34: Special Session: Smart Sensors and Interface Electronics I.....	50
35: Materials and Fabrication I.....	51
36: Position Sensors I.....	52
37: Thermal Sensing II.....	53
38: Special Session: Biosensor Development in Medical Applications II.....	54
39: Chemical Sensing III.....	55
40: Special Session: Smart Sensors and Interface Electronics II.....	56
41: Magnetic Sensing I.....	57
42: Position Sensors II.....	58
43: Sensor Systems and Networks I.....	59
• Poster Session II.....	60
Friday, June 14	
44: Special Session: New Trends in Metal-Oxide Semiconducting Gas Sensors.....	66
45: Special Session: Sensor-System Interfaces on a Chip.....	67
46: Photonic Sensors: Optical Properties I.....	68
47: Materials and Fabrication II.....	69
48: Special Session: Nanometric Sensing.....	70
49: Sensor Systems and Networks II.....	71
50: Special Session: Lab-on-Chip with Integrated Sensor Arrays I.....	72
51: Special Session: Chemical Sensor Interfaces and Systems.....	73
52: Photonic Sensors: Optical Properties II.....	74
53: Materials and Fabrication III.....	75
54: Position Sensors III.....	76
55: Sensor Systems and Networks III.....	77
56: Special Session: Lab-on-Chip with Integrated Sensor Arrays II.....	78
57: Gas Sensing I.....	79
58: Photonic Sensors: Optical Properties III.....	80
59: Magnetic Sensing II.....	81
60: Special Session: Electromechanical Behavior of MEMS Sensors and Actuators.....	82
61: Pressure Sensors I.....	83
62: Applications: Biomedical.....	84
63: Gas Sensing II.....	85
64: Materials and Fabrication IV.....	86
65: Magnetic Sensing III.....	87
66: Electromechanical Systems.....	88
67: Pressure Sensors II.....	89
• Conference Timetable.....	Centerfold
• Exhibitors.....	90
• Sensors 2002 Organizing Committee.....	91
• Sensors 2002 Technical Program Committee.....	92

PROGRAM HIGHLIGHTS

IEEE Sensors 2002

IEEE Sensors 2002 is the first conference organized by the IEEE Sensors Council. This Conference will bring together scientists, engineers, and business leaders who are interested in sensor science and technology. The fact that over 600 abstracts were received is strong evidence that the sensor community welcomes a general sensor conference backed by a professional society. The Technical Program Committee accepted 429 of the submissions.

The IEEE Sensors Council (www.ieee.org/sensors) has 26 member societies, with a combined membership of 260,000. With the great interest shown in IEEE Sensors 2002, the Council has decided to make IEEE SENSORS Conference an annual event.

A major advantage of having IEEE sponsorship is that the Conference Proceedings is an IEEE publication that is distributed to about 1000 libraries worldwide and is accessible on-line at IEEE Xplore (www.ieee.org/ieeexplore) for the foreseeable future.

A special attraction at IEEE SENSORS 2002 will be the banquet speaker, Dean Kamen, inventor of the Segway™ Human Transporter, who will discuss the role of sensors in Segway and demonstrate the transporter.

We hope to see you at IEEE SENSORS 2002.

Keynote Speakers

This year's Keynote Speakers will be Dr. Amy E. Alving, Director, Special Projects Office, DARPA, who will speak on "Bio Warfare Defense Sensors: Applications and Research" and Professor Kazuhiro Hane, Tohoku University, who will speak on "New Optical Sensors Fabricated by Si."

Banquet Speaker

The banquet speaker will be Dean Kamen, inventor of the Segway™ Human Transporter. He will discuss the role of sensors in Segway and will demonstrate the transporter.

Tutorials

Eight tutorials in two parallel tracks (Sensors & Systems Applications and Engineering the Sensors of Tomorrow) will be offered on Tuesday, June 11, from 9:00 am to 5:30 pm. These tutorials will focus on the application and evaluation of sensors science and technology. Registration hours for the Tutorials are listed in the centerfold. See page 5 for further details.

Exhibition

The SENSORS 2002 Exhibition opens on Tuesday, June 11, at 7:00 pm with a reception and concludes on Friday, June 14, at 12:00 noon. Many of the leaders and innovators in the Sensors industry will be represented. See page 90 for a listing of exhibitors and show hours.

GENERAL INFORMATION

Logistics

IEEE SENSORS 2002 Conference will be held June 11-14, 2002, at the Hyatt Orlando Hotel in Kissimmee, Florida.

Sponsorship

The IEEE SENSORS 2002 Conference is sponsored by the IEEE Sensors Council.

Registration

Advance Registration is not required, but it is strongly encouraged for quick pick-up of registration materials, reduced fees, and for your convenience. The registration fee includes admission to all technical sessions, a single ticket to the Thursday evening banquet, all refreshment breaks, and a copy of the Proceedings. On-line registration is also available through the IEEE SENSORS 2002 Web site (<http://www.ieee.org/sensors>) or complete the enclosed registration form (see centerfold), include your payment, and mail or fax to the address below. Checks should be made payable to IEEE SENSORS 2002 in U.S. currency drawn on a U.S. bank. Only credit card payments may be faxed.

Palisades Convention Management

Attn: Jimmy Le (IEEE Sensors 2002)

411 Lafayette Street, Suite 201

New York, NY 10003

fax 212/460-5460

The deadline for receipt of Advance Registration is May 13, 2002. Requests for refunds must be made in writing and received no later than May 13, 2002. Confirmations will be mailed. However, confirmation of registration can also be made by calling 1-800-350-0111 or 212/460-9700.

Registration will take place in the Paradise Foyer of the Hyatt Orlando Hotel during the hours listed below.

Tuesday, June 11	7:30 am – 9:00 pm
Wednesday, June 12	7:30 am – 5:00 pm
Thursday, June 13	7:30 am – 5:00 pm
Friday, June 14	7:30 am – 3:30 pm

Hotel Accommodations

The meeting will be held at the Hyatt Orlando Hotel, located at 6375 Irlo Bronson Memorial Highway, Kissimmee, FL 34747; telephone 407/396-1234. A block of sleeping rooms has been reserved for attendees of the IEEE SENSORS 2002 Conference at the Hyatt Orlando. The special meeting rates are listed below.

Single Occupancy	\$ 86
Double Occupancy	\$106

Hotel reservations can be made on-line at the IEEE SENSORS Web site (www.ieee.org/sensors) or by calling 407/396-1234 prior to May 20. Reservations received after this date will be processed at the conference rate on a space availability basis only. When making reservations, please be sure to mention that you are attending SENSORS 2002.

Speaker's Prep Room

Speakers may preview their presentations in the Key Largo Room from 7:00 am to 5:00 pm on Wednesday and Thursday and from 7:00 am to 3:00 pm on Friday.

Coffee Breaks

Complimentary coffee will be served on Tuesday outside the designated Tutorial rooms, and in the Exhibit Hall on Wednesday through Friday.

Hospitality Desk

A hospitality desk will be set up adjacent to the registration area to answer any questions you may have regarding local attractions and events.

Airport/Hotel Transportation

The Orlando International Airport is located about 30 minutes from the Hyatt Orlando Hotel. Shuttle and taxi service is available to and from the hotel. The average taxi fare is \$40 each way. Shuttle service to and from the airport is provided by Mears Transportation. The round trip fare is \$27. For more information, please visit www.mearstransportation.com or call 407/423-5566.

Message Center

Messages for attendees will be posted in the Message Center located adjacent to the IEEE SENSORS registration desk. For incoming messages, please call the Hyatt Orlando at 407/396-1234 and ask to be transferred to the IEEE SENSORS registration desk.

Visa Requests

International participants may need a letter of invitation in order to obtain a visa. Requests should clearly state the participant's full name, full address, fax number, and e-mail address. Requests for invitation letters should be sent to:

IEEE SENSORS 2002 Conference

Attn: Jimmy Le

411 Lafayette Street, Suite 201

New York, NY 10003

Fax: 212/460-5460

e-mail: jle@pcm411.com

Reception and Banquet

All conference attendees are invited to attend the reception scheduled to be held on Tuesday evening, June 11. The reception will accompany the opening of the SENSORS 2002 Exhibition. The reception will begin at 7:00 pm in Florida Hall West. Conference attendees are also invited to attend the Banquet to be held on Thursday evening, June 13. This event promises to be one of the highlights of the conference, allowing the sensors community to meet in a congenial environment. The Banquet will begin at 7:00 pm in Paradise Ballrooms II & III. The banquet speaker will be Dean Kamen, inventor of the Segway™ Human Transporter. Also, the Best Student Paper Award will be announced.

Paper Awards

The IEEE Sensor 2002 Conference will bestow a Best Paper Award and a Best Student Paper Award. The Best Student Paper Award will be presented at the Thursday evening banquet. The winner will receive a plaque and a cash award of \$1000. The Best Paper Award winner will also receive a plaque and an award of \$1000, but will be announced at the 2003 IEEE SENSORS Conference. Both awards are sponsored by Samsung.

Conference Contact

Anyone requiring additional information should contact the Conference Coordinator, Jimmy Le, c/o Palisades Convention Management, 411 Lafayette Street, Suite 201, New York, NY 10003, 212/460-8090 ext. 208, or jle@pcm411.com. For registration verification, call 1-800-350-0111 or 212/460-9700.

Conference Web Site

For additional information on Orlando and the IEEE Sensors Conference, individuals are encouraged to visit our Web site at <http://www.ieee.org/sensors>.

TUESDAY, JUNE 11 TUTORIALS

Tutorials 1-4

SENSORS AND SYSTEMS APPLICATIONS

Tuesday, June 11 / 9:00 am – 5:30 pm / Paradise D&E

Tutorials Chair:

Michiel J. Vellekoop, Technical University of Vienna, Austria

T-1: Technology, Principles, and Applications of Inertial Microelectromechanical Sensors (9:00-10:30)

Andrei M. Shkel

University of California at Irvine, Irvine, CA

Sukhan Lee

Samsung Advanced Institute of Technology, Suwon, Korea

This tutorial covers three major topics related to the technology, physics, and applications of micro-scale inertial sensors (accelerometers and gyroscopes). The first part provides a basic introduction to MEMS technology, covering primary questions needed to evaluate micro-machining as a technology of choice for inertial micro-sensors. Three technologies (surface micromachining, bulk micromachining, and mixed fabrication processes) will be introduced and compared. The second part of the tutorial will be devoted to (i) an overview of R&D efforts worldwide; (ii) the introduction to the principles of operation and detection; (iii) a review of the advantages and challenges; and (iv) speculation about possible future design trends. The tutorial will be concluded by highlighting a wide range of applications enabled by inertial micro-sensors and discussing future opportunities for this sensor technology in medicine, robotics, personal navigation, and consumer electronics.

Instructor Bios:

Andrei M. Shkel is an Assistant Professor in the Department of Mechanical & Aerospace Engineering at the University of California, Irvine. He is also the Director of the UCI Micro-Systems Laboratory. Dr. Shkel's research interests are in design, fabrication, packaging, and advanced control of integrated microelectromechanical systems (MEMS) for biomedical, communications, and inertial applications. He served as a reviewer for more than a dozen major journals and international conferences in these areas, published over 40 papers in archival journals and international conferences, and organized/co-organized several tutorials on MEMS technology and sensors-related symposia, conferences, and special conference sessions. Dr. Shkel is an associate member of the IEEE, ASME, and SPIE.

Sukhan Lee is currently an Executive Vice-President of the Samsung Advanced Institute of Technology (SAIT), Corporate R&D Center, Samsung. He is currently serving as a Chief Research Officer overseeing Micro/Nano Systems Technologies. He is also leading a team for breakthrough research. Prior to joining SAIT in 1998, Dr. Lee has been a Professor of Electrical Engineering and Computer Science at the University of Southern California since 1983. He has also been a Senior Member of the Technical Staff at the Jet Propulsion Laboratory, California Institute of Technology, since 1990. Dr. Lee received his Ph.D. in Electrical Engineering from Purdue University, West Lafayette, Indiana, in 1982, and his M.S. and B.S. degrees in Electrical Engineering from Seoul National University, Korea, in 1972 and 1974, respectively. He has been elected as an IEEE Fellow in 1998, and elected as a Member of Korean National Science of Academy in 1999. He is currently a Vice-President of the Korean Sensor Society and a Vice-President of the Korean Electrical and Electronics Materials Society.

BREAK

(10:10-10:30)

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Fuqian Yang, *University of Kentucky, USA*
Z. Y. Zhou, *Tsinghua University, China*
Yinian Zhu, *Nanyang Technological University, Singapore*

T-2: Electronic Noses: Towards a Smart Nose-on-a-Chip (11:00–12:30)

Julian W. Gardner
University of Warwick, Warwick, U.K.

In the first part of this tutorial, an overview of the microtechnologies and signal-processing methods employed in the different types of electronic noses reported to date will be presented. Recent efforts on the development of a smart "nose-on-a-chip" /n i.e., a small micro-machined electronic nose with some level of intelligence /n will be discussed. In the second part of the tutorial, the different types of commercial electronic noses will be reviewed, from the large desktop PC-based systems through small portable, handheld units. Then, the applications of electronic noses will be described from quality assurance in the foods and drink industries through to automotive engineering and more-tentative biomedical diagnostics. Finally, the marketplace for odor sensors and electronic noses will be examined and some thoughts on their successful future potential to disrupt/create mass markets will be presented.

Instructor Bio:

Julian W. Gardner received his B.Sc., Ph.D., D.Sc. CEng., FIEE, and MIEEE degrees. He is a Professor of Electronic Engineering at the School of Engineering of Warwick University. He has worked in the field of microsensors for 15 years and pioneered research in the emerging fields of machine olfaction and electronic noses. Dr. Gardner leads a research group on smart devices and is an author or co-author of over 250 technical papers and patents as well as six technical books, several on electronic noses. Interested readers are referred to "Electronic Noses: Principles and Application," edited by Gardner and Bartlett (Oxford University Press, 1999).

LUNCH (12:30–2:00)

T-3: Optical-Fiber Sensors (2:00–3:30)

Richard O. Claus
Virginia Tech, Blacksburg, VA

Optical-fiber sensors have been developed during the past 25 years for numerous measurement system applications. In many cases, they have distinct performance advantages over conventional sensing approaches for use in harsh environments or where massive sensor multiplexing is required. This tutorial describes the fundamentals of optical-fiber sensors and presents examples of specific uses in both laboratory and field instrumentation applications.

Instructor Bio:

Richard Claus received his B.E.S. and Ph.D. degrees from the Johns Hopkins University in the 1970s. Since 1977, he has served on the engineering faculty at Virginia Tech, where he is currently the Lewis A. Hester Chair of Engineering and the Director of the Fiber- and Electro-Optics Research Center. With colleagues and students, he has authored more than 800 journal and conference papers and 29 issued patents. He has received research awards from SPIE, OSA, ASME, and ASCE for work related to optical-fiber sensors and materials. In 2002, he is serving as the Technical Chair of the Optical Fiber Sensors (OFS) Conference in Portland, Oregon.

BREAK (3:30–4:00)

T-4: Magnetic Sensor Microsystems (4:00–5:30)

Rade S. Popovic
Swiss Federal Institute of Technology Lausanne,
Lausanne, Switzerland

This tutorial will provide insight into the magnetic sensor microsystems with the highest industrial impact. They are based on Hall, AMR, GMR, inductive, and flux-gate magnetic sensors. A summary of a few relevant basic physical phenomena will begin the tutorial. Then, how we can exploit these phenomena and their combinations in magnetic sensor devices and how we can combine these devices with electronic circuits in order to amplify the useful signal and suppress parasitic influences, such as offset, noise, and temperature effects, will be explained. Finally, some of the successful realizations of the corresponding magnetic sensor microsystems and their applications will be discussed.

Instructor Bio:

Radivoje S. Popovic obtained his Dipl. Ing. degree in engineering physics from the University of Belgrade, and M.Sc. and Dr.Sc. from the University of Nis, Yugoslavia. From 1969 to 1981, he worked for Ei, Nis, Yugoslavia. From 1982 to 1993, he was with Landis & Gyr, Zug, Switzerland, responsible for research in sensor microsystems, and became Vice-President, R&D. Currently, he is a professor for microsystems at the Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland. His interests include sensors for magnetic and optical signals. Mr. Popovic is founder of the magnetic sensor company SENTRON AG, Zug, Switzerland, and is an IEEE EDS Distinguished Lecturer.

ENGINEERING THE SENSORS OF TOMORROW

Tuesday, June 11 / 9:00 am – 5:30 pm / Paradise A&B

T-5: Measurement System Design and Evolution (9:00-10:30)

Patrick L. Walter

Endevco Corp., San Juan Capistrano, CA, and
Texas Christian University, Fort Worth, TX

The focus of this tutorial will be on providing guidance to optimize measurement system design. It will first look back at some of the historic beginnings of pressure, force, acceleration, and strain measurements. It then will provide an introduction to the key considerations that should be applied to measurement systems being designed for test and control applications. Rules of thumb that can be applied to data before accepting them as valid for subsequent analyses will also be provided. Lastly, future trends in measurement systems such as MEMS, wireless data transmission, and smart transducers will be covered.

Instructor Bio:

Patrick L. Walter was employed for 30 years at Sandia National Laboratories in Albuquerque, New Mexico. For the majority of this time, he managed various flight, field, and laboratory test activities. In 1995, Dr. Walter joined the Engineering Department of Texas Christian University. Since 1996, he has also performed technical consulting at Endevco Corp. Dr. Walter has numerous publications, has served and chaired DoD and DOE committees, and lectures in measurement system design. He is a member of the Instrument Society of America, Society of Experimental Mechanics, American Society of Engineering Educators (Instrumentation and Design Divisions), and is a licensed professional engineer.

BREAK (10:30-11:00)

T-6: Low-Offset dc Amplifiers for Sensors (11:00-12:30)

Kofi Makinwa

Delft University of Technology, Delft, The Netherlands

In recent years, several new techniques have been developed to reduce offset in CMOS amplifiers and comparators. New chopping techniques in particular make it possible to reduce amplifier offset to the sub-microvolt level. This tutorial will cover the use of chopping and auto-zeroing in the design of CMOS interface circuitry for sensors. Examples of the use of these techniques in SMART wind, temperature, and magnetic sensors will be given.

Instructor Bio:

Kofi Makinwa studied at the Obafemi Awolowo University, Ile-Ife, Nigeria, where he received his B.S. degree (1st class honors) in 1985 and his M.S. degree in 1988, both in Electronic Engineering. He then proceeded to the Philips International Institute, Eindhoven, The Netherlands, where he received his M.E.E. degree (with distinction) in 1989. He began his working career in 1989 as a research scientist at Philips Research Laboratories in Eindhoven, a position he held till 1999. During this period he developed electronic systems for interactive displays and for optical and magnetic storage systems. He is currently at Delft University of Technology, Delft, The Netherlands, where he is working towards his Ph.D. on 2-D thermal flow sensors. He holds nine patents.

