

Welcome to the 8th International OPTO Conference in Nürnberg!



For the 8th OPTO conference the Organising Committee has decidedly set the focus on optical measuring technologies, adding the subtitle "Photonic Metrology" for the 2008 and the following events. This is to conform the spectrum of the concurrent SENSOR+TEST fair, giving best benefit for the attendance of both the conference and the exhibiton.

OPTO 2008 is dedicated to novel optical and optoelectronic methods and their applications in measurement. Photonics, considered to be one of the key technologies of the future, has gathered interest in the formerly OPTO Conferences and Exhibitions since the first event in 1994. OPTO 2008 is again to strengthen the position of European R&D in optics, optoelectronics, and optical metrology. There is continuous growth in the fields of optical measurement, processing, and communication techniques because industrial conditions require in many cases non-tactile, fast, and interference-free methods. The OPTO conference offers researchers, developers, producers, and suppliers of optoelectronic methods and equipment excellent opportunities for information, communication, and exchange. It is the place to establish contacts with suppliers of services as well as with prospective business partners.

Nürnberg, founded in 1050, has a long tradition in science, technology, and art and is the second largest city in Bavaria. In 1492 Martin Behaim designed the first globe; Peter Henlein invented the first pocket watch at the turn of the 16th century. With Hans Sachs and Hans Rosenplüt, the poetry of the Meistersingers reached its peak. Works of art of highest European level were created by the wood carver Veit Stoß, the sculptor Adam Kraft, and the painter Albrecht Dürer. In 1835 the first German train drove from Nürnberg to Fürth. Reduced to rubble in 1945, the rebuilding programme of the town took a long time. Today one finds patrician homes, impressive churches, the imperial castle, and a five kilometer wall encircling the old town.

We hope to meet you at the OPTO 2008 – Photonic Metrology in Nürnberg!

Prof. Dr. Elmar Wagner
Chairman of the OPTO Conference Committee

Welcome to the 10th International IRS² Conference in Nürnberg, the world's sensor capital!



On behalf of the Programme Committee and the organiser, I would like to most cordially welcome you to the IRS² 2008, the International Infrared Sensor and Systems Conference. Since 1998 IRS² Conference is being held together with OPTO, the Conference covering optical and optoelectronic methods and their applications, thus connecting the visible and the infrared range of light. Like the two previous conferences, this one will again take place in Nürnberg, the global sensor capital. SENSOR+TEST exhibition is the world's largest sensor fair and thus serves as an optimal environment for IRS² and OPTO.

This year sees a jubilee in Infrared Sensors & Systems Conference history. It is already the 10th event in a series founded by Professor Ludwig Walther in 1985. Prof. Walther counts as the father of infrared sensor technology in the former East Germany. Based on his accomplishments, three enterprises in the field of infrared sensor technology have been founded by his alumni since the early 1990s (DIAS Infrared GmbH, InfraTec GmbH, Heimann Sensor GmbH). This year's conference will again give evidence of Ludwig Walther's impact to science and technology by the presentations of these above-mentioned companies showing results of their astonishing story of success.

When I took over the chairmanship of the Programme Committee of IRS² in 1997, I was really impressed by the spirit of the infrared community to communicate, to collaborate and to exchange ideas and results. I felt that this is a long-lasting basis for a conference looking towards the present and future developments of infrared sensors and systems and their corresponding applications.

Since its beginning it has been always the goal of this meeting to bring developers, manufactures and users of infrared components and systems as well as scientists and engineers together to discuss current results and future trends. I am sure that this conference again will be a connecting link between research, development and application as well as between universities, research institutions and industry.

A successful conference cannot live just by its own and its environment. Therefore, our recognition and gratitude goes to all authors, contributors and exhibitors who provide the substance without which a conference could not exist.

We are looking forward to an exciting and inspiring OPTO/IRS² Conference and would be glad to see you in Nürnberg.