LUNCH (12:30-2:00)

T-7: Technologies for Sensor and Microsystem Fabrication (2:00-3:30)

Martin A. M. Gijs

Swiss Federal Institute of Technology Lausanne,
Lausanne, Switzerland

A good control and mastering of technology always is a prerequisite for the correct functioning of a miniaturized sensor or microsystem. Subsequently, technologies related to the realization of structures in Si, metals, glasses, and polymers will be discussed. For example, microfabrication of Si inertial sensors requires knowledge of chemical vapor deposition (CVD) techniques, lithography, as well as on wet and dry etching. For the realization of metallic sensor microstructures, as present in a magnetic read head, technologies such as electroplating and thin-film sputter deposition are important. Glass is an important material for the realization of microfluidic devices, and various glass etching and bonding technologies will be discussed. Finally, polymers and plastics form a fourth important category of materials. The use of functional thick resists, micromoulding, and high-precision microfabrication of structures using the LIGA technique will be presented.

Instructor Bio:

Martin A. M. Gijs received his B.Sc. degree in physics in 1981 from the Katholieke Universiteit Leuven, Belgium, and his Ph.D. degree in physics at the same university in 1986. He joined Philips Research Laboratories in Eindhoven, The Netherlands, in 1987. Subsequently, he has been working on micro- and nano-fabrication processes of high-critical-temperature superconducting Josephson and tunnel junctions, the microfabrication of microstructures in magnetic multilayers showing the giant magnetoresistance effect, the design and realization of miniaturized motors for hard-disk applications, and the design and realization of planar transformers for miniaturized power applications. Since 1997, he has been with the Swiss Federal Institute of Technology Lausanne (Ecole Polytechnique Fédérale de Lausanne) as a professor heading the Microsystems Technology group within the Institute of Microelectronics and Microsystems. His main interests are in developing new glass and magnetic device microfabrication technologies and the development and use of microsystem technologies for biomedical applications (bio-MEMS).

BREAK (3:30-4:00)

T-8: Modeling and Simulation: Automatic Model Reduction (4:30-5:30)

Jan G. Korvink and Evgenii Rudnyi

University of Freiburg, Freiburg, Germany

The rapid development of MEMS-based devices requires a 3-D time-dependent simulation for coupled physical domains (thermal, mechanical, electrical, etc.). This requires a solution of high-dimensional ordinary differential equations (ODEs), resulting from the space discretization of the device, and hence, as a rule, parallel computing. However, instead of a "brute force" approach to integrate a large system of ODEs, one can use modern mathematical methods to reduce its dimension. It happens that in many cases of practical importance the order of ODEs can be reduced by several orders of magnitude, almost without sacrificing precision. During the tutorial, the attendee will learn: (1) How to reduce relatively small linear systems up to 1000 orders of ODEs with SLICOT library, implementing the latest developments of modern control theory; (2) How to employ implicit moment matching methods based on Krylov subspaces (Arnoldi and Lanczos algorithms) to reduce huge linear systems of ODEs; (3) What to expect from mathematicians in the near future in order to be able to apply results from control theory to large linear systems; and (4) How to reduce nonlinear systems of ODEs by means of Proper Orthogonal Decomposition.

Instructor Bio:

Jan G. Korvink holds the chair of microsystem simulation at the University of Freiburg. He received his D.Sc. degree from the Swiss Federal Institute of Technology (ETH) in 1993, and his M.Sc. degree from the University of Cape Town in 1987. Dr. Korvink was senior scientist at the Physical Electronics Laboratory of ETH before moving to Freiburg. He is co-author of more than 40 technical articles in conference proceedings and journals, and has co-authored one book chapter and the SOLIDIS microsystem simulation software. He is co-founder and current chairman of the CAD for MEMS international workshop. He serves on the program selection committees of the IEEE-IEDM and the IEEE-MEMS. Dr. Korvink is the associate editor (Europe) for "Sensors and Materials," MYUKK, Tokyo, Japan. He is a member of the IEEE and the ASME. His main research interests are in the modelling and numerical simulation of microsystems.

PLENARY SESSION

Wednesday, June 12 / 8:30–10:00 am / Paradise II & III

Chair: *Franco Maloberti, University of Texas, USA*

Welcoming (8:30–9:00)

John Vig, Founding President, IEEE Sensors Council
Franco Maloberti, President, IEEE Sensors 2002
Michael Shur, Technical Program Co-Chair, IEEE Sensors 2002

Keynote Addresses

1.1: Bio Warfare Defense Sensors: Applications and Research (9:00–9:30)

Dr. Amy E. Alving, Director, Special Projects Office
DARPA, Arlington, VA

Some applications for bio warfare defense sensors and the needs that arise from those applications, as well as some current areas of research and development to meet those needs, will be described.

1.2: New Optical Sensors Fabricated by Si (9:30–10:00)

Professor Kazuhiro Hane
Graduate School of Mechanical Engineering
Tohoku University, Miyagi, Japan

Si micromachining is a promising technique for the fabrication of several optical sensors. It is also indispensable for low-cost assembly. We studied the Si micromachining for the fabrication of optical sensors and optical systems. Deep reactive ion etching (D-RIE) was used to produce the Si three-dimensional structures of the sensors. New versions of the optical position sensor, optical encoder, and laser interferometer were proposed. In those sensors, the optical transmission structures were employed to generate new optical functions. The Si micromachining was also applied to the integration of optical components. The integrated optical systems such as the laser beam scanner and the micro-probe for scanning near-field optical microscopy were fabricated. In the integration, the Si three-dimensional structures were fabricated by a lithographic technique using spray resist coater.

BREAK (10:00–10:30)

INTEGRATED OPTICAL SENSORS I

Wednesday, June 12 / 10:30 am – 12:00 pm / Ballroom II

Chair: *Matthew Clark, University of Nottingham, U.K.*

2.1: Invited Paper: Integrated Optical Sensors for Active 3-D Vision (10:30)

A. Simoni
Istituto Trentino di Cultura (ITC-irst), Trento, Italy

2.2: Optical/Electronic "Whisker" Sensors for Detecting Airflow, Vibration, and Touch on Mobile Robotic Systems (11:00)

C. M. Higgins, S. L. Hill
University of Arizona, Tucson, AZ

2.3: A Real-Time VLSI Optical Centroid Processor (11:15)

B. H. Pui, B. Hayes-Gill, M. Clark, M. Somekh,
C. See, S. Morgan, A. Ng
University of Nottingham, Nottingham, U.K.

2.4: Integrated Motion-Computation Sensor (11:30)

M. A. Estrada, E. Turenne, D. Poussart, M. Tremblay
Laval University, Quebec, Canada

2.5: A Time-Based Asynchronous Readout CMOS CMOS Image Sensor for High-Dynamic Range Application (11:45)

X. Guo, J. G. Harris
University of Florida, Gainesville, FL

LUNCH (12:00–1:30)

MOLECULAR SELF-ASSEMBLED SENSORS

Wednesday, June 12 / 10:30 am – 12:00 pm / Ballroom III

Chair: *Francisco Arregui, University of Navarra, Spain*

3.1: Invited Paper: Molecularly Self-Assembled Sensors for Biomedical Applications (10:30)

J. B. Mecham, K. Huie
NanoSonic, Inc., Blacksburg, VA

Q. Chen
Virginia Tech, Blacksburg, VA

R. O. Claus
NanoSonic, Inc., Blacksburg, VA, and Virginia Tech,
Blacksburg, VA

F. J. Arregui, I. R. Matias
Universidad Publica de Navarra, Pamplona, Spain

3.2: Invited Paper: Molecularly Self-Assembled Optical-Fiber Sensors (11:00)

I. R. Matias, F. J. Arregui
Universidad Publica de Navarra, Pamplona, Spain

R. O. Claus
Virginia Tech, Blacksburg, VA, and NanoSonic, Inc.,
Blacksburg, VA

K. L. Cooper
NanoSonic, Inc., Blacksburg, VA

3.3: Self-Assembled Monolayers of Chiral Porphyrin Diads as Sensing Material for Enantioselective Chemical Sensors (11:30)

R. Paolesse, C. Di Natale, A. Froio, E. Martinelli
University of Rome "Tor Vergata," Rome, Italy

A. Macagnano
IME-CNR, Lecce, Italy, and PSM-CNR, Rome, Italy

A. D'Amico
University of Rome "Tor Vergata," Rome, Italy;
IME-CNR, Lecce, Italy; and PSM-CNR, Rome, Italy

3.4: Humidity-Sensitive Properties of In-Situ Synthesized Sodium Polystyrenesulfonate/ZnO Nanocomposites (11:45)

M. J. Yang, Y. Li, Y. She, M. F. Ling, H. P. Wang
Zhejiang University, Hangzhou, People's Republic of
China

LUNCH (12:00–1:30)

INNOVATIVE AUTOMOTIVE SENSORS

Wednesday, June 12 / 10:30 am – 12:00 pm / Ballroom A

Chair: *Bernhard Jakoby, Technical University of Vienna, Austria*

4.1: Invited Paper: Micromachined Sensors for Automotive Applications (10:30)

J. Marek
Robert Bosch GmbH, Reutlingen, Germany

4.2: Invited Paper: New Chemical Sensors for Automotive Applications (11:00)

J. H. Visser, S. G. Ejakov, D. Kubinski, M. Parsons,
R. E. Soltis
Ford Research Laboratory, Dearborn, MI

4.3: Linear Magnetic Position Sensor for Automotive Applications (11:30)

Z. Liu
American Microsystems, Inc., Pocatello, ID

L. Tian
Intel Corp., Seattle, WA

J. Parham
Bourns, Inc., Ogden, UT

A. B. Frazier
Georgia Institute of Technology, Atlanta, GA

4.4: Micromachined Thermal-Conductivity Hydrogen Detector for Automotive Applications (11:45)

M. Arndt
Robert Bosch GmbH, Reutlingen, Germany

LUNCH (12:00–1:30)

FLEXIBLE SENSORS IN SMART APPLICATIONS

Wednesday, June 12 / 10:30 am – 12:00 pm / Ballroom D

Chair: *Thomas Papakostas, Tekscan, Inc., USA*

- 5.1: **Invited Paper: Electroactive Polymer Fibers and Fabrics for Distributed, Conformable, and Interactive Systems** (10:30)

D. De Rossi
University of Pisa, Pisa, Italy

- 5.2: **Invited Paper: Low-Cost Planar PTF Sensors for the Identity Verification of Smartcard Holders** (11:00)

N. J. Henderson, N. M. White
University of Southampton, Southampton, U.K.

T. V. Papakostas
Tekscan, Inc., Boston, MA

P. H. Hartel
Universiteit Twente, Enschede, The Netherlands

- 5.3: **A Large-Area Force Sensor for Smart-Skin Applications** (11:30)

T. V. Papakostas, J. Lima, M. Lowe
Tekscan, Inc., Boston, MA

- 5.4: **A Textile-Based Capacitive Pressure Sensor** (11:45)

M. Sergio, N. Manaresi, M. Tartagni, R. Guerrieri
University of Bologna, Bologna, Italy

R. Canegallo
STMicroelectronics, Italy

LUNCH (12:00–1:30)

HARSH-ENVIRONMENT MICROSYSTEMS AND NANOSYSTEMS TECHNOLOGY I

Wednesday, June 12 / 10:30 am – 12:00 pm / Ballroom C

Co-Chairs:

Robert Okojie, NASA–Glenn Research Center, USA
Kevin Kornegay, Cornell University, USA

- 6.1: **Invited Paper: Commercialization of Harsh-Environment Microsystems: Existing Challenges** (10:30)

W. C. Merrill
Glennan Microsystems Initiative, Cleveland, OH

- 6.2: **Invited Paper: Silicon Carbide for MEMS and NEMS: An Overview** (11:00)

C. A. Zorman, M. Mehregany
Case Western Reserve University, Cleveland, OH

- 6.3: **Pt/Ga₂O₃/SiC Schottky-Diode-Based Gas Sensor** (11:30)

A. Trinchì, Y. Li, W. Wlodarski
RMIT University, Melbourne, Australia

- 6.4: **Interface States in High-Temperature SiC Gas Sensing** (11:45)

R. N. Ghosh, P. Tobias, B. Golding
Michigan State University, East Lansing, MI

LUNCH (12:00–1:30)

SENSORS FOR MICRO-TORQUE MEASUREMENTS

Wednesday, June 12 / 10:30 am – 12:00 pm / Ballroom F

Chair: *Werner Brenner, Vienna University of Technology, Austria*

**7.1: Invited Paper: Microstructure Torque Estimation (10:30)
Using MEMS Optical Monitoring**

*J. Park, L. Wang, J. Dawson, L. Hornak, P. Famouri
West Virginia University, Morgantown, WV*

**7.2: Invited paper: Micro-Torque Measurement (11:00)
Using Outer-Rotor Polysilicon Micromotors**

*K. C. Stark
NineSigma, Inc., Hightstown, NJ*

*A. A. Yasseen
Orchid BioSciences, Inc., Princeton, NJ*

*S. M. Phillips, M. Mehregany
Case Western Reserve University, Cleveland, OH*

**7.3: Invited Paper: Principles of Torque Measurement (11:30)
for Rotating Microactuators**

*G. Abraham, R. Duffait, P. Wurmsdobler, A. Matzner,
W. Brenner
MTE Innovative Measurement Solutions Messsysteme
GmbH, Vienna, Austria*

LUNCH (12:00-1:30)

INTEGRATED OPTICAL SENSORS II

Wednesday, June 12 / 1:30–3:00 pm / Ballroom II

Chair: *Matthew Clark, University of Nottingham, U.K.*

**8.1: Invited Paper: Smart Pixel Arrays for Coherent (1:30)
Detection Technologies**

*R. P. Salathé, École Polytechnique Fédérale
de Lausanne, Lausanne, Switzerland*

**8.2: A CMOS Smart Pixel for Active 3-D Vision (2:00)
Applications**

*L. Viarani, D. Stoppa, L. Gonzo, M. Gottardi, A. Simoni
Istituto Trentino di Cultura (ITC-irst), Trento, Italy*

**8.3: Experimental High-Speed CMOS Image Sensor (2:15)
System and Applications**

*A. O. Ercan, F. Xiao, X. Liu, S. H. Lim, A. El Gamal,
B. Wandell
Stanford University, Stanford, CA*

**8.4: Reconfigurable Vision with High-Performance (2:30)
CMOS Active Pixel Sensors**

*B. Pain, G. Yang, C. Sun, C. Basset, T. Cunningham,
C. Wrigley
Jet Propulsion Laboratory, California Institute of
Technology, Pasadena, CA*

**8.5: OMNIVIEWS: Direct Omnidirectional Imaging (2:45)
Based on a Retina-like Sensor**

*G. Sandini
University of Genoa, Genoa, Italy*

*T. Pajdla
Czech Technical University, Prague, Czechoslovakia*

*J. Santos-Victor
Instituto Superior Tecnico, Lisbon, Portugal*

BREAK (3:00–3:30)

BIOLOGICAL SENSING I

Wednesday, June 12 / 1:30–3:00 pm / Ballroom III

Chair: *Dwight Woolard, Army Reserach Office, USA*

- 9.1: Plastic Colorimetric Resonant Optical Biosensor (1:30)**
for Multiparallel Detection of Label-Free
Biochemical Interactions
B. Cunningham, B. Lin, J. Qiu, P. Li, J. Pepper, B. Hugh
SRU Biosystems, Woburn, MA
- 9.2: Biosensing Using Thickness-Shear-Mode (TSM) (1:45)**
Quartz Resonators: Viscoelastic Film with
Liquid-Overlayer Analysis
C. A. Bailey, B. Fiebor, W. Yan, V. Vodyanoy,
R. W. Cernosek, B. A. Chin
Auburn University, Auburn University, AL
- 9.3: Monitoring the Kinetics of Endothelial Cell (2:00)**
Behavior in Suspensions Using TSM
Piezoelectric Sensors
K. A. Barbee, R. M. Lec, J. Sorial
Drexel University, Philadelphia, PA
A. Fertala
Thomas Jefferson Medical University, Philadelphia, PA
- 9.4: Electrical-Permittivity-Based Sensor to Evaluate (2:15)**
Fresh-Milk Somatic-Cell Concentration
G. J. Grillo, M. A. Pérez, J. C. Antón, F. J. Ferrero
University of Oviedo, Asturias, Spain
- 9.5: Surface Biopotential Monitoring by Needle-Type (2:30)**
Micro Electrode Array
L. C. Pan
Taipei Medical University, Taiwan, R.O.C.
P. W. Lin
Taipei Municipal Wan-Fang Hospital, Taiwan, R.O.C.
F. G. Tseng, C. Lin
National Tsing Hua University, Taiwan, R.O.C.
- 9.6: A CMOS-Compatible Optical Filter for High- (2:45)**
Throughput Enzymatic-Analysis Devices
V. P. Iordanov, R. Ishihara, P. M. Sarro, A. Bossche
Delft University of Technology, Delft, The Netherlands
M. J. Vellekoop
Vienna University of Technology, Gusshausstrasse, Austria

BREAK (3:00–3:30)

APPLICATIONS: AUTOMOTIVE

Wednesday, June 12 / 1:30–2:45 pm / Ballroom A

Chair: *Jiri Marek, Robert Bosch GmbH, Germany*

- 10.1: Touch-Mode Capacitive Pressure Sensor for (1:30)**
Passive Tire-Monitoring System
S. Yamamoto, O. Nakao, H. Nishimura, H. Nakamura,
T. Takizawa, R. S. Pollack
Fujikura, Ltd., Tokyo, Japan
R. S. Pollack
Phase IV Engineering
- 10.2: Microacoustic Viscosity Sensor for Automotive (1:45)**
Applications
B. Jakoby
Vienna University of Technology, Vienna, Austria
M. Scherer, M. Buskies, H. Eisenschmid
Robert Bosch GmbH, Reutlingen, Germany
- 10.3: Vehicle Fault Diagnostics Using a Sensor- (2:00)**
Fusion Approach
S. Muldoon, M. Kowalczyk, J. Shen
Delphi Technical Center-Brighton, Brighton, MI
- 10.4: Common Design Techniques for Quartz Rate (2:15)**
Sensors for Both Automotive and Aerospace/
Defense Market Applications
A. M. Madni
BEI Technologies, Inc., Sylmar, CA
L. E. Costlow
BEI Technologies, Inc., Systron Donner Inertial Division,
Concord, CA
- 10.5: The Investigation of Stator Coil and Lead (2:30)**
Temperatures on the High Voltage Inside Large
Power Generators via Use of Fiber Bragg Gratings
N. M. Theune, M. Müller, H. Hertsch, J. Kaiser, M. Willsch,
P. Krämmer, T. Bosselmann
Siemens AG, Erlangen, Germany

BREAK (2:45–3:30)

SIGNAL PROCESSING I

Wednesday, June 12 / 1:30–3:00 pm / Ballroom D

Chair: Julian Gardner, University of Warwick, Coventry, U.K.

11.1: Selecting Bands for Angle-Based Classification in Hyperspectral Processing (1:30)

*N. Keshava, A. Batra
MIT Lincoln Laboratory, Lexington, MA*

11.2: Sensor Impedance-Spectrum-Measurement Interface with Lock-In Amplifier (1:45)

*S.-Q. Ma, J. Schroeder, P. Hauptmann
University of Magdeburg, Magdeburg, Germany*

11.3: An Adaptive Fuzzy-Logic Algorithm for Ranking Logical Sensory Performance (2:00)

*G. Shayer, O. Cohen, Y. Edan, E. Korach
Ben-Gurion University of the Negev, Beersheba, Israel*

11.4: The Assessment of the Final Metrological Characteristics of a MEMS-Based NDIR Spectrometer through System Modeling and Data Processing (2:15)

*C. Calaza, E. Meca, M. Moreno, S. Marco, J. Samitier
University of Barcelona, Barcelona, Spain*

11.5: Ultrasonic Multi-Transducer Processing for Pattern Recognition (2:30)

*N. Aitoufroukh, E. Colle
University of Evry Val d'Essonne, Courcouronnes, France*

*C. Barat
CNRS, Sophia Antipolis, France*

11.6: Electronic-Nose Module with System on Chip (2:45)

*E.-T. Jang, W.-Y. Chung
Dongseo University, Pusan, Korea*

BREAK (3:00-3:30)

HUMIDITY SENSORS

Wednesday, June 12 / 1:30–3:00 pm / Ballroom C

Chair: Hiroaki Suzuki, University of Tsukuba, Japan

12.1: Novel Soil-Moisture Sensors Applying Thermal Characteristics of Soil and Water (1:30)

*Y. Yamamoto, K. Hamaguchi, Y. Yamamoto, A. Ogawa
Tamagawa University, Tokyo, Japan*

12.2: High-Sensitivity Low-Relative-Humidity Sensor Based on Overlay on Side-Polished Fibers (1:45)

*A. Álvarez-Herrero, H. Guerrero
Instituto Nacional de Técnica Aeroespacial, Madrid, Spain*

*D. Levy
Instituto Nacional de Técnica Aeroespacial, Madrid, Spain,
and Instituto de Ciencia de Materiales de Madrid, Madrid,
Spain*

12.3: Contributions to the Measured Capacitance by the Dielectric Properties of Water in Insulated Electrode Soil-Moisture Sensors (2:00)

*P. Johnson, D. Thiel, D. James
Griffith University, Nathan, Australia*

12.4: Relative-Humidity Sensors Based on Porous Polysilicon and Porous Silicon Carbide (2:15)

*E. J. Connolly, H. T. M. Pham, P. M. Sarro, P. J. French
Delft University of Technology, Delft, The Netherlands*

12.5: Porous Silicon Vapor Sensor with Phase-Detection Electronics (2:30)

*H. Saha, J. Das, S. Dey, S. M. Hossain
Jadavpur University, Kolkata, India*

12.6: A Novel Highly Reversible Humidity Sensor Based on Poly(2-propyn-2-furoate) (2:45)

*M. J. Yang, Y. Li, M. F. Ling
Zhejiang University, Hangzhou, People's Republic of China*

BREAK (3:00–3:30)

SENSOR PHENOMENA

Wednesday, June 12 / 1:30–3:00 pm / Ballroom F

Chair: *W. Wlodarski, RMIT University, Australia*

13.1: Organic Molecular Thin Films as Gas Sensors (1:30)

*L. Lozzi, S. Santucci, M. Passacantando,
L. Ottaviano, C. Cantalini
University of L'Aquila, L'Aquila, Italy*

13.2: Frequency Interference Between Two Quartz-Crystal Microbalances (1:45)

*K. H. Lee, F. Shen, P. Lu, S. J. O'Shea
Institute of High Performance Computing,
The Rutherford, Singapore*

13.3: Energy Trapping in Mesa-Shaped Quartz-Crystal Microbalance (2:00)

*F. Shen, K. H. Lee, P. Lu, S. J. O'Shea
Institute of High Performance Computing, The Rutherford,
Singapore*

13.4: Planar Anti-Resonant Reflecting Optical Waveguides as Sensors for Liquid Substances (2:15)

*R. Bernini
CNR-IREA, Napoli, Italy*

*S. Campopiano, L. Zeni
Seconda Università di Napoli, Aversa, Italy*

*C. R. de Boer, P. M. Sarro
Delft University of Technology, Delft, The Netherlands*

13.5: LGX Pure Shear-Horizontal SAW for Liquid Sensor Applications (2:30)

*M. Pereira da Cunha
University of Maine, Orono, ME*

*D. C. Malocha
University of Central Florida, Orlando, FL*

13.6: Refractive-Index Measurements and Their Application to Smart Polymer Processing (2:45)

*A. Cusano, G. Breglio, M. Giordano, L. Nicolais
University of Naples, Naples, Italy*

BREAK (3:00–3:30)

CHEMICAL SENSING I

Wednesday, June 12 / 3:30–5:00 pm / Ballroom II

Chair: *John Vetelino, University of Maine, USA*

14.1: An Optical Gas Sensor Based on Ellipsometric Readout (3:30)

*G. Wang, H. Arwin, R. Jansson
Linköping University, Linköping, Sweden*

14.2: Investigation of an Integrated Gas Sensor Array (3:45)

*G.-Z. Yan
Peking University, Beijing, China, and Hong Kong
University of Science & Technology, Hong Kong, China*

*P. C. H. Chan, J. K. O. Sin, I.-M. Hsing
Hong Kong University of Science & Technology,
Hong Kong, China*

*M. Miao
Peking University, Beijing, China*

14.3: Electronic Interface Modules for Solid-State Chemical Sensors (4:00)

*S. McKennoch, D. M. Wilson
University of Washington, Seattle, WA*

14.4: A Single-Chip pH Sensor Fabricated by a Conventional CMOS Process (4:15)

*P. A. Hammond, D. R. S. Cumming
University of Glasgow, Glasgow, U.K.*

*D. Ali
Philips Research Laboratories, Redhill, U.K.*

14.5: Investigation of Si/LaF₃ Structure as Light-Addressable Potentiometric Fluoride Sensor (4:30)

*A. B. M. Ismail
Osaka University, Osaka, Japan, and Rajshahi University,
Rajshahi, Bangladesh*

*K. Furuichi, T. Yoshinobu, H. Iwasaki
Osaka University, Osaka, Japan*

14.6: A Novel MEMS Biochemical Sensor Based on Optical Fabry-Perot Interference (4:45)

*D. Li, S. Jin
Tianjin University, Tianjin, People's Republic of China*

*W. Wu, Y. Hao
Peking University, Beijing, People's Republic of China*

BIOLOGICAL SENSING II

Wednesday, June 12 / 3:30–5:00 pm / Ballroom III

Chair: *Michiel Vellekoop, Technical University of Vienna, Austria*

15.1: Comparing Biosensors (3:30)

L. Lading
Sensor Technology Center, Brøndby, Denmark

L. B. Nielsen
Biotechnological Institute, Denmark

T. Sevel
FORCE Technology, Denmark

15.2: A Cheap and Portable Sensing System for Electrochemical Genotyping (3:45)

S. Cho, J. J. Pak
Korea University, Seoul, Korea

15.3: Validation and Benchmarking of a High-Speed Modulation Design for Oxygen-Saturation Measurement Using Photoplethysmographic Ring Sensors (4:00)

P. Shaltis, S. Rhee, H. Asada
MIT, Cambridge, MA

15.4: Fabrication and Testing of a Smart Tongue Device for Liquid Sensing (4:15)

M. Cole, G. Sehra, J. W. Gardner
University of Warwick, Coventry, U.K.

V. K. Varadan
Pennsylvania State University, State College, PA

15.5: QCM Viscometer for Bioremediation Monitoring (4:30)

W. A. Gee, K. M. Ritalahti, W. D. Hunt, F. E. Loeffler
Georgia Institute of Technology, Atlanta, GA

15.6: A Miniaturized Planar Glucose Sensor Based on Prussian Blue as Electrocatalyst for H₂O₂ (4:45)

J. Zhu, Z. Zhu, Z. Lai
East China Normal University, Shanghai, China

FIBER BRAGG GRATINGS IN SENSING SYSTEMS

Wednesday, June 12 / 3:30–5:00 pm / Ballroom A

Chair: *Yinian Zhu, Nanyang Technological University, Singapore*

16.1: Invited Paper: Advances in UV-Inscribed Fiber-Grating Optical-Sensor Technologies (3:30)

L. Zhang
Aston University, Birmingham, U.K.

16.2: Invited Paper: Fabrication and Performance Characteristics of Optical Fiber Gratings for Sensing Applications (4:00)

Y. Chung, U.-C. Paek
Kwangju Institute of Science & Technology,
Kwangju, Korea

16.3: Dynamic MEMS-Based Photonic Bandgap Filter (4:30)

R. H. Trimm, E. J. Tuck, G. Tuck, M. C. Buncick
AEGIS Technologies Group, Inc., Huntsville, AL

M. Kranz
Morgan Research Corp., Huntsville, AL

P. Reiner
Jaycor, Inc., Huntsville, AL

M. G. Temmon, P. R. Ashley
U.S. Army and Missile Command,
Redstone Arsenal, AL

16.4: Fabrication of Extremely Short-Length Fiber Bragg Gratings for Sensor Applications (4:45)

M.-C. Wu, R. S. Rogowski, K. K. Tedjojuwono
NASA Langley Research Center, Hampton, VA

SIGNAL PROCESSING II

Wednesday, June 12 / 3:30–5:00 pm / Ballroom D

Chair: *Michael Shur, Rensselaer Polytechnic Institute, USA*

- 17.1: Uncertainty Reduction in an Ultrasonic Pulse-Echo Sensor by Using Full Bandwidth** (3:30)

*J. A. van Deventer
Luleå University of Technology, Luleå, Sweden*

- 17.2: Pre-processing of Electronic-Nose Data by Independent Component Analysis** (3:45)

*E. Martinelli, C. Falconi, A. D'Amico, C. Di Natale
University of Rome, Rome, Italy*

- 17.3: Noise Reduction from Photoplethysmographic Measurements Using a Variable Step-Size LMS Filter and an Optoelectronic Sensor** (4:00)

*K. W. Chan, Y. T. Zhang
The Chinese University of Hong Kong, Shatin,
Hong Kong, China*

- 17.4: Velocity Measurement in a Fluid Using LDV: Low-Cost Sensor and Signal-Processing Design** (4:15)

*A. Le Duff, G. Plantier
École Supérieure d'Électronique de L'Ouest,
Angers, France*

*J.-C. Valière
Université de Poitiers, Poitiers, France*

*T. Bosch
ENSEEIH, Toulouse, France*

- 17.5: A Novel Sensor Interrogation Technique Using a Chirped Fiber-Grating-Based Sagnac Loop** (4:30)

*D. Zhao, X. Shu, L. Zhang, I. Bennion
Aston University, Birmingham, U.K.*

- 17.6: A 66-dB Dynamic Magneto-Optic Current Transformer with Advanced Signal Processing** (4:45)

*S. Mohr, T. Bosselmann
Siemens AG, Erlangen, Germany*

ACOUSTIC SENSING

Wednesday, June 12 / 3:30–5:00 pm / Ballroom C

Chair: *Sub Reddy, University of Surrey, U.K.*

- 18.1: A MEMS Phased-Array Transducer for Ultrasonic Flaw Detection** (3:30)

*A. Jain, D. W. Greve, I. J. Oppenheim
Carnegie Mellon University, Pittsburgh, PA*

- 18.2: A Novel SAW Micro-Array Concept for Environmental Organic Gas Detection at Low Concentrations** (3:45)

*M. Rapp, F. Bender, A. Voigt
Forschungszentrum Karlsruhe GmbH,
Karlsruhe, Germany*

- 18.3: Passive Acoustic Sensing for Tracking Knocks on Large Interactive Displays** (4:00)

*J. A. Paradiso, C. K. Leo, N. Checka, K. Hsiao
MIT Media Laboratory, Cambridge, MA*

- 18.4: Detection and Sizing of Micro Bubbles in Streaming Fluids with Ultrasound** (4:15)

*K. V. Jenderka
Martin Luther University Halle-Wittenberg, Halle,
Germany*

*M. Schultz, G. Dietrich
Company for Applied Medical Physics and Technique,
Ltd., Germany*

- 18.5: Object-Discrimination System Using a Neural Network with Inputs for Distance and Sensitivity Information of an Ultrasonic Sensor** (4:30)

*S. Aoshima, N. Yoshizawa, T. Yabuta, K. Hanari
Ibaraki University, Ibaraki, Japan*

- 18.6: Wireless, Batteryless, Wearable Microphones Using Inductive Coupling** (4:45)

*K. J. Cho, H. H. Asada
MIT, Cambridge, MA*

INERTIAL SENSORS I

Wednesday, June 12 / 3:30–5:00 pm / Ballroom F

Chair: *Qing-An Huang, South East University, China*

- 19.1: A Sensitive and Economical Method to Directly Detect Particles (3:30)**
M. A. Cooper, F. N. Dultsev, T. Minson, V. P. Ostanin, C. Abell, D. Klenerman
University of Cambridge, Cambridge, U.K.
- 19.2: Motion-Dynamics Sensing Scheme for MEMS Micro-Motor (3:45)**
M. J. McCaslin, E. J. Kozubal
Read-Rite Corp., Fremont, CA
M. Del Sarto
STMicroelectronics, San Jose, CA
- 19.3: Monolithic Miniaturized Quartz Microbalance Array and Its Application to Chemical Sensor Systems for Liquids (4:00)**
J. Rabe, S. Büttgenbach
Technical University of Braunschweig, Braunschweig, Germany
J. Schröder, P. Hauptmann
Otto von Guericke University, Magdeburg, Germany
- 19.4: A High-Performance Mixed Micromachined Differential Resonant Accelerometer (4:15)**
S. Seok, B. Lee, J. Kim, K. Chun
Seoul National University, Seoul, Korea
- 19.5: Stress-Free Quad-Beam Optical Silicon Accelerometer (4:30)**
J. A. Plaza, A. Llobera, C. Dominguez, J. Esteve
Centro Nacional de Microelectrónica, Barcelona, Spain
J. Berganzo, J. Garcia
Ikerlan, Spain
- 19.6: Theoretical Study, Modeling, and Realization of Resonant Gyroscopes with Optical Output (4:45)**
S. Baglio, S. Castorina, N. Savalli
University of Catania, Catania, Italy

POSTER SESSION I

Wednesday, June 12 / 5:30–7:00 pm / Florida East Hall

INTEGRATED OPTICAL SENSORS

- P1.1: Dynamic Particle-Shape Measurements Using a Near-Field Optical Sensor**
J. H. Nieuwenhuis, M. J. Vellekoop
Vienna University of Technology, Vienna, Austria
J. Bastemeijer, A. Bossche
Delft University of Technology, Delft, The Netherlands
- P1.2: Pixel-Based Random Access Image Sensor Array for Real-Time IBR**
R. Oi, K. Aizawa
University of Tokyo, Tokyo, Japan
T. Hamamoto
Tokyo University of Science, Tokyo, Japan
- P1.3: CMOS Passive Pixel Design Techniques**
I. L. Fujimori, C. G. Sodini
MIT, Cambridge, MA
- P1.4: ASIC Design of a SMART Sensor Based on Porous Silicon Sensing**
H. Saha, S. Dey, J. Das, S. M. Hossain
Jadavpur University, Kolkata, India
- P1.5: Surface-Acoustic-Wave Wavefront Sensor Using Custom Optics on a Standard CMOS Process**
S. D. Sharples, M. Clark, M. G. Somekh
University of Nottingham, Nottingham, U.K.
- P1.6: Comparison of Different Control-Loop Concepts for Direct Distance Measurement Using Photonic Mixing Devices**
D. Becker, P. Gulden, M. Vossiek
Siemens AG, Munich, Germany
- P1.7: DOPCAM: Full-Field Laser-Doppler Blood-Flow Imaging**
C. Kongsavatsak, S. P. Morgan, B. R. Hayes-Gill, M. Clark, J. A. Crowe
University of Nottingham, Nottingham, U.K.

OPTICAL IMAGING PROPERTIES

P1.8: A Spaceborne Multispectral Image Sensor and Performance Tracking

*W-S. Lin, W-H. Sung
National Taiwan University, Taipei, Taiwan, R.O.C.*

P1.9: Fundamental Imaging Properties of Transillumination Laser CT Using Optical Fiber Applicable to Bio-Medical Sensing

*Y. Sasaki, J. Suzuki, M. Takagi, T. Yuasa, B. Devaraj,
T. Akatsuka
Yamagata University, Yamagata, Japan*

*S. Tanosaki
I.T. Research, Co., Ltd., Sendai, Japan*

*H. Taniguchi
Iwate University, Morioka, Japan*

P1.10: A New CMOS Pixel with Lateral and Vertical BJT Structure

*Y-J. Kook, Y-J. Park, H-S. Min
Seoul National University, Seoul, Korea*

*J-H. Lee
Wonkwang University, Jeonbuk, Korea*

P1.11: Novel Micro-Scanner for Optical Communications: Architecture and Performance

*D. Yan, B. Xu, J. Castracane
University at Albany-SUNY, Albany, NY*

P1.12: Comparison of Modern CCD and CMOS Image Sensor Technologies and Systems for Low-Resolution Imaging

*B. Carlson
Symbol Technologies, Inc., Holtsville, NY*

P1.13: A Matrix Transform Imager and Architecture

*P. Hasler, A. Bandyopadhyay
Georgia Institute of Technology, Atlanta, GA*

OPTICAL/PHOTONIC

P1.14: Accurate-Temperature Sensor System Based on Linear-Cavity Fiber Laser Array

*P-C. Peng, H-Y. Tseng, S. Chi
National Chiao-Tung University, Hsinchu, Taiwan, R.O.C.*

P1.15: Growth and Photoconductor Properties of HgCdTe/GaAs Epilayers

*K. J. Hong, C. S. Park
Chosun University, Kwangju, Korea*

P1.16: Limitary Operation Conditions Affecting CID Near-Infrared Detector Performance

*B. G. Vainer
Institute of Semiconductor Physics, Novosibirsk, Russia*

P1.17: Integrated 2-D Optical Lenses Designed in PDMS Layer to Improve Fluorescence Using Optical Fibers

*S. Camou, T. Fujii, J-P. Gouy, H. Fujita
University of Tokyo, Tokyo, Japan*

P1.18: Novel Microactuators Based on a Photo-Thermo-Mechanical Actuation Strategy

*S. Baglio, S. Castorina, L. Fortuna, N. Savalli
University of Catania, Catania, Italy*

P1.19: Preparation of Nanocrystalline CdS by Novel Microwave Solvothermal Technique for Photonic Applications

*A. V. Murugan, B. B. Kale, R. S. Sonawane
Centre for Materials for Electronics Technology, Pune, India*

*V. Saaminathan
Multimedia University, Selangor, Malaysia*

ACOUSTIC

P1.20: Novel QCM Biosensing Based on Analyte-Specific Precipitation Reactions

*S. M. Reddy, N. G. Karousos
University of Surrey, Surrey, U.K.*

P1.21: Novel MEMS Microshell Transducer Arrays for High-Resolution Underwater Acoustic Imaging Applications

*M. Mescher, K. Houston
Charles Stark Draper Laboratory, Cambridge, MA*

*J. Bernstein
Corning, Inc., Corning, NY*

*L. E. Cross, B. Xu, J. Cheng
The Pennsylvania State University, University Park, PA*