Prof. Dr. Gerald Gerlach
Chairman of the IRS² Conference Committee

Tuesday, 6 May 2008

OPTO & IRS² Plenary Talk

Chair: G. Gerlach, Technische Universität Dresden (Germany)
E. Wagner, Fraunhofer Institute for Physical Measurement
Techniques IPM, Freiburg (Germany)

10:00 **Welcome**

ÜV1 10:15 **Fusion of Optical Sensor Information**

H. Vogel, Carl Zeiss Optronics GmbH,
Oberkochen (Germany)

ÜV2 10:45 **Terahertz – an Additional Spectral Range for Measuring and Testing**

R. Beigang, Fraunhofer Institute for Physical
Measurement Techniques IPM c/o TU Kaiserslautern,
Freiburg (Germany)

11:15 *Coffee Break*

1 Sources and Modules

Chair: J. Czarske, Technische Universität Dresden (Germany)

1.1 11:40 **Externally Stabilized DFB-Lasers for High Resolution CW THz Spectroscopy**

T. Göbel, D. Schönherr, C. Sydlo, M. Feiginov,
P. Meissner, H. L. Hartnagel, Technische Universität
Darmstadt; A. Roggenbuck, A. Deninger, TOPTICA
Photonics AG (Germany)

1.2 12:00 **Quantum Cascade Lasers for Sensing Applications**

J. Koeth, M. Fischer, M. Legge, J. Seufert, R. Werner,
nanoplus Nanosystems and Technologies GmbH,
Gerbrunn (Germany)

1.3 12:20 **Design of a Micro-Integrated Optical MEMS for Camera Applications**

S. Leelavanichkul, Ronnie Boutte, Ian Harvey,
F. Solzbacher, University of Utah, Salt Lake City (USA)

1.4 12:40 **Adaptive PDMS Membrane Lens**

F. Schneider, C. Müller, U. Wallrabe,
Albert-Ludwigs-Universität Freiburg – IMTEK;
D. Eberhard, D. Strohmeier, Fraunhofer Institute for
Physical Measurement Techniques IPM, Freiburg (Germany)

13:00 *Lunch Break*

Tuesday, 6 May 2008

OPTO & IRS² Plenary Talk (Room St. Petersburg)

Chair: G. Gerlach, Technische Universität Dresden (Germany)
E. Wagner, Fraunhofer Institute for Physical Measurement
Techniques IPM, Freiburg (Germany)

10:00 **Welcome**

ÜV1 10:15 **Fusion of Optical Sensor Information**

H. Vogel, Carl Zeiss Optronics GmbH,
Oberkochen (Germany)

ÜV2 10:45 **Terahertz – an Additional Spectral Range for Measuring and Testing**

R. Beigang, Fraunhofer Institute for Physical
Measurement Techniques IPM c/o TU Kaiserslautern,
Freiburg (Germany)

11:15 *Coffee Break*

1 Applications I

Chair: J. Hollandt, PTB Physikalisch-Technische Bundesanstalt, Berlin
(Germany)

1.1 11:40 **Spatially Registered Infrared Imaging for Metrological Thermography**

M. Brandner, T. Thurner, Technical University Graz (Austria)

1.2 12:00 **Active Thermography with Uncooled Infrared Cameras**

B. Köhler, L. Haupt, Fraunhofer-Institut für Zerstörung-
freie Prüfverfahren, Dresden; G. Hofmann, DIAS Infrared
GmbH, Dresden; T. Werner, Werner Industrielle Elektro-
nik, Kreischa; S. Brunner, HTS GmbH, Coswig (Germany)

1.3 12:20 **Investigation of Ultrasonic Heating by Infrared Imaging and Finite Element Simulation**

L. Bahr, M. Kaltenbacher, R. Lerch, Friedrich-Alexander-
Universität Erlangen (Germany)

1.4 12:40 **Using Thermography in Classification of Plants in Greenhouses**

J. Fly Hansen, University of Southern Denmark,
Odense M, (Denmark)

13:00 *Lunch Break*

2 Fibre Optic Sensing

Chair: R. Willsch, IPHT Institute of Photonic Technology, Jena (Germany)

- 2.1** 14:00 **Sapphire Fiber Fabry-Perot Interferometer for the Measurement of High Temperatures**
D. Fischer, W. Ecke, I. Latka, Institute of Photonic Technology (IPHT), Jena; T. Bosselmann, Siemens AG, Erlangen (Germany)
- 2.2** 14:20 **Roundness Measurements of Boreholes with Small Diameters Using a Fiber-Optic Sensor**
N. König, R. Schmitt, F. Depiereux, Fraunhofer Institute for Production Technology IPT, Aachen (Germany)
- 2.3** 14:40 **Intercomparison of Optical FBG-based Strain Sensors and Resistive Strain Gauges**
J. Roths, P. Kratzer, University of Applied Sciences München (Germany)
- 2.4** 15:00 **Ring and Sagnac Loop Based Fiber Optic Resonators: Applications in High Sensitivity Active Sensing**
A. J. Das, H. K. Gahir, B. B. Padhy, Defence Institute of Advanced Technology, Pune, (Indien)
- 15:20 *End*