IONIZATION RADIATION SENSORS

P1.22: Gamma-Radiation Dosimetry Using Tellurium Dioxide Thin-Film Structures

*K. Arshak, O. Korostynska
University of Limerick, Limerick, Ireland*

P1.23: Development of a Novel Ultra-Fast Scintillator with MQW Structure

*K. Shibuya, M. Koshimizu, K. Asai
The University of Tokyo, Tokyo, Japan, and Japan Science and Technology Corp., Saitama, Japan*

*H. Shibata
The University of Tokyo, Tokyo, Japan*

P1.24: X-Ray Microdetectors Based on an Array of Scintillators: A Maskless Process Using Laser Ablation

*J. G. Rocha, N. F. Ramos, M. V. Moreira,
S. Lanceros-Mendez, J. H. Correia
University of Minho, Guimaraes, Portugal*

*R. F. Wolfenbuttel
Delft University of Technology, Delft, The Netherlands*

P1.25: Multiple-Channel Optical-Fiber Radiation Dosimeter for Radiotherapy Applications

*A. L. Huston, P. L. Falkenstein, B. L. Justus
Naval Research Laboratory, Washington, DC*

*R. Altemus, R. W. Miller, H. King
National Cancer Institute, National Institutes of Health,
Bethesda, MD*

MECHANICAL PROPERTIES INERTIAL

P1.26: Design Optimization of Three-Axis Accelerometers Based on Four Seismic Masses

*H. Rödjegård, G. Anderson
The IMEGO Institute, Göteborg, Sweden*

MICROWAVE/MILLIMETER-WAVE SENSORS

P1.27: An Ultra-Wideband Radar for Vehicle Detection in Railroad Crossings

*S. P. Lohmeier, R. Rajaraman, V. C. Ramasami
University of Kansas, Lawrence, KS*

AUTOMOTIVE

P1.28: UV Laser-Diode Fluorescence Fiber Sensor for Commercial Gasolines

*K. Ozanyan, T. L. Yeo, H. Hindle, H. McCann
University of Manchester, Manchester, U.K.*

*N. R. J. Poolton
University of Manchester, Manchester, U.K., and Daresbury Laboratory, Warrington, U.K.*

BIOSENSORS

P1.29: Characterization of Cell Adhesion by the Quartz-Crystal Microbalance Technique

*D. Le Guillou-Buffello, M. Gindre, L. Haïder, P. Laugier
Université de Cergy-Pontoise, Cergy, France*

P1.30: Remote System for Patient Monitoring Using Bluetooth™

*J. Andreasson, M. Ekström, A. Fard, J. Garcia Castaño,
T. Johnson
Mälardalen University, Mälardalen, Sweden*

P1.31: An Intelligent Optical-Fiber-Based Sensor System for Monitoring Food Quality

*M. O'Farrell, E. Lewis
University of Limerick, Castletroy, Limerick, Ireland*

*N. Jackman
Echo Food Systems, Limerick, U.K.*

P1.32: A Disposable Membrane-Strip Immunosensor

*Z. Muhammad-Tahir, E. C. Alocilja
Michigan State University, East Lansing, MI*

P1.33: A Miniaturized Planar Glucose Sensor Based on Prussian Blue as the Electrocatalyst for H₂O₂

*J. Zhu, Z. Zhu, Z. Lai
East China Normal University, Shanghai, China*

P1.34: Thermal Fluid-Layer Characterization in Microfluidic Systems

*H. Ernst
Albert-Ludwigs University, Freiburg, Germany, and
HSG-IMIT, Villingen-Schwenningen, Germany*

*G. Urban
Albert-Ludwigs University, Freiburg, Germany*

P1.35: Fluxgate Can Replace SQUID for Lung Diagnostics

*P. Ripka, P. Kaspar, A. Típek
Czech Technical University, Czech Republic*

*K. Svabova
Prague Public Health Center, Prague, Czech Republic*

*R. Holusa
National Institute of Public Health, Czech Republic*

P1.36: High-Speed Scanning Wavelength-Multiplexed Fiber-Optic Sensors for Biomedicine

*Z. Yaqoob, N. A. Riza
University of Central Florida, Orlando, FL*

P1.37: Characterization of Protein Films Using the Scanning Kelvin Probe Technique

*D. C. Hansen
Princeton Applied Research, Oak Ridge, TN*

P1.38: Detection of Agricultural Chemicals Using a Lipid Membrane Sensor

*Y. Naito
Anritsu Corp., Kanagawa, Japan, and Kyushu University,
Japan*

*H. Ikezaki, A. Taniguchi
Anritsu Corp., Kanagawa, Japan*

*K. Toko
Kyushu University, Japan*

P1.39: Vapor-Phase SAW Immunoassay Sensors

*D. D. Stubbs, W. D. Hunt, S. H. Lee, D. F. Doyle
Georgia Institute of Technology, Atlanta, GA*

ENVIRONMENTAL

P1.40: A Large-Scale Seismic Sensing Array on the Sea Floor with Fiber-Optic Accelerometers

*Y. Shindo, T. Yoshikawa
Oki Electric Industry Co., Ltd., Shizuoka, Japan*

P1.41: Self-calibrated PTC Air-Flow Sensor

*M. Horn, L. Umar
University of Bundeswehr Munich, Neubiberg, Germany*

P1.42: PC-Based Optical Ozone Monitor Using a CCD Photodetector

*W-Y. Chung
Dongseo University, Pusan, Korea*

HUMIDITY

P1.43: Liquid Sensor System Using Reflecting Surface-Acoustic-Wave Delay Lines

*T. Nomura, A. Saitoh
Shibaura Institute of Technology, Tokyo, Japan*

P1.44: Improvement of Polyimide Capacitive Humidity Sensor by Reactive Ion Etching and Novel Electrode Design

*J. H. Chen, Y. L. Yang, S. R. S. Huang
National Tsing Hua University, Hsinchu, Taiwan, R.O.C.*

FOOD

P1.45: Sensory and Electronic Nose Analysis of Porcine Meatloaf in Relation to Ingredient Quality

*T. Hansen, D. V. Byrne
The Royal Veterinary and Agricultural University,
Frederiksberg, Denmark*

*K. Boholt
Teknik Energy & Environment, Søborg, Denmark*

*E. Gammelgaard
Tulip International, Vejle, Denmark*

MICROFABRICATED CHEMICAL AND BIOLOGICAL SENSORS I

Thursday, June 13 / 8:30–10:00 am / Ballroom II

Chair: *Bahram Ghodsain, Molecular Reflections, Inc., USA*

20.1: Invited Paper: Sensor Technologies to Advance Genomics Research (8:30)

*J. A. Schloss
National Human Genome Research Institute, National Institutes of Health, Bethesda, MD*

20.2: Invited Paper: MEMS-Based Systems for DNA Sequencing and Forensics (9:00)

*D. Ehrlich, L. Carey, J. Chiou, S. Desmarais, S. El-Difrawy, L. Koutny, R. Lam, P. Matsudaira, B. Mckenna, L. Mitnik-Gankin, T. O'Neil, M. Novotny, A. Srivastava, W. Timp
MIT, Cambridge, MA*

20.3: Electronic Baseline Suppression for Liquid-Conductivity Detection in a Capillary Electrophoresis Microchip (9:30)

*F. Laugere, J. Bastemeijer, A. Bossche
Delft University of Technology, Delft, The Netherlands*
*M. J. Vellekoop
Vienna Institute of Technology, Vienna, Austria*

20.4: A New Microchannel Device for Protein Detection from a Mixture (9:45)

*Y. Kuo, H. H. Lee
Texas A&M University, College Station, TX*

BREAK (10:00–10:30)

DEVELOPMENTS IN QUARTZ-CRYSTAL BIOSENSING

Thursday, June 13 / 8:30–10:00 am / Ballroom III

Chair: *Sub Reddy, University of Surrey, U.K.*

21.1: Invited Paper: Protein Surface Adsorption Detected by Magnetic Direct Excitation of Acoustic Waves (8:30)

*M. Thompson, S. Ballantyne
University of Toronto, Toronto, Ontario, Canada*

21.2: Invited Paper: Kinetic Studies of Molecular Recognition on DNA by Using a 27-MHz Quartz-Crystal Microbalance (9:00)

*Y. Okahata
Tokyo Institute of Technology, Yokohama, Japan*

21.3: Invited Paper: Immobilization of Proteins and Oligonucleotides on Gold and Development of Reliable QCM Biosensors (9:30)

*M. Mascini, S. Tombelli
Università degli Studi di Firenze, Florence, Italy*

BREAK (10:00–10:30)

INTEGRATED SOI SENSORS I

Thursday, June 13 / 8:30–10:00 am / Ballroom A

Chair: *Adrian M. Ionescu, Ecole Polytechnique Federale de Lausanne, Switzerland*

- 22.1: **Invited Paper: Silicon-on-Insulator CMOS Gas Sensors** (8:30)

*F. Udrea, J. W. Gardner
University of Cambridge and University of Warwick,
Coventry, U.K.*

- 22.2: **Invited Paper: Capacitive Pressure and Inertial Sensors by Epi-SOI Surface Micromachining** (9:00)

*S. Renard, C. Pisella, J. Collet, V. Gaff, J.-L. Lauront
Tronic's Microsystems, Grenoble, France*

- 22.3: **A Novel Resistive Gas Sensor with Integrated MOSFET Micro Hot Plate Based on a SOI CMOS Analog Process** (9:30)

*F. Udrea, C. C. Lu, J. A. Covington, J. W. Gardner
University of Cambridge and University of Warwick,
Coventry, U.K.*

- 22.4: **SOI-CMOS Compatible Low-Power Microheater Optimization and Fabrication for Smart Gas Sensor Implementations** (9:45)

*J. Laconte, C. Dupont, A. Akheyar, J.-P. Raskin, D. Flandre
Université Catholique de Louvain, Louvain-la-Neuve,
Belgium*

BREAK (10:00–10:30)

TACTILE SENSORS FOR ROBOTICS APPLICATIONS

Thursday, June 13 / 8:30–10:00 am / Ballroom D

Chair: *Chiang Liu, University of Illinois at Urbana-Champaign, USA*

- 23.1: **Invited Paper: A Tactile Sensory-Enhanced Assistive Robot** (8:30)

*N. J. Ferrier, C. Lozano, M. Tyler
University of Wisconsin at Madison, Madison, WI*

- 23.2: **Invited Paper: A Sheet-Type Sensor Using Pressure-Conductive Rubber with Electrical-Wire Stitches Method** (9:00)

*M. Shimojo, R. Makino
The University of Electro-Communications, Tokyo, Japan*

*A. Namiki, M. Ishikawa, T. Suzuki, K. Mabuchi
University of Tokyo, Tokyo, Japan*

- 23.3: **Tactile Sensor Based on Piezoelectric Resonance** (9:30)

*G. M. Krishna, K. Rajanna, L. Shivalingappa
Indian Institute of Science, Bangalore, India*

- 23.4: **Novel Sensor Technology for Shear and Normal Strain Detection with Generalized Electrostriction** (9:45)

*T. R. Filanc-Bowen, G. H. Kim, Y. M. Shkel
University of Wisconsin at Madison, Madison, WI*

BREAK (10:00–10:30)

HARSH-ENVIRONMENT MICROSYSTEMS AND NANOSYSTEMS TECHNOLOGY II

Thursday, June 13 / 8:30–10:00 am / Ballroom C

Co-Chairs:

Robert Okojie, NASA–Glenn Research Center, USA

Kevin Kornegay, Cornell University, USA

24.1: *Invited Paper: Chemical Sensor Arrays for Harsh Environments and Aerospace Applications* (8:30)

G. W. Hunter, P. G. Neudeck

NASA–Glenn Research Center, Cleveland, OH

D. Makel

Makel Engineering, Inc., Chico, CA

C. C. Liu, B. Ward, Q. H. Wu

Case Western Reserve University, Cleveland, OH

V. Thomas

Ohio Aerospace Institute, Cleveland, OH

24.2: *Invited Paper: Characterization of Silicon Carbide MEMS for High-g Launch Applications* (9:00)

G. L. Katulka

Army Research Laboratory, Aberdeen Proving Ground, MD

24.3: *Invited Paper: Packaging Considerations for Very-High-Temperature Microsystems* (9:30)

E. Savrun

Sienna Technologies, Inc., Woodinville, WA

BREAK (10:00–10:30)

INERTIAL SENSORS II

Thursday, June 13 / 8:30–9:45 am / Ballroom F

Chair: *Qing-An Huang, South East University, China*

25.1: *Arrow-Based Optical Accelerometers* (8:30)

A. Llobera, J. A. Plaza, J. Esteve, C. Dominguez

Centro Nacional de Microelectrónica, Barcelona, Spain

I. Salinas

Universidad de Zaragoza, Zaragoza, Spain

J. Berganzo, J. Garcia

Ikerlan, Spain

25.2: *Sub-Micron-Range Thickness Measurements Using a Novel Scanning Heterodyne Optical Interferometer* (8:45)

N. A. Riza, M. A. Arain

University of Central Florida, Orlando, FL

25.3: *A Reliable Gyroscope-Based Gait-Phase Detection Sensor Embedded in a Shoe Insole* (9:00)

I. P. I. Pappas, S. Mangold

Automatic Control Laboratory, Zurich, Switzerland

T. Keller

ParaCare Institute for Rehabilitation and Research at University Hospital Balgrist, Zurich, Switzerland

25.4: *Feedforward Control Algorithm for Structural-Imperfection Compensation in MEMS Rate-Integrating Gyroscopes* (9:15)

C. C. Painter, A. M. Shkel

University of California at Irvine, Irvine, CA

25.5: *Simulation of Characteristic of Comb-Gimbal Micromachined Gyroscope* (9:30)

L. Che, B. Xiong, Y. Wang

Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Science, Shanghai, People's Republic of China

BREAK (9:45–10:30)

MICROFABRICATED CHEMICAL AND BIOLOGICAL SENSORS II

Thursday, June 13 / 10:30 am – 12:00 pm / Ballroom II

Chair: *Bahram Ghodsain, Molecular Reflections, Inc., USA*

26.1: A Silicon-Based FPW Sensor-Array System with Polymer Fluidics Integrated on a PCB (10:30)

*C. Dubé, J. Fiering, M. Mescher
Charles Stark Draper Laboratory, Cambridge, MA*

26.2: Magnetic Sensing for Genomic Detection and Analysis (10:45)

*C. R. Tamanaha
Geo-Centers, Inc., Fort Washington, MD*
*R. J. Colton, M. M. Miller, S. P. Mulvaney, J. C. Rife,
L. J. Whitman
Naval Research Laboratory, Washington, DC*
*M. A. Piani
Nova Research, Inc.*

26.3: Advanced Sensor Technologies for Microscale to Nanoscale Biological Measurements (11:00)

*D. M. Porterfield
University of Missouri-Rolla, Rolla, MO*

26.4: A Lab-on-a-Chip for Cell Detection and Manipulation (11:15)

*G. Medoro, N. Manaresi
Silicon Biosystems S.R.L., Bologna, Italy*
*A. Leonardi, L. Altomare, M. Tartagni, R. Guerrieri
University of Bologna, Bologna, Italy*

26.5: An Optical Sensor for Multi-Component Immunodetection (11:30)

*S. Suzuki, Y. Kanakogi, T. Hagiwara, I. Tachibana, M. Iida
Siekei University, Tokyo, Japan*

26.6: Study of Dual-Parameter Piezoelectric DNA Sensor for Liquid Detection (11:45)

*Z. Gao, F. Chao, H. Wang, Y. Fang
Tianjin Institute of Hygiene and Environmental Medicine,
Tianjin, People's Republic of China*
*H. Pan, H. Zhu
Tsinghua University, Beijing, People's Republic of China*

LUNCH (12:00–1:30)

BIOSENSING III

Thursday, June 13 / 10:30 am – 12:00 pm / Ballroom III

Chair: *R. Claus, NanoSonic, Inc., USA*

27.1: Optimization of On-Chip Micro-Electromagnets for Biomolecular Separation (10:30)

*Q. Ramadan, D. P. Puiiu
Nanyang Technological University, Singapore*

*V. Samper, P. Neuzil
Institute of Microelectronics, Singapore*

*L. Marie, L. T. Meng, H. C. Kiat, Y. S. Qin
National University of Singapore, Singapore*

27.2: Monitoring Interfacial Biological Processes: Deposition of Collagen on Gold Surface with the Use of TSM Piezoelectric Sensors (10:45)

*A. Fertala
Thomas Jefferson Medical University, Philadelphia, PA*

*R. M. Lec
Drexel University, Philadelphia, PA*

27.3: Microcantilever Sensors for the Detection of Biomolecular Interactions (11:00)

*K. M. Hansen, T. G. Thundat
Oak Ridge National Laboratory, Oak Ridge, TN*

27.4: Development of Life-Cell-Based Affinity Microassay for HT Screening (11:15)

*E. Spiller, T. Frömmichen, A. Zimmermann,
A. E. Sippel, G. A. Urban
University of Freiburg, Freiburg, Germany*

27.5: Photon-Based Sensing of Pathogens in Food (11:30)

*F. P. Mathew, E. C. Alocilja
Michigan State University, East Lansing, MI*

27.6: Fiber-Optic Sensors for Ultrasonic Virtual Biopsy (11:45)

*L. Masotti, E. Biagi, A. Acquafresca, D. Menichelli
University of Florence, Florence, Italy*

LUNCH (12:00–1:30)

INTEGRATED SOI SENSORS II

Thursday, June 13 / 10:30 am – 12:00 pm / Ballroom A

Chair: *Adrian Ionescu, Ecole Polytechnique Federale de Lausanne, Switzerland*

- 28.1: Invited Paper: SOI CMOS Hall-Effect Sensor Architectures for High-Temperature Applications up to 300°C** (10:30)

*L. Portmann, H. Ballan, M. Declercq
Swiss Federal Institute of Technology, Lausanne,
Switzerland*

- 28.2: Invited Paper: Intelligent SOI CMOS Integrated Circuits and Sensors for Heterogeneous Environments and Applications** (11:00)

*D. Flandre, S. Adriaensen, A. Afzaljan, J. Laconte,
D. Levacq, C. Renaux, L. Vancaille, J.-P. Raskin
Université Catholique de Louvain, Louvain-la-Neuve,
Belgium*

*L. Demeüs, P. Delatte, V. Dessard, G. Picun
CISSOID, Louvain-la-Neuve, Belgium*

- 28.3: Design and Fabrication of a Bulk-Silicon CMOS-MEMS Gyroscope** (11:30)

*H. Xie, G. K. Fedder
Carnegie Mellon University, Pittsburgh, PA*

- 28.4: Ultra-Low-Power Thermal Sensor with Silicon-on-Insulator Structure for High-Temperature Applications** (11:45)

*B. Li, B. Y. Liu, X. R. Zheng
South China University of Technology, Guangzhou, China*

*P. T. Lai, Z. H. Wu
The University of Hong Kong, Hong Kong, China*

*J. K. O. Sin
The Hong Kong University of Science & Technology, Hong
Kong, China*

LUNCH (12:00–1:30)

SIGNAL PROCESSING III

Thursday, June 13 / 10:30 am – 12:00 pm / Ballroom D

Chair: *Michael Shur, Rensselaer Polytechnic Institute, USA*

- 29.1: Fast Interface for a Resistive Touch Screen** (10:30)

*R. N. Aguilar, G. C. M. Meijer
Delft University of Technology, Delft, The Netherlands*

- 29.2: Erroneous Classifications in Electronic Noses Due to Noise** (10:45)

*K. L. Goodner
U.S. Citrus and Subtropical Products Laboratory,
Winter Haven, FL*

*J. G. Dreher, R. L. Rouseff
University of Florida, Lake Alfred, FL*

- 29.3: Dual-Use Signal Processing for a Multiple-Sensor System: Sonar and Optical Image Processing for Underwater Obstacle Avoidance** (11:00)

*T. M. Massengill, D. M. Wilson
University of Washington, Seattle, WA*

- 29.4: A New Nulling Method in the V-BLAST Under Uncertain Channel Information** (11:15)

*K. Lee, J. Chun
KAIST, Taejon, Korea*

- 29.5: An Optical-Fiber Water Sensor Utilizing Signal-Processing Techniques and Artificial Neural-Network Pattern Recognition** (11:30)

*D. King, W. B. Lyons, C. Flanagan, E. Lewis
University of Limerick, Castletroy, Limerick, Ireland*

- 29.6: The Outer-Product as a Method for the Fusion of Data from Different Electronic Noses** (11:45)

*C. Di Natale, R. Paolesse
University of Rome, Rome, Italy*

*G. Olafsdottir
Icelandic Fisheries Laboratories, Reykjavik, Iceland*

*A. Macagnano
IME-CNR, Lecce, Italy, and PSM-CNR, Rome, Italy*

*A. D'Amico
University of Rome, Rome, Italy; IME-CNR, Lecce, Italy;
and PSM-CNR, Rome, Italy*

LUNCH

(12:00–1:30)

APPLICATIONS: AEROSPACE

Thursday, June 13 / 10:30 am – 12:00 pm / Ballroom C

Chair: *Upendra Singh, NASA-Langley Research Center, USA*

- 30.1: Combination of Low-Power Radars and Non-Rotating Sector Antennas for Surveillance of Ground Moving Traffic in Airports (10:30)**

*K.-H. Bethke, B. Röde, A. Schroth
German Aerospace Center (DLR), Wessling, Germany*

- 30.2: Sensing and Perception Challenges in Planetary-Surface Robotics (10:45)**

*E. Tunstel, A. Howard
NASA-Jet Propulsion Laboratory, Pasadena, CA*

- 30.3: Thin-Film Strain-Gauge Sensors for Ion Thrust Measurement (11:00)**

*R. J. Stephen, K. Rajanna
Indian Institute of Science, Bangalore, India*

*V. Dhar, K. G. K. Kumar, S. Nagabushanam
ISRO Satellite Center, Bangalore, India*

- 30.4: Embedded Micromachined Fiber-Optic Fabry-Perot Pressure Sensors for Aerodynamics Applications (11:15)**

*M. J. Gander, W. N. MacPherson, J. S. Barton,
R. L. Reuben, J. D. C. Jones
Heriot-Watt University, Edinburgh, U.K.*

*R. Stevens
Rutherford Appleton Laboratory, Didcot, U.K.*

*K. S. Chana, S. J. Anderson
QinetiQ, Pyestock, Hampshire, U.K.*

*T. V. Jones
Oxford University, Oxford, U.K.*

- 30.5: Sensor Applications at Kennedy Space Center (11:30)**

*J. M. Perotti, A. Eckhoff
NASA-Kennedy Space Center, Kennedy Space Center, FL*

- 30.6: Electromagnetic Sensors for Microsatellites (11:45)**

*V. Korepanov
Lviv Center, Institute of Space Research, Lviv, Ukraine*

LUNCH (12:00–1:30)

THERMAL SENSING I

Thursday, June 13 / 10:30 am – 12:00 pm / Ballroom F

Chair: *Kevin Kornegay, Cornell University, USA*

- 31.1: Experimental Study of High-TCR Pt Thin Films for Thermal Sensors (10:30)**

*K. Tsutsumi, A. Yamashita, H. Ohji
Mitsubishi Electric Corp., Hyogo, Japan*

- 31.2: Embedded Silver Halide Optical-Fiber Temperature Sensor (10:45)**

*S. Sade, O. Eyal, A. Katzir
Tel Aviv University, Tel Aviv, Israel*

- 31.3: Ferroelectric Thin Films for Pyroelectric Sensors (11:00)**

*W. Liu, L. Sun, W. Zhu, O. K. Tan
Nanyang Technological University, Singapore*

- 31.4: A Reconstruction Technique for Stimulated-Brillouin-Scattering-Based Fiber-Optic Sensors for Simultaneous Measurement of Temperature and Strain (11:15)**

*R. Bernini
CNR-IREA, Naples, Italy*

*A. Minardo, L. Zeni
Seconda Università di Napoli, Aversa, Italy*

- 31.5: Multi-Sensors to Measure Pressure and Temperature Made from a New Polyacene Quinone Radical Polymer (11:30)**

*Q. Lei, Y. Fan, W. Zhang
Harbin University of Science and Technology, Harbin, China*

*F. Huang
National Science Foundation Committee of China*

- 31.6: The Chemistry and Physics of Doped BaTiO₃ for PTCR Thermistors (11:45)**

*Z-G. Zhou, Z-L. Tang, Z-T. Zhang
Tsinghua University, Beijing, China*

LUNCH (12:00–1:30)

BIOSENSOR DEVELOPMENT IN MEDICAL APPLICATIONS I

Thursday, June 13 / 1:30–3:00 pm / Ballroom II

Chair: *Sheila Grant, University of Missouri-Columbia, USA*

**32.1: Invited Paper: Fiber-Optic Sensing of Tissue pH (1:30)
to Assess Low-Blood-Flow States**

*B. R. Soller, P. O. Idwasi, S. O. Heard
University of Massachusetts Medical School,
Worcester, MA*

**32.2: Invited Paper: Implantable Glucose Sensor: (2:00)
Progress and Problems**

*F. Moussy
University of Connecticut Health Center,
Farmington, CT*

**32.3: Immobilization of RET Biomolecules for an (2:30)
HIV Sensor**

*S. A. Grant
University of Missouri, Columbia, MO*

*J. Xu
Michigan Technological University, Houghton, MI*

32.4: Acoustic Plate Mode Tissue Sensor (2:45)

*F. G. Tseng, K. C. Leou, Y. Y. Lai
National Tsing Hua University, Taiwan, R.O.C.*

*L. C. Pan, Y. C. Liang, L. D. Chen
Taipei Medical University, Taiwan, R.O.C.*

BREAK (3:00–3:30)

CHEMICAL SENSING II

Thursday, June 13 / 1:30–3:00 pm / Ballroom III

Chair: *Vasyli' V. Il'chenko, Kiev Taras Shevchenko, University, Ukraine*

**33.1: Electrically Controlled Metal Oxide Gas Sensor (1:30)
Designed with PROSA-CHEM**

*M. Scheinert, T. Doll
Ilmenau Technical University, Ilmenau, Germany*

*J. Wöllenstein, H. Böttner
Fraunhofer Institute of Physical Measurement Techniques,
Freiburg, Germany*

*H. P. Frechrichs, H. Verhoeven, M. Lehmann
Micronas GmbH, Freiburg, Germany*

**33.2: SnO₂ Sensors with Variable Operating (1:45)
Temperature for CO Detection: Selectivity
and Sensitivity Enhancement**

*A. Burresti, A. Fort, S. Rocchi, B. Serrano, N. Ulivieri,
V. Vignoli
University of Siena, Siena, Italy*

*G. Sberveglieri, E. Zampicini
University of Brescia, Brescia, Italy*

**33.3: Higher-Order Sensing Using QCM Sensor Array (2:00)
and Preconcentrator with Variable Temperature**

*T. Nakamoto, K. Sukegawa, E. Sumitomo
Tokyo Institute of Technology, Tokyo, Japan*

**33.4: A Miniature pH Sensor Based on Pre-oxidized (2:15)
Petroleum Pitch-Based Carbon-Fiber Microelectrode**

*Y-F. Tu, J-W. Di, P. Xu
Suzhou University, Suzhou, People's Republic of China*

**33.5: New Surface-Acoustic-Wave Gas Sensor of the (2:30)
Mass-Sensitive Type Sensitive to the Thermal
Properties of Gases**

*R. G. Kryshtal, A. V. Medved
Institute of Radio Engineering and Electronics, Russian
Academy of Sciences, Moscow, Russia*

**33.6: Non-Cooled p-InAsSbP/n-InAs Photodiodes for (2:45)
Detection of Pollutant Gases**

*V. I. Khivrych, N. M. Panchenko, A. V. Sukach, V. V. Tetyorkin
Scientific Center Institute for Nuclear Research National
Academy of Sciences of Ukraine, Kiev, Ukraine*

*N. V. Zotova, S. A. Karandashev, M. A. Matveev,
N. M. Remennyi, B. A. Stus, G. N. Talalakin
Institute of Semiconductor Physics, National Academy
of Sciences of Ukraine, Kiev, Ukraine*

BREAK (3:00–3:30)

SMART SENSORS AND INTERFACE ELECTRONICS I

Thursday, June 13 / 1:30–3:00 pm / Ballroom A

Co-Chairs:

Gerard Meijer, Delft University of Technology, The Netherlands

Kofi Makinwa, Delft University of Technology, The Netherlands

- 34.1: Invited Paper: CMOS Smart Temperature Sensors: How to Improve Accuracy (1:30)**

A. Bakker

Philips Semiconductors, Delft, The Netherlands

- 34.2: Invited Paper: Single-Chip CMOS Capacitive Gas Sensor for Detection of Volatile Organic Compounds (2:00)**

*C. Hagleitner, A. Kummer, A. Hierlemann, H. Baltes
Physical Electronics Laboratory, Zurich, Switzerland*

- 34.3: Magnetoresistive Sensors and a New Hardware-Based Interpolation Method for Length and Angle Measurements (2:30)**

K. Leitis, W. Bonath

University of Applied Sciences, Giessen, Germany

- 34.4: Switched-Capacitor Front End for Capacitance Measurements with Extended Linear Range (2:45)**

V. P. Iordanov, G. C. M. Meijer

Delft University of Technology, Delft, The Netherlands

S. N. Nihitjanov

ASML, Veldhoven, The Netherlands

BREAK (3:00–3:30)

MATERIALS AND FABRICATION I

Thursday, June 13 / 1:30–3:00 pm / Ballroom D

Chair: *Lina Sarro, Delft University of Technology, The Netherlands*

- 35.1: Measurement of the Viscoelastic Constants of a Sol-Gel Material by an Acoustic Method (1:30)**

*M. Gindre, S. Serfaty, B. Senouci, L. Martinez, P. Griesmar
Université de Cergy-Pontoise, Cergy, France*

- 35.2: Fabrication and Characterization of Flexible Silicon Substrates with Electroplated Gold Leads (1:45)**

*T. Lisby, J. Branebjerg
DELTA Danish Electronics, Hørsholm, Denmark*

O. Hansen

Technical University of Denmark

- 35.3: Novel Piezoelectric Materials for Advanced Sensor Applications (2:00)**

*P. W. Rehrig, E. Alberta, W. S. Hackenberger
TRS Ceramics, Inc., State College, PA*

T. R. Shrouf

The Pennsylvania State University, University Park, PA

- 35.4: Examination of Thin Porous Monolayer and Multilayer Structures Containing an Underlayer of Porous Silicon (2:15)**

*I. A. Leonov, O. P. Pchelyakov, K. P. Mogilnikov
Institute of Semiconductor Physics, Novosibirsk, Russia*

- 35.5: Micromechanical Structures Fabricated by an Electrochemical Process (2:30)**

*M. O. S. Dantas, E. Galeazzo, H. E. M. Peres,
F. J. Ramirez-Fernandez
São Paulo University, São Paulo, Brazil*

- 35.6: Oxidized Porous-Silicon Thick Layers as Substrates for RF/Microwave IC Applications (2:45)**

Y. Long

*East China Normal University, Shanghai, China, and
Chang De Normal University, Chang De, China*

Z. Zhu, Z. Lai, Y. Shi, P. Xin

East China Normal University, Shanghai, China

BREAK (3:00–3:30)

POSITION SENSORS I

Thursday, June 13 / 1:30–3:00 pm / Ballroom C

Chair: *William Tang, DARPA, USA*

- 36.1: Optical Sensors for the Velocity and Slip Measurement of Automobile Belt Drives (1:30)**

*C. Berger
Karlsruhe University, Karlsruhe, Germany*

- 36.2: Novel Semi-Transparent Optical Position Sensors for High-Precision Alignment Monitoring Applications (1:45)**

*V. Danielyan, S. Horvat, H. Kroha
Max Planck Institute of Physics, Munich, Germany*

- 36.3: A Comparison of Layered Metal-Semiconductor Optical Position Sensitive Detectors (2:00)**

*J. Henry, J. Livingstone
The University of Western Australia, Crawley, Western Australia*

- 36.4: An Incremental Capacitive Sensor for Harsh Environments (2:15)**

*B. Brandsttner, G. Brasseur, S. Cermak, H. Zangl
Graz University of Technology, Graz, Austria
P. L. Fulmek
Vienna University of Technology, Vienna, Austria*

- 36.5: Application of MEMS for Improved Emitter-Location Accuracy (2:30)**

*N. E. Wu, M. L. Fowler
State University of New York at Binghamton, Binghamton, NY*

- 36.6: On-Wafer Stiffness and Displacement Measurements of Freestanding MEMS Structures (2:45)**

*R. Maggini, F. Gueissaz, D. Piquet
ASULAB S.A., Marin, Switzerland*

BREAK (3:00–3:30)

THERMAL SENSING II

Thursday, June 13 / 1:30–3:00 pm / Ballroom F

Chair: *Fuqian Yang, University of Kentucky, USA*

- 37.1: Design and Development of High-Performance NTC Thermistors (1:30)**

*R. K. Kamat, G. M. Naik, V. M. S. Vernekar
Goa University, Goa, India*

- 37.2: Non-Idealities of Temperature Sensors Using Substrate PNP Transistors (1:45)**

*M. A. P. Pertjjs, G. C. M. Meijer, J. H. Huijsing
Delft University of Technology, Delft, The Netherlands*

- 37.3: Influence of Surface Roughness on Heat Conductance in Silicon Cryogenic Sensors (2:00)**

*Z. Moktadir, R. J. Wiegerink, M. Elwenspoek
University of Twente, Enschede, The Netherlands*

*M. P. Bruijn, M. Ridder, W. A. Mels
Space Research Organization Netherlands, Utrecht, The Netherlands*

- 37.4: A Model of Bipolar Transistors for Thermal-Sensor Applications (2:15)**

*C. Falconi, C. Di Natale, A. D'Amico
University of Rome, Rome, Italy*

*J. H. Huijsing
Delft University of Technology, Delft, The Netherlands*

- 37.5: Fiber-optic Temperature Sensor for Use in Experimental Microwave Hyperthermia (2:30)**

*C. P. A. Pennisi, L. Leija
Centro de Investigacion y de Estudios Avanzados del IPN, Mexico*

*W. Fonseca
ESIME IPN, Mexico*

- 37.6: Simultaneous Refractive Index and Temperature Measurement Using a Cascaded Long-Period Grating Device (2:45)**

*B. A. L. Gwandu, X. W. Shu, T. D. P. Allsop, W. Zhang, L. Zhang, D. J. Webb, I. Bennion
Aston University, Birmingham, U.K.*

BREAK (3:00–3:30)

BIOSENSOR DEVELOPMENT IN MEDICAL APPLICATIONS I

Thursday, June 13 / 3:30–5:00 pm / Ballroom II

Chair: *Sheila Grant, University of Missouri-Columbia, USA*

- 38.1: Invited Paper: A Kinetic Study of Analyte-Receptor Binding and Dissociation for DNA Biosensor Applications (3:30)**

*A. Ramakrishnan, A. Sadana
University of Mississippi, University, MS*

- 38.2: Invited Paper: Ion Concentrations in Live Cells from Highly Selective Ion Correlation Fluorescent Nano-Sensors (4:00)**

*M. Brasuel, E. Park, R. Kopelman
University of Michigan at Ann Arbor, Ann Arbor, MI*

- 38.3: Invited Paper: Nanoengineering of Fluorescence-Based Biochemical Sensors Using Molecular Self-Assembly: Thin Films and Micro/Nanoshells (4:30)**

*P. S. Grant, S. R. Nayak, T. Duchesne, K. Guice,
Q. Brown, Y. Lvov, M. J. McShane
Louisiana Tech University, Ruston, LA*

CHEMICAL SENSING III

Thursday, June 13 / 3:30–4:45 pm / Ballroom III

Chair: *Hiroaki Suzuki, University of Tsukuba, Japan*

- 39.1: Transient-Response Chemical-Discrimination Module (3:30)**

*S. Hoyt, S. McKennoch, D. M. Wilson
University of Washington, Seattle, WA*

- 39.2: Adaptive Temperature Modulation for CO/CH₄ Concentration Assessment (3:45)**

*A. Perera, T. Sundic, T. Pardo, S. Marco
University of Barcelona, Barcelona, Spain*

- 39.3: Identification of Organic Solvents by a Virtual Multisensor System with Hierarchical Classification (4:00)**

*A. Schütze, A. Gramm, T. Rühl
Saarland University, Saarbruecken, Germany*

- 39.4: Electrochemical Detection of Chloride, Bromide, and Iodide by Monoatomic Films of Silver on Gold Electrodes (4:15)**

*P. E. Laibinis, R. Michalitsch, P. Castaño, C. Bristow
MIT, Cambridge, MA*

- 39.5: Sol-Gel-Based Oxygen Sensor & Luminescence-Lifetime-Based Instrumentation (4:30)**

*J. C. Campo, M. A. Pérez, N. Barragán, C. Blanco,
J. C. Viera
University of Oviedo, Gijón, Spain*

SMART SENSORS AND INTERFACE ELECTRONICS II

Thursday, June 13 / 3:30–5:00 pm / Ballroom A

Co-Chairs:

Gerard Meijer, Delft University of Technology, The Netherlands

Kofi Makinwa, Delft University of Technology, The Netherlands

- 40.1: Invited Paper: Smart Silicon Sensors: Examples of Hall-Effect Sensors and Capacitive Fingerprint Sensors (3:30)**

P. de Jong, G. C. M. Meijer

Delft University of Technology, Delft, The Netherlands

- 40.2: Invited Paper: CMOS Microsystem for ac Current Measurement with Galvanic Isolation (4:00)**

V. Frick, L. Hebrard, P. Poure, F. Anstotz, F. Braun

Laboratoire d'Électronique et de Physique des Systèmes Instrumentaux (LEPSI), Strasbourg, France