16:00 Job Tea-Time

Lockeres Zusammentreffen von Bewerbern und Firmen zum Gedankenaustausch - mit Tee, Kaffee und Gebäck.
(Halle 9, Stand 345)

16:30 SENSOR+TEST 2008
Opening and Presentation of the SENSOR Innovation Award 2008
(Room Shanghai)

2 Applications II

Chair: R. Riesenberger, IPHT Institute of Photonic Technology, Jena (Germany)

- 2.1** 14:00 **High-Accuracy Thermodynamic Temperature Measurements with Near-Infrared Filter Radiometers**
N. Noukhov, D. Taubert, P. Meindl, J. Hollandt, Physikalisch-Technische Bundesanstalt, Berlin (Germany)
- 2.2** 14:20 **Self-Organizing Maps as a Clustering Algorithm to Evaluate Multi-Spectral Data in Industrial Applications**
S. Böhmer, H. Budzier, V. Krause, G. Gerlach, Technische Universität Dresden (Germany)
- 2.3** 14:40 **Selective Gas Detection Using Laser-Based Photoacoustics**
M. Wolff, H.G. Groninga, Ch. Wetzel, PAS-Tech GmbH, Zarrentin (Germany)
- 2.4** 15:00 **Infrared Emitters for Spectroscopic Applications**
B. C. Elias, Cal-Sensors, Santa Rosa (USA)
- 15:20 *End*

16:00 Job Tea-Time

Lockeres Zusammentreffen von Bewerbern und Firmen zum Gedankenaustausch - mit Tee, Kaffee und Gebäck.
(Halle 9, Stand 345)

16:30 SENSOR+TEST 2008 Opening and Presentation of the SENSOR Innovation Award 2008
(Room Shanghai)

Wednesday, 7 May 2008

OPTO & IRS² Plenary Talk

Chair: G. Gerlach, Technische Universität Dresden (Germany)
E. Wagner, Fraunhofer Institute for Physical Measurement
Techniques IPM, Freiburg (Germany)

Üv3 09:00 **Photonic Crystals**
G. von Freymann, University Karlsruhe (Germany)

09:30 *Break*

3 Measurement Technologies

Chair: J. Haus, Helmut Hund GmbH, Wetzlar (Germany)

3.1 09:40 **Estimation of the Degree of Polarization from a Single Image: Characterization of the Precision under Various Coherent Imaging Conditions**
J. Fade, M. Roche, P. Réfrégier, Fresnel Institute, Marseille Cedex (France)

3.2 10:00 **Fundamental Measurement Uncertainty Limits of Doppler Global Velocimetry with Laser Frequency Modulation**
A. Fischer, L. Büttner, J. Czarske, Technische Universität Dresden; M. Eggert, H. Müller, Physikalisch-Technische Bundesanstalt Braunschweig, (Germany)

3.3 10:20 **Planar Microchip Platform for Sensors Based on Fabry-Perot Interference**
M. Will, O. Brodersen, A. Steinke, CiS Institute for Micro Sensors GmbH, Erfurt (Germany)

3.4 10:40 **Material Characterization of Sheet Metal at Elevated Temperatures Using Optical Technologies**
W. Hußnätter, M. Grüner, M. Merklein, University Erlangen-Nürnberg, Erlangen (Germany)

11:00 *Coffee Break*

Wednesday, 7 May 2008

OPTO & IRS² Plenary Talk (Room St. Peterburg)

Chair: G. Gerlach, Technische Universität Dresden (Germany)
E. Wagner, Fraunhofer Institute for Physical Measurement
Techniques IPM, Freiburg (Germany)

Üv3 09:00 **Photonic Crystals**
G. von Freymann, University Karlsruhe (Germany)

09:30 *Break*

3 Sensors and Arrays I

Chair: J. Schieferdecker, Heimann Sensor GmbH, Dresden (Germany)

3.1 09:40 **Uncooled Amorphous Silicon 1024 x 768 Array with 17 µm Pixel-Pitch for IR High Resolution Imaging**
J.-L. Tissot, M. Vilain, O. Legras, P. Robert, C. Minassian, B. Fieque, ULIS, Veurey-Voroize; J.J. Yon, CEA - DRT LETI, Grenoble Cedex (France)