- 40.3: On-Chip Programmabilities and Temperature Compensation (4:30)**

H. K. Trieu, N. Kordas, W. Mokwa

Fraunhofer Institute of Microelectronic Circuits and Systems, Duisburg, Germany

- 40.4: High-Performance Photo Detector for Modulated Lighting (4:45)**

Y. Oike, M. Ikeda, K. Asada

The University of Tokyo, Tokyo, Japan

MAGNETIC SENSING I

Thursday, June 13 / 3:30–5:00 pm / Ballroom D

Chair: *Z. Y. Zhou, Tsinghua University, China*

- 41.1: A Novel Planar Mesh-Type Micro-Magnetic Sensor for the Quality Inspection of Electro-Plated Material (3:30)**

S. C. Mukhopadhyay

Massey University, Palmerston North, New Zealand

- 41.2: Neural-Network-Aided Estimation of Near-Surface Material Properties Using Planar Mesh-Type Micromagnetic Sensor (3:45)**

S. C. Mukhopadhyay

Massey University, Palmerston North, New Zealand

- 41.3: Giant Magneto-Impedance in Multilayers of Magnetic Amorphous Ribbons (4:00)**

F. Amalou, M. A. M. Gijss

Swiss Federal Institute of Technology, Lausanne, Switzerland

- 41.4: A Micro High-Temperature-Superconductor Magnet Flywheel System for Energy Storage, Power Generation, and Attitude Control (4:15)**

E. Lee

University of Texas at San Antonio, San Antonio, TX

- 41.5: Thermomagnetic Residual Offset in Integrated Hall Plates (4:30)**

P. Ruther, U. Schiller, O. Paul

IMTEK-Materials, Institute for Microsystem Technology, University of Freiburg, Freiburg, Germany

W. Buesser, R. Janke

Micronas AG, Freiburg, Germany

- 41.6: Magnetic Angular Encoder Using Automatic Offset-Compensation Technique (4:45)**

M. Kayal, E. Chevallaz, F. Burger, R. Popovic

Swiss Federal Institute of Technology, Lausanne, Switzerland

POSITION SENSORS II

Thursday, June 13 / 3:30–5:00 pm / Ballroom C

Chair: *Star R. Huang, National Tsinghua University, Taiwan*

- 42.1: A Class of MEMS Gyroscopes with Increased Parametric Space** (3:30)
C. Acar, A. Shkel
University of California at Irvine, Irvine, CA
- 42.2: Wafer-Bonded High-Dynamic-Range Single-Crystal-Silicon Tunneling Accelerometer** (3:45)
D. T. Chang, R. L. Kubena, F. P. Stratton, D. J. Vickers-Kirby, R. J. Joyce, J. Kim
HRL Laboratories, LLC, Malibu, CA
- 42.3: Resolver Position-Sensing System with Integrated Fault Detection for Automotive Applications** (4:00)
B. Hare, A. Murray, A. Hirao
Analog Devices KK, Tokyo, Japan
- 42.4: Design and Realization of an Optical Bi-Axial Miniature Inclination Sensor** (4:15)
J. Clijnen, W. Meeusen, D. Reynaerts, H. Van Brussel, R. Simons, K. Plessers
K. U. Leuven, Heverlee, Belgium
- 42.5: Fiber-Bragg-Grating Sensors for Position Monitoring in High-Energy Physics** (4:30)
M. Bertani, S. Bianco, F. L. Fabbri, M. Giardoni, A. La Monaca, E. Pace, M. Pallotta
Laboratori Nazionali di Frascati dell'INFN (LNF-INFN), Frascati, Italy
M. A. Caponero, L. Morici
ENEA Frascati, Frascati, Italy, and LNF-INFN, Frascati, Italy
F. Felli, A. Paolozzi, A. Scicutelli
Università degli Studi Roma, Rome, Italy, and LNF-INFN, Frascati, Italy
- 42.6: A Contactless Capacitive Angular Encoder** (4:45)
M. Gasulla, X. Li, G. C. M. Meijer
Delft University of Technology, Delft, The Netherlands

SENSOR SYSTEMS AND NETWORKS I

Thursday, June 13 / 3:30–5:00 pm / Ballroom F

Chair: *Pedro Silva Girão, Lab Medidas Electricas, Portugal*

- 43.1: Optimal Estimation Methodology for Flexible-Structure Vibration Measurement** (3:30)
J. Lin
Ching Yun Institute of Technology, Taiwan, R.O.C.
- 43.2: Development Trends in Sensor Technology: A New BCG Matrix Analysis as a Potential Tool of Technology Selection for a Sensor Suite** (3:45)
J. P. Singh
Instruments Research & Development Establishment, Dehra Dun, India
- 43.3: Next-Generation Technologies to Enable Sensor Networks** (4:00)
D. R. Martinez, M. Gruber
MIT Lincoln Laboratory, Lexington, MA
- 43.4: Stabilizing Controller Design for Distributed Sensor Networks with Time-Varying Delays** (4:15)
V. R. Herath, K. Premaratne, M. Dogruel, P. H. Bauer
University of Miami, Coral Gables, FL
- 43.5: An Architecture Supporting Monitoring and Configuration in Real-Time Smart Transducer Networks** (4:30)
P. Peti, R. Obermaisser, W. Elmenreich, T. Losert
Vienna University of Technology, Vienna, Austria
- 43.6: Task-Oriented Self-Organization of Ad-Hoc Sensor System** (4:45)
J. Zhang, K. Premaratne, M. Dogruel
University of Miami, Coral Gables, FL
P. H. Bauer
University of Notre Dame, Notre Dame, IN

POSTER SESSION II

Thursday, June 13 / 5:30–7:00 pm / Florida Hall East

MODELING/EVALUATION

P2.1: Membrane Modeling of Pull-In Instability in MEMS Sensors and Actuators

*F. Yang
University of Kentucky, Lexington, KY*

P2.2: Testing and Simulation of Novel MEMS Relays by Applying Digital Image Correlation Technology

*C-S. Wang, C-Y. Xiong, W-B. Zhang, J. Fang, Z-H. Li
Peking University, Beijing, People's Republic of China*

P2.3: A System-Level Model in VHDL-AMS for a Micromechanic Vibration Sensor Array

*M. Schlegel, G. Herrmann, D. Müller
Chemnitz University of Technology, Chemnitz, Germany*

P2.4: Modeling and Identification of a PZT-Driven Cantilever Actuator

*S-F. Ling, B. lu
Nanyang Technological University, Singapore*

P2.5: The Role of Structural Factors in In₂O₃ Gas Response

*G. Koratcenkov, V. Brinzari, A. Cerneavski, M. Ivanov
Technical University of Moldova, Chisinau, Republic of Moldova*

*A. Cornet, J. Morante, A. Cabot, J. Arbiol
Universitat de Barcelona, Barcelona, Spain*

*V. Golovanov
Odessa National University, Odessa, Ukraine*

P2.6: Electrical Sensing Properties of Polypyrrol

*M. Campos
UNIP-Universidade Paulista, Ribeirão Preto, Brazil*

P2.7: Super-Low-Temperature Sintering of Semiconducting-BaTiO₃-Based PTCR Ceramics

*Z-G. Zhou, X-F. Tang, Z-L. Tang
Tsinghua University, Beijing, People's Republic of China*

P2.8: A Ray-Tracing Approach for Simulating Recognition Abilities of Active Infrared Sensor Arrays

*B. Iske, U. Rückert
University of Paderborn, Paderborn, Germany*

P2.9: Numerical Modeling of Sensing and Actuating Electromechanical Transducers

*R. Lerch
Universität Erlangen-Nürnberg Lehrstuhl für Sensorik,
Erlangen, Germany*

P2.10: Study on Dynamic Characteristic of the Silicon Micromachined Gyroscope with a Fence Structure

*X. Bin, L. Che, S. Fu, Y. Wang
Shanghai University of Microsystem and Information
Technology, Chinese Academy of Sciences, Shanghai,
People's Republic of China*

P2.11: Precise Calculation of Capacitances of Complex-Shaped Capacitive-Sensor Elements by the Method of Direct Field-Strength Determination

*G. M. Gorbova, M. M. Gorbov, G. C. M. Meijer
Delft University of Technology, Delft, The Netherlands*

P2.12: Investigation of SPR Technology Using Texas Instruments' Spreeta™ Sensor

*D. R. Sommers, D. D. Stubbs, W. D. Hunt
Georgia Institute of Technology, Atlanta, GA*

P2.13: Impedance Spectroscopic Study of MEMS Microphone

*S. B. Lee, P. V. Loeppert
Knowles Electronics, LLC, Itasca, IL*

P2.14: Compensation of Packaging Asymmetry in a 2-D Wind Sensor

*S. P. Matova, K. A. A. Makinwa, J. H. Huijsing
Delft University of Technology, Delft, The Netherlands*

P2.15: Understanding the Long-Term and Analyte Exposure Effects on Tin Oxide Thick-Film Sensors

*J. W. Allen, B. T. Marquis
Sensor Research & Development Corp., Orono, ME*

P2.16: Impact of Micro-Resonator Geometric Shape on Quality Factor Using Finite Elements with Dynamic Thermoelastic Coupling

*J. Gorman
MIT, Cambridge, MA, and Charles Stark Draper Laboratory,
Cambridge, MA*

*A. Duwel
Charles Stark Draper Laboratory, Cambridge, MA*

P2.17: CAD Modeling and Fabrication of Planar Thin-Film Airflow Sensors

*R. J. Adamec, P. Tanner, D. V. Thiel
Griffith University, Nathan, Queensland, Australia*

P2.18: Direct Calculation of Sensor Performance in a FEA Model

*R. Krondorfer, T. C. Lommasson
SensoNor asa..., Horten, Norway*

P2.19: Characterization and Modeling of Ge-Film Thermometers for Low-Temperature Measurements

*V. K. Dugaev
National Academy of Sciences of Ukraine, Chernovtsy,
Ukraine, and ISEL, Lisbon, Portugal*

*G. G. Ihas, C. McKenney
University of Florida, Gainesville, FL*

*V. F. Mitin
National Academy of Sciences of Ukraine, Chernovtsy,
Ukraine, and MicroSensor Ltd., Kiev, Ukraine*

*M. Vieira
ISEL, Lisbon, Portugal*

P2.20: Smart Adaptable Strain Gage Conditioner

*S. Poussier, H. Rabah, S. Weber
Laboratoire d'Instrumentation Electronique de Nancy,
Vandoeuvre les Nancy, France*

P2.21: Mechanical and Thermal Sensors, Sensor Materials, and Fabrication Methods (Micro and Nanosensors)

*F. W. Beil, R. H. Blick, A. Wixforth
Ludwig-Maximilians-Universität, München, Germany*

*D. Schuh, M. Bichler
Universität München, Garching, Germany*

P2.22: A New Analytical Model for Detectivity Prediction of Resistance Bolometers

*F. Kohl, A. Jachimowicz, F. Keplinger, R. Chabicovsky
Vienna University of Technology, Wien, Austria*

P2.23: Displacements and Rotations of Practical Vibrational Modes of Piezoelectric Bimorph Cantilever Beams

*A. Ballato, Y. Kim
U.S. Army CECOM, Fort Monmouth, NJ*

P2.24: Determination of the Sensitivity Behavior of an Acoustic and Thermal Flow Sensor by Electronic Characterization

*J. W. van Honschoten, T. S. J. Lammerink, G. J. M. Krijnen,
M. C. Elwenspoek
University of Twente, Enschede, The Netherlands*

*V. B. Svetovoy
Institute of Microelectronics, Yaroslavl, Russia*

P2.25: Withdrawn

P2.26: Withdrawn

P2.27: A Study in the Application of Multilayer Perceptrons to the Analysis of Sensor Systems Data

*M. Pardo, G. Sberveglieri
INFM and University of Brescia, Brescia, Italy*

ELECTROMAGNETIC PROPERTIES

P2.28: New Antenna Sensor for Temperature Control by Microwave Radiometry

*V. Thomy, L. Dubois, C. Vanoverschelde, J. P. Sozanski,
J. Pribetich
Université de Lille, Villeneuve d'Ascq, France*

P2.29: Application Fields of a Miniaturized Ion Mobility Spectrometer

*T. Horvath, S. Sielemann, M. Teepe
G.A.S. Gesellschaft für Analytische Sensorsysteme,
Dortmund, Germany*

*J. I. Baumbach
ISAS, Dortmund, Germany*

P2.30: Eddy Field Mitigation in a Distributed Magnetic Local Positioning System

*E. Prigge
Stanford University, Stanford, CA*

*J. How
MIT, Cambridge, MA*

PRESSURE

P2.31: Pressure Transducers with Frequency Output on the Base of Strain-Sensitive Unijunction Transistors

*G. G. Babichev, S. I. Kozlovskiy, V. A. Romanov,
N. N. Sharan
Institute of Semiconductor Physics, Ukraine Academy of
Sciences, Kiev, Ukraine*

ROBOTICS

P2.32: An Ultrasonic Obstacle Sensing System for Fire-Fighting Robot

F. Tong

Southeast University, Nanjing, Jiangsu, People's Republic of China

L. Xu

Xiamen University, Xiamen, People's Republic of China

D. Tong

Technical Center of Mingguang, Fire Fighting Equipment Factory of Anhui Province, Mingguang, People's Republic of China

P2.33: Local Discriminant Bases and Optimized Wavelet to Classify Ultrasonic Echoes: Application in Indoor Mobile Robotics

C. Barat

CNRS, Sophia-Antipolis, France

P2.34: Application of an Extended Kalman Filter to Multiple Low-Cost Navigation Sensors in Wheeled Mobile Robots

*I. A. R. Ashokaraj, P. Silson, A. Tsourdos
Cranfield University, Wiltshire, U.K.*

P2.35: Robot Soccer Using Analog VLSI Sensors

*V. Becanovic, A. Bredenfeld, P. G. Ploeger
Fraunhofer Institute for Autonomous Intelligent Systems,
Sankt Augustin, Germany*

P2.36: Controlling a Gas/Odor Plume-Tracking Robot Based on Transient Responses of Gas Sensors

*H. Ishida, G. Nakayama, T. Nakamoto, T. Moriizumi
Tokyo Institute of Technology, Tokyo, Japan*

P2.37: A Novel Ultrasonic Sensing System for Autonomous Mobile Systems

D. Bank

*Research Institute for Applied Knowledge Processing,
Ulm, Germany*

P2.38: Sensor Application for Automation

R. Tanner, S. Kumar

Western Michigan University, Kalamazoo, MI

P2.39: Design and Application of the Field-Bus-Based Intelligent Robot Plug-and-Play Sensing System

*J. Zhang, Y. Ge, X. Wang, G. Song, J. Jiang
University of Science and Technology, Hefei,
People's Republic of China, and Chinese Academy of
Sciences, Hefei, People's Republic of China*

P2.40: Sensor Fusion for Ultrasonic and Laser Arrays in Mobile Robotics: A Comparative Study of Fuzzy, Dempster, and Bayesian Approaches

*R. H. Nezhad, B. Moshiri
University of Tehran, Tehran, Iran*

*M. R. Asharif
University of Ryukyus, Okinawa, Japan*

AEROSPACE

P2.41: Satellite Attitude Acquisition Using Dual Star Sensors with a Bootstrap Filter

*S. Cho, J. Chun
Korea Institute of Science & Technology, Taejeon, Korea*

P2.42: Latest Development in Advanced Sensors at Kennedy Space Center

*J. M. Perotti, A. Eckhoff, T. Erdogan
Nasa-Kennedy Space Center, FL*

P2.43: Air Target Detection Using Synthetic-Aperture Bistatic Radar with Non-Cooperative GPS-Based Transmitter: Case Study

*B. Mojarrabi, J. Homer, K. Kubik
The University of Queensland, Brisbane, Australia*

P2.44: An Internet-Based Inverse-GPS System for Monitoring and Tracking Mobile Aquatic Sensors

*B. J. Howell, J. Frolik
Tennessee Technological University, Cookeville, TN*

P2.45: Effectively Simultaneous Temperature and Strain Measurement Utilizing a Dual-Grating Sensor Formed by Type IA and IIA FBGs

*X. Shu, Y. Liu, D. Zhao, B. Gwandu, F. Floreani, L. Zhang,
I. Bennion
Aston University, Birmingham, U.K.*

THERMAL

P2.46: Micro-Electro-Mechanical Digital-to-Analog Converter Based on a Novel Bimorph Thermal Actuator

*Q. Liu, Q-A. Huang
Southeast University, Nanjing, People's Republic of China*

NEW TRENDS IN METAL OXIDE SEMICONDUCTING GAS SENSORS

Friday, June 14 / 8:30–10:00 am / Ballroom II

Chair: *Giorgio Sberveglieri, University of Brescia, Italy*

- 44.1: *Invited Paper: Heteroepitaxy of Tungsten Oxide Films on Sapphire and Silicon for Chemiresistive Sensor Applications* (8:30)

*R. J. Lad
University of Maine, Orono, ME*

- 44.2: *Invited Paper: Mixed Nanostructured Oxides of Ti and VI-B-Group Elements for Gas Sensing* (9:00)

*V. Guidi, E. Comini, G. Faglia, M. Ferroni
Università di Ferrara, Ferrara, Italy*

- 44.3: *Invited Paper: New Materials and Technologies for Micromachined Metal Oxide Gas Microsensor Arrays* (9:30)

*J. Wöllenstein, H. Böttner
Fraunhofer Institute of Physical Measurement Techniques,
Freiburg, Germany*

*J. A. Plaza, C. Cané
Centro Nacional de Microelectrónica, Barcelona, Spain*

BREAK (10:00–10:30)

SENSOR SYSTEM INTERFACES ON A CHIP

Friday, June 14 / 8:30–10:00 am / Ballroom III

Chair: *Denise Wilson, University of Washington, USA*

- 45.1: *Just Add a Sensor: Integrating Analog and Digital Signal Conditioning in a Programmable System-on-Chip* (8:30)

*D. Seguire
Cypress Microsystems, Bothell, WA*

- 45.2: *Biologically Inspired Auditory-Sensing-System Interfaces on a Chip* (9:00)

*P. Hasler, P. D. Smith, R. Ellis, D. Graham, D. Anderson
Georgia Institute of Technology, Atlanta, GA*

- 45.3: *Optical Chemical-Sensor-System Interfaces on a Chip* (9:30)

*K. S. Booksh, D. M. Wilson, L. A. Obando, M. Warren
Arizona State University, Tempe, AZ*

BREAK (10:00–10:30)

PHOTONIC SENSORS: OPTICAL PROPERTIES I

Friday, June 14 / 8:30–10:00 am / Ballroom A

Chair: *Gerald Gerlach, Dresden University of Technology, Germany*

- 46.1: Detectivity of NTC Thin-Film Sensor (8:30)**
M. Lee, M. Yoo
Yeungnam University, Kyungsan, Korea
- 46.2: Biometric System Based on One Large-Area a-SiC:H P-I-N Photodiode (8:45)**
M. Vieira, M. Fernandes, A. Fantoni, P. Louro, R. Schwarz
ISEL, Lisbon, Portugal
- 46.3: Visible Optical Sensing of Ammonia-Based Polyaniline Film (9:00)**
Y-S. Lee, N-J. Choi, B-T. Kim, J-S. Huh, D-D. Lee
Kyungpook National University, Taegu, Korea
- 46.4: Optical-Fiber Sensor Using Tailored Porous Sol-Gel Fiber Core (9:15)**
S. Tao, C. B. Winstead, J. P. Singh, R. Jindal
Mississippi State University, Starkville, MS
- 46.5: Optically Powered VCSEL-Based Miniaturized E-Field Probe with High Sensitivity (9:30)**
W. Mann, K. Petermann
Technical University of Berlin, Berlin, Germany
- 46.6: Integrated Laser Doppler Velocimeter for Fluid-Velocity and Wall-Friction Measurements (9:45)**
P. Lemaître-Auger
LCIS-INPG, Valence, France
A. Cartellier
LEGI-INPG-UJF, St. Martin d'Herès, France
P. Benech, I. S. Duport
IMEP-LEMO-INPG, Grenoble, France

BREAK (10:00–10:30)

MATERIALS AND FABRICATION II

Friday, June 14 / 8:30–10:00 am / Ballroom D

Chair: *Remis Gaska, Sensor Electronic Technology, Inc., USA*

- 47.1: Fabrication Technology for Closely Coupled Microcoils with Integrated Flux Guidance and Their Application to Proximity and Magnetoelastic Force Sensors (8:30)**
V. Seidemann, S. Büttgenbach
Technical University of Braunschweig, Braunschweig, Germany
- 47.2: Single-Crystal-Silicon MEMS Fabrication Technology Using Proton-Implantation Smart-Cut Technique (8:45)**
J. Du, D. J. Young, W. H. Ko
Case Western Reserve University, Cleveland, OH
- 47.3: GaPO₄ Crystals for Sensor Applications (9:00)**
P. M. Worsch, P. W. Krempf, F. Krispel, C. Reiter, H. Thanner, W. Wallnöfer
AVL List GmbH, Graz, Austria
- 47.4: Investigation and Characterization of β -Ga₂O₃ Nano-Wire for Gas-Sensing Applications (9:15)**
M. Z. Atashbar
Western Michigan University, Kalamazoo, MI
M-F. Yu
Zyvex Corp., Richardson, TX
X. Chen
Institute of Physics and Center for Condensed Matter Physics, Chinese Academy of Sciences, Beijing, China
- 47.5: Fabrication of Poly-Germanium-Based Thermopiles on Plastic (9:30)**
M. Moradi, A. Moafi, S. Mohajerzadeh
University of Tehran, Tehran, Iran
- 47.6: Sensors for Harsh Environments by Direct-Write Thermal Spray (9:45)**
S. Sampath, J. Longtin, R. J. Gambino, S. Tankiewicz
State University of New York at Stony Brook, Stony Brook, NY
R. Greenlaw
Integrated Coating Solutions, Inc., Huntington Beach, CA

BREAK (10:00–10:30)

NANOMETRIC SENSING

Friday, June 14 / 8:30–10:00 am / Ballroom C

Co-Chairs:

Takahito Ono, Tohoku University, Japan

Masayoshi Esashi, Tohoku University, Japan

- 48.1: Invited Paper: Ultimate Sensing with an Ultrathin Single-Crystal-Silicon Resonator (8:30)**

T. Ono

Tohoku University, Sendai, Japan

- 48.2: Invited Paper: Micromachined Nano Devices: From MEMS to Electron Devices (9:00)**

H. Hashiguchi

Kagawa University, Japan, and Japan Science and Technology Corp., Tokyo, Japan

H. Fujita

University of Tokyo, Tokyo, Japan and Japan Science and Technology Corp., Tokyo, Japan

- 48.3: Analog Fiber-Optic Position Sensor with Nanometric Resolution (9:30)**

F. Lamarque, C. Prella

Université de Technologie de Compiègne, Compiègne, France

- 48.4: One-Micron-Precision Optically Aligned Method for Hot-Embossing and Nano-Imprinting (9:45)**

P. Lindner, C. Schaefer

EV Group, Schaerding, Austria

B. Wieder, R. Islam

EV Group U.S., Inc., Phoenix, AZ

BREAK (10:00–10:30)

SENSOR SYSTEMS AND NETWORKS II

Friday, June 14 / 8:30–10:00 am / Ballroom F

Chair: *Sukhan Lee, SAIT, Korea*

- 49.1: Fault-Tolerance Techniques for Sensor Networks (8:30)**

F. Koushanfar

University of California at Berkeley, Berkeley, CA

M. Potkonjak

University of California at Los Angeles, Los Angeles, CA

- 49.2: Signal Architecture for a Distributed Magnetic Local-Positioning System (8:45)**

E. Prigge

Stanford University, Stanford, CA

J. How

Massachusetts Institute of Technology, Cambridge, MA

- 49.3: Limitations of Emergent Wireless Sensor Networks: A Plea for Advancement in Core Technologies (9:00)**

N. Correal, M. R. Perkins

Motorola, Inc., Fort Lauderdale, FL

- 49.4: An Autonomous 16-mm³ Solar-Powered Node for Distributed Wireless Sensor Networks (9:15)**

B. Warneke, M. Scott, B. Leibowitz, L. Zhou, C. Bellew,

J. M. Kahn, B. E. Boser, K. S. J. Pister

University of California at Berkeley, Berkeley, CA

- 49.5: Ebus: A Sensor Bus Based on the SPI Serial Interface (9:30)**

H. S. Prasad

State University of New York at Buffalo, Amherst, NY

D. Wobschall

Esensors, Inc., Amherst, NY

- 49.6: Dynamic Link Labels for Energy-Efficient MAC Headers in Wireless Sensor Networks (9:45)**

G. Kulkarni, C. Schurgers, M. Srivastava

University of California at Los Angeles, Los Angeles, CA

BREAK (10:00–10:30)

LAB-ON-CHIP WITH INTEGRATED SENSOR ARRAYS I

Friday, June 14 / 10:30 am – 12:00 pm / Ballroom II

Chair: *Gerald Urban, IMTEK, Germany*

- 50.1: **Invited Paper: Microarrays for Protein and Nucleic Acid Analysis** (10:30)

*R. Ekins
University College London, London, U.K.*

- 50.2: **Invited Paper: Microfluidic Devices for Trapping and Manipulation of Biological Nano-Particles** (11:00)

*M. Dürr, J. Kentsch, M. Stelzle
Natural & Medical Sciences Institute, Reutlingen, Germany*

*G. Gradl, T. Schnelle
Evotec Analytical Systems GmbH, Hamburg, Germany*

*P. Geggier, M. Jäger
FhG IBMT, Berlin, Germany*

*A. Haage, A. Normann
Mediagnost GmbH, Reutlingen, Germany*

*R. Hagedorn, T. Müller
Humboldt Universität zu Berlin, Berlin, Germany*

*G. Fuhr
FhG IBMT, St. Ingbert, Germany*

- 50.3: **Frequency-Selective Sensor Arrays for Vibration Measurement** (11:30)

*D. Scheibner, J. Mehner, B. Brämer, T. Gessner,
W. Dötzel
Chemnitz University of Technology, Chemnitz,
Germany*

- 50.4: **Metabolomic Chips for Clinical Monitoring** (11:45)

*I. Moser, G. Jobst, G. Urban
University of Freiburg, Freiburg, Germany*

LUNCH (12:00–1:30)

CHEMICAL SENSOR INTERFACES AND SYSTEMS

Friday, June 14 / 10:30 am – 12:00 pm / Ballroom III

Chair: *Denise Wilson, University of Washington, USA*

- 51.1: **Invited Paper: New CMOS Gas Sensors and Devices** (10:30)

*J. W. Gardner
University of Warwick, Coventry, U.K.*

*F. Udrea
Cambridge University, Coventry, U.K.*

- 51.2: **Invited Paper: Vapor Detection, Classification, and Quantification Performance Using Arrays of Conducting Polymer-Composite Chemically Sensitive Resistors** (11:00)

*N. S. Lewis, S. Briglin, M. S. Freund, B. Sisk, E. Tillman
California Institute of Technology, Pasadena, CA*

- 51.3: **Invited Paper: ChemFET Arrays for Chemical-Sensing Microsystems** (11:30)

*B. J. Polk
Georgia Institute of Technology, Atlanta, GA*

LUNCH (12:00–1:30)

PHOTONIC SENSORS: OPTICAL PROPERTIES II

Friday, June 14 / 10:30 am – 12:00 pm / Ballroom A

Chair: *Pietro Siciliano, IME-CNR Lab, Italy*

- 52.1: A Wavelength Sensor Using an Optical Directional Coupler** (10:30)

*S. Somkuarnpanit, S. Jaturuntruengsri, S. Khoonthaweetep
King Mongkut's Institute of Technology, Bangkok, Thailand*

- 52.2: Novel Optical Distance Sensor Based on MSM Technology** (10:45)

*P. Gulden, D. Becker, M. Vossiek
Siemens AG, Munich, Germany*

- 52.3: Ultra-Stabilization of Temperature in APD Sensors by Means of a High-Frequency Switching Regulator** (11:00)

*M. A. Pérez, J. C. Campo, F. J. Ferrero, J. C. Antón
University of Oviedo, Gijón, Spain*

- 52.4: Accurate and Real-Time Doppler Frequency Estimation with Multiplicative Noise for Velocity Measurements Using Optical-Feedback Interferometry** (11:15)

*G. Plantier, A. Sourice
École Supérieure d'Électronique de l'Ouest (ESEO),
Angers, France*

*T. Bosch
ENSEEIH, France*

*N. Servagent
École des Mines de Nantes, France*

- 52.5: A Novel Silicon MIS Photodetector Using Molecular Semiconductor as Intermediate Oxide Layer** (11:30)

*A. Malik, J. L. Sosa, S. Alcántara
INAOE, Puebla, Mexico*

- 52.6: Tunable Mid-Infrared Receiving Sensors Made of $\text{In}_x\text{Ga}_{1-x}\text{As}/\text{Al}_y\text{Ga}_{1-y}\text{As}/\text{Al}_z\text{Ga}_{1-z}\text{As}$ Asymmetric Step Quantum-Well Structure** (11:45)

*W. G. Wu
Peking University, Beijing, China*

LUNCH (12:00–1:30)

MATERIALS AND FABRICATION III

Friday, June 14 / 10:30 am – 12:00 pm / Ballroom D

Chair: *Taesong Kim, KIST, Korea*

- 53.1: Thermally Activated Aging of Polysilicon** (10:30)

*M. Ehmann, P. Ruther, F. Schubert, O. Paul
University of Freiburg, Freiburg, Germany*

- 53.2: New Substrates for MOEMS** (10:45)

*M. Reiche
Max-Planck-Institut für Mikrostrukturphysik,
Halle, Germany*

*E. Hiller, D. Stolze
CIS Institut für Mikrosensorik GmbH, Erfurt, Germany*

- 53.3: Enhancement of the Low-Temperature Response of Thin-Film Gas Sensors by UV Irradiation** (11:00)

*E. Comini, L. Ottini, G. Faglia, G. Sberveglieri
Università di Brescia, Brescia, Italy*

- 53.4: Investigation of Different Passivation Technologies for Thin-Film Sensors on Ceramic Substrates** (11:15)

*U. Schmid, G. Krötz
EADS Deutschland GmbH, Munich, Germany*

- 53.5: Optical and Electrical Gas-Sensing Properties of $\text{In}_x\text{O}_y\text{N}_z$ Films** (11:30)

*M. Ando
National Institute of Advanced Industrial Science &
Technology (AIST), Osaka, Japan*

*H. Steffes
Technical University Berlin, Berlin, Germany*

*R. Chabicovsky, G. Stangl
Vienna University of Technology, Vienna, Austria*

*M. Haruta
Research Institute for Green Technology, AIST, Ibaraki,
Japan*

- 53.6: Simulation and Design of a Silicon Drag-Force Gas-Flow Sensor Based on the Piezoresistive Effect** (11:45)

*V. A. Kolchuzhin, A. V. Shaporin
Novosibirsk State Technical University, Novosibirsk, Russia*

LUNCH (12:00–1:30)

POSITION SENSORS III

Friday, June 14 / 10:30–12:00 am / Ballroom A
Chair: Star R. Huang, National Tsinghua University, Taiwan

- 54.1: A Novel Torsion Fiber Sensor Based on High-Birefringence Fiber Bragg Grating (10:30)**

Y-L. Lo, B-R. Chue
National Cheng Kung University, Taiwan, R.O.C.

- 54.2: Array of PZT Pyroelectric Thick-Film Sensors for Contactless Measurement of XY Position (10:45)**

V. Ferrari, A. Ghisla, D. Marioli, A. Taroni
Università di Brescia, Brescia, Italy

- 54.3: Geometrical and Physical Models of a 3-D Range Finder (11:00)**

C. Barat, J. Triboulet, E. College, F. Chavand, E. C. N'Zi
Université d'Evry Val d'Essonne, Evry, France

- 54.4: Low-Cost Magnetic Torque Sensor (11:15)**

H. Ruser, U. Tröltzsch, M. Horn, H.-R. Tränkler
University of Bundeswehr Munich, Neubiberg, Germany

- 54.5: A Gazing-Point-Distance Detection System for Accommodation Assisting Glasses (11:30)**

T. Fujita, S. Sato, M. Idesawa
University of California at Berkeley, Berkeley, CA

- 54.6: A New Two-Axis Magnetic Position Sensor (11:45)**

C. Schott, R. Racz, F. Betschart
SENTRON AG, Zug, Switzerland
R. S. Popovic
Swiss Federal Institute of Technology, Lausanne, Switzerland
LUNCH (12:00–1:30)

SENSOR SYSTEMS AND NETWORKS III

Friday, June 14 / 10:30 am – 12:00 pm / Ballroom F
Chair: Pedro Silva Girão, Lab Medidas Electricas, Portugal

- 55.1: Architecture, Feasibility Study, and a Prototype of a Vestibular Implant Using 3-Axes MEMS Gyroscopes (10:30)**

A. M. Shkel, J. Liu, F-G. Zeng
University of California at Irvine, Irvine, CA

- 55.2: An Internet and Microcontroller-Based Remote Operation Multi-Sensor System for Water-Quality Monitoring (10:45)**

O. Postolache, P. S. Girão, J. M. D. Pereira, H. G. Ramos
Laboratório de Medidas Eléctricas, Lisbon, Portugal

- 55.3: Remote Process Monitoring Using Optical-Fibre Sensors (11:00)**

B. Degamber, G. F. Fernando
Cranfield University, Swindon, U.K.

- 55.4: An Integrated Framework for Internet-Based Applications of Smart Sensors (11:15)**

M. Sveda, R. Vrba
Brno University of Technology, Brno, Czech Republic

- 55.5: A Low-Cost Internet-Enabled Smart Sensor (11:30)**

P. Ferrari, A. Flammini, D. Marioli, A. Taroni
Università di Brescia, Brescia, Italy

- 55.6: Enhanced Multiplexing Capacity of Low-Coherence Reflectometric Sensors Based on a Loop Topology (11:45)**

L. Yuan
Harbin Engineering University, Harbin, China
W. Jin, L. Zhou, Y. L. Hoo
Hong Kong Polytechnic University, Hong Kong, China
LUNCH (12:00–1:30)

SENSOR SYSTEMS AND NETWORKS III

Friday, June 14 / 1:30–3:00 pm / Ballroom II

Chair: *Gerald Urban, IMTEK, Germany*

- 56.1: **Invited Paper: Can MicroTAS Be Alternatives for Sensors?** (1:30)

*J. C. T. Eijkel, O. P. Naji, P. Monaghan, A. Manz
Imperial College, London, U.K.*

- 56.2: **Invited Paper: A Multi-Layer Plastic Packaging Technology for Miniaturized Bio Analysis Systems Containing Integrated Electrical and Mechanical Functionality** (2:00)

*A. Han, O. Wang, S. K. Mohanty, M. Graff, A. B. Frazier
Georgia Institute of Technology, Atlanta, GA*

- 56.3: **A Novel Fluidic Network System for Enzyme Batch Immobilization and Blood Sensing** (2:30)

*F. G. Tseng, K. H. Lin, C. C. Chieng
National Tsing Hua University, Taiwan, R.O.C.*

- 56.4: **Multifunctional Magnetofluidic Device: Ampermeter, Protection Relay, and Actuator** (2:45)

*C. D. Buioca, A. Stanci, V. Iusan
University of Petrosani, Petrosani, Romania*

*M. Buioca
High School Vulcan, Petrosani, Romania*

BREAK (3:00–3:30)

GAS SENSING I

Friday, June 14 / 1:30–3:00 pm / Ballroom III

Chair: *Ghenadi Korotcenkov, Technical University of Moldavia, Moldavia*

- 57.1: **Gas-Sensing Properties of Catalytically Modified WO₃ with Copper and Vanadium for NH₃ Detection** (1:30)

*I. Jiménez, A. Vilà, A. Cornet, J. R. Morante
University of Barcelona, Barcelona, Spain*

- 57.2: **Resistance Noise Spectroscopy of SnO Thick-Film Gas Sensors** (1:45)

*J. M. Parks, B. T. Marquis, G. P. Harmer
Sensor Research & Development Corp., Orono, ME*

- 57.3: **Metal Oxides for Gas Sensing with Field-Effect Devices** (2:00)

*I. Eisele, M. Burgmair
Universität der Bundeswehr München, Neubiberg, Germany*

- 57.4: **Gas Selective Barrier Organic Sensors** (2:15)

*V. Khivrych
Institute for Nuclear Research, National Academy of Sciences, Kiev, Ukraine*

*Ya. Vartsimakha, I. Veklych
Institute of Physics, National Academy of Sciences, Kiev, Ukraine*

- 57.5: **Low-Drift Air-Gap CMOS-FET Gas Sensor** (2:30)

*R. Paris, S. Pawel, R. Herzer, T. Doll
Ilmenau Technical University, Ilmenau, Germany*

*P. Kornetzky
IMMS GmbH, Ilmenau, Germany*

*G. Eranna, R. P. Gupta
CEERI, Pilany, India*

- 57.6: **Effects of Proton Implantation on Selectivity Enhancement of Sputter-Deposited Indium Tin Oxide Gas Sensors** (2:45)

*A. Salehi
K. N. T. University of Technology, Tehran, Iran*

BREAK (3:00–3:30)

PHOTONIC SENSORS: OPTICAL PROPERTIES III

Friday, June 14 / 1:30–3:00 pm / Ballroom A

Chair: *R. Salathe, EPFL, Switzerland*

- 58.1: A Multiplexed Point-Temperature Fiber Sensor Array Using the OTDR Technique and TDM Mechanism** (1:30)

*G. Hewa-Gamage
University of New South Wales, Sydney, Australia*

- 58.2: Geometry Measurements Using Self-Mixing Interference in a Semiconductor Laser** (1:45)

*T. Bosch
ENSEEIH, Toulouse, France*

*S. Donati
University of Pavia, Pavia, Italy*

*N. Servagent
École des Mines de Nantes, Nantes, France*

- 58.3: Novel FTO/SRO/Silicon Optical Sensors: Characterization and Applications** (2:00)

*A. Malik, M. Aceves, S. Alcántara
INAOE, Puebla, Mexico*

- 58.4: Photosensors Based on Transient Processes in MIS Structures with a Leak Insulator** (2:15)

*A. Malik, A. Kosarev
INAOE, Puebla, Mexico*

- 58.5: Practical Diffraction-Limited Angle-Sensitive Detectors** (2:30)