3.2 10:00 **Thermopile Sensor Arrays with Internal Amplifiers and Digital Out**
B. Forg, W. Leneke, J. Schieferdecker, M. Schulze, M. Simon, K. Storck, Heimann Sensor GmbH, Eltville and Dresden (Germany)

3.3 10:20 **Four Channel Infrared Detector with Quadro Thermopile Chip for Gas Analysis Measurements**
T. Eick, O. Sausemuth, St. Biermann, MICRO-HYBRID Electronic GmbH, Hermsdorf (Germany)

3.4 10:40 **Uncooled Amorphous Silicon TEC-less 1/4 VGA IRFPA with 25 µm Pixel-Pitch for Low-End Applications**
J.-L. Tissot, M. Vilain, O. Legras, S. Tinnes, C. Minassian, B. Fieque, J.M. Chiappa, A. Touvignon, ULIS, Veurey Voroize (France)

11:00 *Coffee Break*

OPTO Poster Presentation 11:20-12:20

Chair: E. Wagner, Fraunhofer Institute for Physical Measurement Techniques IPM, Freiburg (Germany)

OPTO Poster Session: 13:00 – 14:30

P1 Infrared Reflective Interrupter for Sealing Function Detection
M. Schreiner, Freudenberg GmbH & Co. KG, Weinheim (Germany)

P2 Modelling and Simulation of Driver Assistance Systems
L. Muche, J. Becker, P. Schneider, Fraunhofer Institute for Integrated Circuits IIS, Dresden (Germany)

P3 Applications of Metamaterials in Optical Waveguide Isolators
R. J. El-Khozondar, Al-Aqsa University, Gaza;
H. J. El-Khozondar, Islamic University of Gaza (Palestina);
M. M. Shabat, Max Planck Institute for the Physics of Complex Systems, Dresden, (Germany)

P4 Interference Measurement of Rough Surface Reliefs
O. V. Angelsky, A. P. Maksimyak, P. P. Maksimyak,
Chernivtsy State University, Chernivtsy (Ukraine)

P5 RGB - LED - Sensor
V. Lange, F. Ribeiro, D. Kühlke, Furtwangen University, Furtwangen;
W. Tews, LITEC-LLL GmbH, Greifswald (Germany)

P6 A New Optical Enzyme Sensor for the Detection of Pesticides
W. Fichtner, M. Berthold, H. Kaden, Kurt-Schwabe-Institut für Mess- und Sensortechnik e.V. Meinsberg, Ziegra-Knobelsdorf;
D. Enke, K. Hobritz, F. Janowski, University Halle-Wittenberg, Halle, (Germany)

P7 Fluorescence Microscopy made easy: Routine Fluorescence Analysis with an LED Incident-Light Illuminator
J. Haus, W. Müller, Helmut Hund GmbH, Wetzlar (Germany)

P8 Optical Inspection of Wide-Gap Semiconductors
I. A. Sokolov, M. Bryushinin, A.F. Ioffe Physical-Technical Institute, St. Petersburg (Russia)

P9 Grating-Coupling of Thermal Radiation as an Essential Element of a Fully Integrated IR-Absorption Sensor System
J. Kasberger, Integrated Microsystems Austria, Wiener Neustadt;
B. Jakoby, Johannes Kepler University Linz (Austria)

P10 A Novel Integrated Optical Scanning Filter for Interrogation of Fiber Bragg Grating Sensors
A. Shamray, A.S. Kozlov, I.V. Ilichev, M.P. Petrov, A.F. Ioffe Physical-Technical Institute, St. Petersburg (Russia)

IRS² Poster Presentation 11:20-12:20

Chair: G. Gerlach, Technische Universität Dresden (Germany)

IRS² Poster Session: 13:00 – 14:30

P1 The Metrology Light Source of the PTB - a Source of IR- and THz-Radiation
A. Hoehl, R. Müller, R. Klein, G. Ulm, Physikalisch-Technische Bundesanstalt, Berlin; M. Abo-Bakr, K. Bürkmann-Gehrlein, J. Feikes, J. Rahn, M. v. Hartrott, G. Wüstefeld, BESSY GmbH, Berlin (Germany)

P2 Determination of the Spectral Responsivity of THz-Detectors with Blackbody Radiation
B. Gutschwager, C. Monte, J. Hollandt, Physikalisch-Technische Bundesanstalt, Berlin; H. Delsim-Hashemi, O. Grimm, DESY, Hamburg, (Germany)