*A. García-Valenzuela, G. E. Sandoval-Romero
Universidad Nacional Autónoma de México,
Universitaria, México*

- 58.6: Development and Investigation of Narrow-Band Luminescent Coatings for Ultraviolet Optical-Fiber Sensors** (2:45)

*M. McSherry, C. Fitzpatrick, E. Lewis
University of Limerick, Limerick, Ireland*

BREAK (3:00–3:30)

MAGNETIC SENSING II

Friday, June 14 / 1:30–3:00 pm / Ballroom D

Chair: *Kofi Makinwa, Delft University of Technology, Delft, The Netherlands*

- 59.1: Miniaturized Inductive Sensors for Industrial Applications** (1:30)

*M. Jagiella, S. Fericean
Balluff GmbH, Neuhausen, Germany*

- 59.2: Current Sensor in PCB Technology** (1:45)

*P. Ripka
Czech Technical University, Czech Republic*

*M. Duffy, W. G. Hurley
National University of Ireland, Galway, Ireland*

*S. O'Reilly
National Microelectronic Research Center, Cork, Ireland*

- 59.3: Horizontal Hall-Effect Sensor with High Maximum Absolute Sensitivity** (2:00)

*J-B. Kammerer, L. Hebrard, V. Frick, P. Poure, F. Braun
Laboratoire d'Electronique et de Physique des Systèmes
Instrumentaux, Strasbourg, France*

- 59.4: Electro-Magneto-Mechanical Sensors Based on Parametric Oscillation Circuits** (2:15)

*E. Ejiogu, T. Kawabata, Y. Tanno
Ritsumeikan University, Shiga, Japan*

- 59.5: Epitaxial Iron Garnet Film as an Active Medium of the Fluxgate Transducer** (2:30)

*S. B. Ubizskii, Lviv Polytechnic National University,
Lviv, Ukraine, and R&D Institute for Materials,
Scientific Research Company, Lviv, Ukraine*

*P. M. Vetoshko
Institute of Radioengineering and Electronics,
Academy of Sciences of Russia, Moscow, Russia*

*M. V. Valeiko, P. I. Nikitin
General Physics Institute, Academy of Sciences
of Russia, Moscow, Russia*

- 59.6: Radiation-Resistant Magnetic Sensor Material** (2:45)

*A. Ya. Karpenko, V. I. Khivrych, G. A. Vikhliy
Institute for Nuclear Research, National Academy
of Sciences, Kiev, Ukraine*

*I. Ya. Kulynyak
Drogobych Pedagogical University, Ukraine*

LUNCH (3:00–3:30)

ELECTROMECHANICAL BEHAVIOR OF MEMS SENSORS AND ACTUATORS

Friday, June 14 / 1:30–3:50 pm / Ballroom C

Chair: *Fuqian Yang, University of Kentucky, USA*

60.1: Invited Paper: Optical Applications with SOI-Based MEM Technology (1:30)

N. Jia, J. Kubby, P. Gulvin, J. Diehl, L. Herko, J. Chen, P. Nystrom, K. Feinberg, J. Ma, K. German
Xerox Corp., Webster, NY

B. Scharf, A. Zosel
Microscan Systems, Inc., Renton, WA

D. Kharas, N. De Lanerolle, A. Seck, R. Mali, T. Pumo, C. Nichols
Standard MEMS, Inc., Hauppauge, NY

M. Rosa, D. DeBruyker, E. Peters
Xerox Palo Alto Research Center, Palo Alto, CA

J. Gilbert, T. Korsmeyer, A. Morris, T. Plowman, V. Rabinovich, B. Stoll
Coventor Technologies, Cary, NC

60.2: Invited Paper: Analysis of Flow Rate through Rectangular Orifices of MEMS Valves with Experimental Results (2:00)

Y. Li, G. Wang, Y-H. Su, I. Kao
SUNY at Stony Brook, Stony Brook, NY

60.3: Invited Paper: Electrostatic MEMS Actuator: Fundamental Studies of the Actuator and Failure Mechanism (2:30)

N. Jia, J. Kubby, J. Diehl, P. Nystrom, P. Gulvin, K. Feinberg, J. Kuang, J. Chen
Xerox Corp., Webster, NY

BREAK (3:00–3:30)

PRESSURE SENSORS I

Friday, June 14 / 1:30–3:00 pm / Ballroom F

Chair: *Chiang Lu, University of Illinois at Urbana-Champaign, USA*

61.1: Micro-Torque Measurement Based on the Cable-Brake Principle (1:30)

W. Brenner, A. Vujanic, G. Popovic
Vienna University of Technology, Vienna, Austria

O. Del Medico
INOCON Technologie, Voecklabruck, Austria

61.2: Self-Energized Wireless Pressure Sensor Using Energy Extraction from Injection-Mold Pressure Differential (1:45)

C. Theurer, L. Zhang, R. Gao, D. Kazmer
University of Massachusetts, Amherst, MA

61.3: Sapphire-Based Capacitive Pressure Sensor for High-Temperature and Harsh-Environment Applications (2:00)

M. Soeda, T. Kataoka, Y. Ishikura, S. Kimura, T. Masuda, Y. Yoshikawa, M. Nagata
Yamatake Corp., Kanagawa, Japan

61.4: A Study on the Development of a Thin-Film Pressure Sensor (2:15)

Y. Mihara, T. Someya
Musashi Institute of Technology, Tokyo, Japan

61.5: A Micromachined Self-Resonant-Frequency Modulated Passive Pressure Transducer (2:30)

A. Baldi, W. Choi, B. Ziaie
University of Minnesota, Minneapolis, MN

61.6: Pressure Sensor Based on Distributed Temperature Sensing (2:45)

J. J. Van Baar, R. J. Wiegerink, J. W. Berenschot, T. S. J. Lammerick, G. J. M. Krijnen, M. Elwenspoek
University of Twente, Enschede, Netherlands

BREAK (3:00–3:30)

APPLICATIONS: BIOMEDICAL

Friday, June 14 / 3:30–5:00 pm / Ballroom II

Chair: *Shanhong Xia, Chinese Academy of Sciences, China*

- 62.1: A Novel System for Measuring Optical Properties in the Arterial Blood of Man** (3:30)
A. Castaneda-Miranda
Instituto de Fisica, U.N.A.M., Mexico
- 62.2: A Biomedical Smart Sensor for the Visually Impaired** (3:45)
L. Schwiebert, G. Auner, S. Gupta, P. Siy, R. Iezzi, G. Abrams
Wayne State University, Detroit, MI
- 62.3: Microcomputer-Based Acceleration Sensor Device for Sports Biomechanics Stroke Evaluation by Using Swimmer's Wrist Acceleration** (4:00)
Y. Ohgi
Keio University, Kanagawa, Japan
- 62.4: Non-Invasive and Unrestrained Monitoring of the Human Respiratory System by Sensorized Environment** (4:15)
Y. Nishida, T. Hori
Digital Human Laboratory, National Institute of Advanced Industrial Science and Technology, Tokyo, Japan
- 62.5: Miniature Fiber-Optic Pressure Sensor for Medical Applications** (4:30)
E. Cibula, D. Donlagic
University of Maribor, Maribor, Slovenia
- 62.6: Wireless Level-Sensing Restaurant Glassware** (4:45)
P. Dietz, W. S. Yerazunis, D. Leigh
Mitsubishi Electric Research Laboratories, Cambridge, MA

GAS SENSING II

Friday, June 14 / 3:30–5:00 pm / Ballroom III

Chair: *Jaco Visser, Ford Research Laboratory, USA*

- 63.1: Low-Cost High-Performance Gas Analytical Gradient Microarrays for Intelligent Consumer Products** (3:30)
C. Arnold, W. Andlauer, D. Haeringer, R. Koerber, J. Goschnick
Institut für Instrumentelle Analytik, Karlsruhe, Germany
- 63.2: Enhanced Catalytic Activity of Ultra-Thin CuO Islands on SnO₂ Films for Fast-Response H₂S Gas Sensors** (3:45)
A. Chowdhuri, V. Gupta, K. Sreenivas
University of Delhi, Delhi, India
- 63.3: Study of Gas Sensor Based on Adsorption Heat Measurement Using Y-Cut Quartz-Crystal Microbalance** (4:00)
A. Saitoh, Y. Asari, T. Nomura
Shibaura Institute of Technology, Tokyo, Japan
- 63.4: Contribution of the Gate Insulator to Work-Function Measurements with a Gas-Sensor FET** (4:15)
M. Burgmair, I. Eisele
Universität der Bundeswehr München, Neubiberg, Germany
- 63.5: Characteristics and Gas-Sensing Properties of Mechanochemically Processed Iron-Doped SnO₂ Nanoparticles** (4:30)
L. Cukrov, P. G. McCormick
The University of Western Australia, Crawley, Australia
K. Galatsis
RMIT University, Melbourne, Australia
- 63.6: H₂S-sensing Characteristics of SnO₂-Based Composite Film Gate MIS Diodes** (4:45)
X. He, J. Li, X. Gao, L. Wang
Institute of Electronics, Chinese Academy of Science, Beijing, People's Republic of China

MATERIALS AND FABRICATION IV

Friday, June 14 / 3:30–5:00 pm / Ballroom A

Chair: *Yuelin Wang, Shanghai Institute of Metallurgy, China*

- 64.1: Surface-Effect Humidity Sensors Based on Alumina and Porous Silicon Materials, Electrical Parameters, Sensitivity, and Internal Noises** (3:30)
D. K. An, L. H. Mai, N. T. Ha, N. T. Kien, N. T. Binh
Institute of Materials, National Center for Natural Science and Technology, Hanoi, Vietnam
- 64.2: Humidity-Sensing Properties of Organic-Inorganic (AMPS/SiO₂) Hybrid Materials** (3:45)
W-H. Tao
Chinese Cultural University, Taipei, Taiwan
L-Y. Sung
ITRI/Energy and Resource Laboratories, Hsinchu, Taiwan, R.O.C.
C-C. Hung
Chung-Tuan Christian University, Chungli, Taiwan, R.O.C.
C-L. Hsu
Yuanpei Institute of Science and Technology, Hsinchu, Taiwan, R.O.C.
- 64.3: Nanostructured TiO₂ Thin Films Prepared by Supersonic Beams and Their Application in a Sensor Array for the Discrimination of VOC** (4:00)
T. Toccoli, A. Boschetti, L. Guerini, S. Iannotta
Sezione Istituto Fotonica e Nanotecnologie, Trento, Italy
S. Capone, A. Taurino, P. Siciliano
IME-CNR Sezione IMM, Lecce, Italy
- 64.4: A Microfabrication Strategy for Cylindrical-Ion-Trap Mass-Spectrometer Arrays** (4:15)
H. Peddanenikalva, S. Bhansali, R. T. Short, D. P. Fries
University of South Florida, Tampa, FL
- 64.5: Plasma-Sprayed Thick-Film Anisotropic-Magneto-resistive (AMR) Sensors** (4:30)
R. Gambino, M. M. Raja, S. Sampath
The State University of New York, Stony Brook, NY
R. Greenlaw
Integrated Coating Solutions, Inc., Huntington Beach, CA
- 64.6: Microfabricated Liquid-Core Waveguides for Microanalysis Systems** (4:45)
R. Manor, A. Datta, A. Dhar, M. Holtz, J. Berg,
S. Gangopadhyay, P. Dasgupta, H. Temkin,
V. Veeraraaghavan, R. Vijayaraghavan, T. Dallas
Texas Tech University, Lubbock, TX

MAGNETIC SENSING III

Friday, June 14 / 3:30–5:00 pm / Ballroom D

Chair: *Z. Y. Zhou, Tsinghua University, China*

- 65.1: Comparison of Surface H-Field Measurements Using Hall Sensors and a Novel Multiple Sense Coil Approach** (3:30)
O. Hovorka, G. Lloyd, M. L. Wang
University of Illinois at Chicago, Chicago, IL
- 65.2: Application of a GMR Line Sensor for Non-Destructive Testing** (3:45)
Y. Kataoka, H. Wakiwaka
Shinshu University, Nagano, Japan
O. Shinoura
TDK Corp., Chiba, Japan
- 65.3: Magnetic Sensors with Poly-Si TFTs** (4:00)
E. Carvou, F. Le Bihan, R. Rogel, O. Bonnaud
Université Rennes, Rennes, France
- 65.4: Experimental Evaluation of Differential Thermal Errors in Magnetoelastic Stress Sensors** (4:15)
G. Lloyd, V. Singh, M. L. Wang
University of Illinois at Chicago, Chicago, IL
- 65.5: Developments in a Family of Integrated CMOS Magnetic Sensor/Actuators for Two-Phase Brushless dc Motor Control** (4:30)
P. Riendeau, M. White
Melexis, Inc., Concord, NH
V. Hiligsmann
Melexis, Inc., Tessenderlo, Belgium
- 65.6: Development of Large-Area Iron Garnet Indicator Layers for Magneto-Optic Visualization** (4:45)
I. M. Syvorotka, P. S. Kostyuk
R&D Institute for Materials, Lviv, Ukraine
S. B. Ubizskii
R&D Institute for Materials, Lviv, Ukraine, and Lviv Polytechnic National University, Lviv, Ukraine

ELECTROMECHANICAL SYSTEMS

Friday, June 14 / 3:30–5:00 pm / Ballroom C

Chair: *Pritpal Singh, University of Villanova, USA*

- 66.1: *Invited Paper: Pressure Belt: An Integrated Multisensor System* (3:30)

*M. H. Tanielian, N. P. Kim
Boeing Phantom Works, Seattle, WA*

- 66.2: *Invited Paper: Microsystems Based on Surface Micromachined Mechanisms* (4:00)

*A. Oliver, F. J. Peter
Sandia National Laboratories, Albuquerque, NM*

- 66.3: *Invited Paper: Development of a Fuzzy-Logic-Managed Microscopic Battery* (4:30)

*R. LaFollette
Bipolar Technologies, Provo, UT*

*P. Singh
Villanova University, Philadelphia, PA*

*J. Broadhead
U.S. Nanocorp.*

PRESSURE SENSORS II

Friday, June 14 / 3:30–5:00 pm / Ballroom F

Chair: *Thomas Papakostas, Tekscan Inc., USA*

- 67.1: *A Highly Sensitive Fabry-Perot Shear-Stress Sensor Employing Flexible Membrane and Double SU-8 Structures* (3:30)

*F-G. Tseng, C. J. Lin
National Tsing Hua University, Taiwan, R.O.C.*

- 67.2: *Development of Six-Degree-of-Freedom Micro-Force Sensor for Applications in Geophysics* (3:45)

*D. V. Dao, J. C. Wells, S. Sugiyama
Ritsumeikan University, Shiga, Japan*

*T. Toriyama
New Energy and Industrial Technology Development Organization, Japan*

- 67.3: *A New Pressure Sensor Measured by Heat Transfer* (4:00)

*H. Ohji, N. Yutani, M. Taruya, A. Koshimizu,
S. Kodama, K. Tsutsumi
Mitsubishi Electric Corp., Hyogo, Japan*

- 67.4: *Development of an Optical Force Sensor Usable in fMRI Environments* (4:15)

*S. Sasaki, M. Tada, T. Ogasawara
Nara Institute of Science and Technology, Nara, Japan*

- 67.5: *Combined Effect of the Membrane Flatness Defect and Real Dimension Gauges on the Sensitivity of a Silicon Piezoresistive Pressure Sensor* (4:30)

*Z. Dibi
Université de Batna, Batna, Algeria*

*A. Boukabache, P. Pons
LAAS-CNRS, Toulouse, France*

- 67.6: *SiN Beam Resonant Pressure Sensors with a Novel Structure* (4:45)

*D. Chen, D. Cui, L. Wang
Institute of Electronics, Chinese Academy of Sciences,
Beijing, People's Republic of China*

IEEE SENSORS 2002 EXHIBITORS

Florida Hall West

Tuesday: 7:00 am – 9:00 pm
Wednesday: 9:00 am – 5:00 pm
Thursday: 9:00 am – 5:00 pm
Friday: 9:00 am – 12:00 pm

EV Group, Inc.

HID Corp.,

IEEE

Koheras A/S

NASA–Kennedy Space Center

Naval Research Laboratory

Ocean Optics

Sawyer Research

Sentron AG

VNIISIMS

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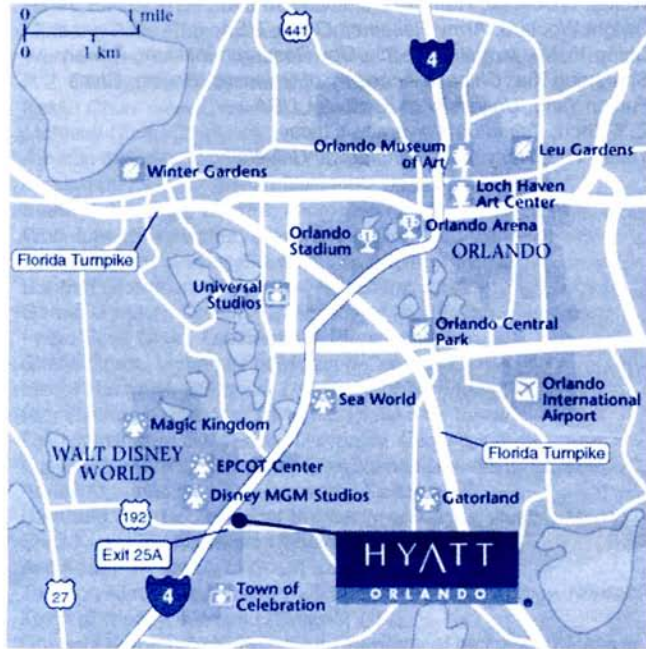
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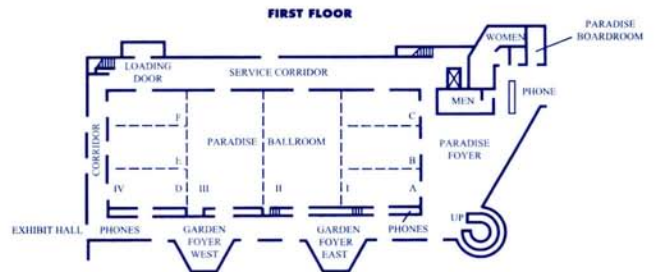
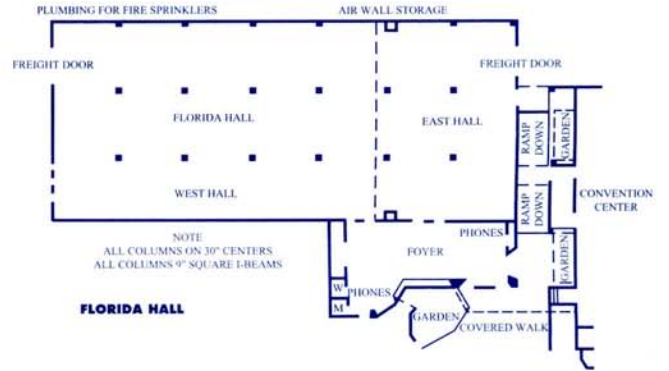
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MAP OF ORLANDO



MAPS OF THE HYATT ORLANDO



NOTES