P3 Characteristics of Optically Controlled Fillets on the Base of HTSC
V. V. Buniatyan, A.G. Hakobyan, State Engineering University of Armenian, Yerevan; V.M. Aroutiounian, Yerevan State University (Armenia)

P4 Miniaturized and Simplified ATR MIR Sensor System for Online Measuring and Monitoring of Inorganic Molecules in Liquids
M. Ewen, A. Braun, G. Falk, R. Clasen, Universität des Saarlandes, Saarbrücken (Germany)

P5 Second Generation FSO for Communication Systems
J. Mikolajczyk, Z. Bielecki, M. Nowakowski, J. Wojtas, Military University of Technology, Warsaw (Polen)

P6 The Application of Artificial Neural Network for Calculation of Heat Power Consumption, Using Infrared System
S. Dudzik, W. A. Minkina, University of Technology Czestochowa, Czestochowa (Polen)

- P11** **Optical Inspection of Micro-Electromechanical Systems**
P. M. Karavaev, I.A. Sokolov, A.F. Ioffe Physical-Technical Institute, St. Petersburg; E.N. Pyatishev, Innovation and Investment Center, St. Petersburg (Russia); S.H. Khan, K.T.V. Grattan, City University, London (Great Britain)
- P13** **True Color Management for Lighting Systems**
E. Hailer, F. Krumbein, MAZet GmbH, Jena (Germany)
- P14** **Smart Optical Sensors for Position and Motion Control**
H.-F. Buehner, Delight Union Ltd., Eichenau; J. Schoerner, University München, (Germany)
- P15** **Reflective Optical Sensor for Scattered Light with Integrated Micro-Optic**
R. Müller, O. Brodersen, CiS Institute for Micro Sensors GmbH, Erfurt; E. Förster, P. Schreiber, Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena (Germany)



4 Applications

Chair: M. Kucejda, Schmidt & Haensch GmbH & Co., Berlin (Germany)

- 4.1** 14:30 **Optical and Other Types of Biosensors in the System of Feed Back Control of Water Purification Process**
N. F. Starodub, A.V. Palladin's Institute of Biochemistry of National Akademy of Sciences of Ukraine, Kiev; N. A. Klimenko, National Academy of Sciences of Ukraine, Kiev (Ukraine)
- 4.2** 14:50 **Medical Textiles for Monitoring of Respiratory Movements by POF Sensors**
J. Witt, M. Schukar, K. Krebber, Bundesanstalt für Materialforschung, Berlin (Germany)
- 4.3** 15:10 **Signal Processing System in Portable NO₂ Optoelectronic Sensor**
Z. Bielecki, J. Wojtas, J. Mikołajczyk, M. Nowakowski, Military University of Technology, Warsaw (Poland)
- 4.4** 15:30 **Lens-less Imaging of Pollen Grains**
C. Graulig, R. Riesenberg, M. Kanka, IPHT Institute of Photonic Technology, Jena (Germany)
- 15:50 *Closing Remarks*
- 16:00 *End of Conference*

4 Sensors and Arrays II

Chair: M. Tacke, Forschungsinstitut für Optronik und Mustererkennung - FGAN-FOM, Ettlingen (Germany)

- 4.1** 14:30 **Analytical Electrothermal Modeling of Microbolometer Infrared Sensors**
U. Dillner, Institute of Photonic Technology, Jena (Germany)
- 4.2** 14:50 **Conductive Polymer Compounds as Microbolometer Material**
A. Nocke, M. Wolf, H. Budzier, G. Gerlach, K.-F. Arndt, Technische Universität Dresden (Germany)
- 4.3** 15:10 **How to Reduce the Microphonic Effect in Pyroelectric Detectors?**
N. Neumann, H. Sänze, Infratec GmbH, Dresden (Germany)
- 4.4** 15:30 **Acceleration Sensitivity of Pyroelectric Single-Element Detectors Based on Lithium Tantalate**
V. Norkus, G. Gerlach, D. Shvedov, Th. Schwarz, Technische Universität Dresden; R. Köhler, DIAS Infrared GmbH, Dresden (Germany)
- 4.5** 15:50 **Mid-Infrared Quantum Cascade Detectors for Thermal Imaging and Environmental Sensors**
D. Hofstetter, F. R. Giorgetta, M. Fischer, M. Graf, University of Neuchatel (Schweiz)
- 16:10 *Closing Remarks*
- 16:20 *End of Conference*