

10th International Conference on Optical Technologies for Sensing and Measurement 2011

(OPTO 2011)

Held at Sensor+Test Conferences 2011

**Nürnberg, Germany
7-9 June 2011**

ISBN: 978-1-61839-602-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2011) by AMA Service GmbH
All rights reserved.

Printed by Curran Associates, Inc. (2012)

For permission requests, please contact AMA Service GmbH
at the address below.

AMA Service GmbH
Von-Münchhausen-Straße 49
31515 Wunstorf
Germany

Phone: +49(0)5033-9639-0
Fax: +49(0)5033-1056

info@sensorfairs.de

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

SENSOR+TEST Conferences 2011: Plenary Talks

Chairs:

G. Gerlach, Technische Universität Dresden
R. Lerch, Universität Erlangen-Nürnberg, Erlangen
E. Wagner, Fraunhofer Institut für Physikalische Messtechnik IPM, Freiburg
R. Werthschützky, Technische Universität Darmstadt (Germany)

Fundamental Constants and the New System of Units (SI)	
E. Göbel, President of Physikalisch-Technische Bundesanstalt, Braunschweig (Germany)	
From Analog to Digital Holography – What is the Benefit?	
W. Osten, Universität Stuttgart (Germany)	
NIRSpec – an IR spectrometer for the James Webb Space Telescope	8
W. Holota, Holota Optics, Bad Tölz (Germany); M. te Plate, ESTEC (Netherlands)	
Sensors for Adaptronic Applications	
Th. Bein, D. Mayer, Fraunhofer-Institut -LBF-, Darmstadt, H. Hanselka, Technische Universität Darmstadt (Germany)	
Better, Faster, More Efficient - How Innovations in Medical Technologies Improve Healthcare	
E. R. Reinhardt, Siemens AG, Erlangen (Germany)	

OPTO Conference

1 Components for Sensing and Detection

Chair: R. Willsch, Institut für Photonische Technologien, Jena (Germany)

1.1 SensMiLi: Optical Absolute Position-Encoder by Single-Track, Q-ary Pseudo-Random-Sequences for Miniature Linear Motors	16
D. Wibbing, J. Binder, Festo AG & Co. KG, Esslingen; W. Schinköthe, IKFF, Stuttgart Universität; Ch. Pauly, C. Gachot, F. Mücklich, Universität des Saarlandes (Germany)	
1.2 Position Encoding and Phase Control of Resonant 2D-MOEMS-Mirrors	22
A. Tortschanoff, A. Frank, M. Lenzenhofer, A. Kenda, Carinthian Tech Research AG, Villach (Austria); M. Wildenhain, T. Sandner, Fraunhofer Institute for Photonic Microsystems, Dresden (Germany)	
1.3 Fibre-Bragg-Gratings in Highly Birefringent Optical Fibres for Advanced FBG Sensing Applications	27
F. Jülich, J. Roths, Munich University of Applied Sciences, München; A. W. Koch, Technische Universität München (Germany)	
1.4 Technologies for Fast Blue and IR PIN Diodes	33
D. Sommer, Konrad Bach, X-FAB Semiconductors Foundry AG, Erfurt (Germany)	

Index

2 3D and Calibration

Chair: W. Osten, Universität Stuttgart (Germany)

- 2.1 **Multi-Wavelength Digital Holography for 3D-Shape-Measurements on Rough Surfaces** 39
M. Fratz, D. Carl, H. Höfler, Fraunhofer Institute for Physical Measurement Techniques (IPM), Freiburg;
D. Skoczowski, A. Heuer, Universität Potsdam (Germany)
- 2.2 **Robust and Miniaturized Non-Incremental Fiber-Optic Distance Sensor for Turbo Machine Rotor Deformation and Vibration Monitoring** 42
F. Dreier, T. Pfister, J. Czarske, Technische Universität Dresden (Germany)
- 2.3 **Ultrafast Surface Inspection System Based on Image Processing with Cellular Neural Networks (CNN)** 48
A. Blug, V. Jetter, P. Strohm, D. Carl, H. Höfler, Fraunhofer Institute for Physical Measurement Techniques IPM, Freiburg (Germany)
- 2.4 **Tunable Laser-Based Calibration and Characterisation of Radiometric Detectors for SI-Traceable Measurements** 54
M. Schuster, A. Sperling, S. Nevas, Physikalisch-Technische Bundesanstalt (PTB), Braunschweig (Germany)
- 2.5 **Controlling Laser Material Processing with Real-Time Algorithms on Cellular Neural Networks** 60
P. Strohm, A. Blug, D. Carl, H. Höfler, Fraunhofer Institute for Physical Measurement Techniques -IPM-, Freiburg (Germany), O. Krause, M. Panzner, Fraunhofer Institut -IWS-, Dresden (Germany)

3 Measuring technologies

Chair: F. Puente León, Karlsruher Institut für Technologie -KIT- (Germany)

- 3.1 **Self-Calibrating Doppler Global Velocimeter with Laser Frequency Modulation** 66
J. Czarske, A. Fischer, F. Sell, L. Büttner, Technische Universität Dresden (Germany)
- 3.2 **A Method to Enhance the Accuracy of Time of Flight Measurement Systems** 72
J. Papadoudis, A. Georgiadis, Leuphana Universität Lüneburg, C. Koch, Fachhochschule Emden/Leer;
St. Klein, Inosens GmbH, Dahlenburg (Germany)
- 3.3 **New Form of Cavity Enhanced Absorption Spectroscopy**
Ch. Petermann, P. Fischer, Fraunhofer Institute for Physical Measurement Techniques IPM, Freiburg (Germany)
- 3.4 **Local Analysis of Honed Surface in Microscopic Images** 79
L. Wang, F. Puente León, Universität Karlsruhe (Germany)

4 Applications

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

- 4.1 **Sensitive Determination of Layer Thickness by Waveguide Terahertz Time-Domain Spectroscopy** 85
M. Theuer, D. Grischkowsky, Oklahoma State University, Stillwater, (USA); R. Beigang, Fraunhofer Institute -IPM-, Kaiserslautern (Germany)
- 4.2 **Novel Optical Titration Sensor Based on Integrated Planar Polymer Waveguides** 89
F. Betschon, M. Halter, vario-opticsag; M. Michler, J. Kremmel, University of Applied Sciences Buchs (NTB);
B. Christensen, P. Schraner, Metrohm AG, Herisau (Switzerland)
- 4.3 **Heterodyne "Weak Measurements" of Nanorod Beam Deflections** 95
M. Pfeifer, P. Fischer, Fraunhofer Institute -IPM-, Freiburg (Germany)
- 4.4 **Optical Biosensor Based on the Dependent Expression of Fluorescent Proteins** 100
J. Kothe, A. Schröter, G. Gerlach, K. Zarschler, G. Rödel, D. Wersing, M. Mkandawire,
W. Pompe, Technische Universität Dresden (Germany)

OPTO Poster Session

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

P1	Combined ESPI and Digital Speckle Correlation Techniques for 3D Displacement	106
Field Measurement		
O. Sakharuk, L. I. Muravsky, A. B. Kmet, T. I. Voronyak, O. P. Maksymenko, Karpenko Physico-Mechanical, Lviv (Ukraine)		
P2	New Method for Determination of Surface Distribution of Elastic Properties by Surface Acoustic Waves	111
O. Mokryy, V. Koshevyy, Lviv Polytechnic National University (Ukraine)		
P3	Detection of Optical Signal in the Multispectral Optoelectronic Sensor Employing Cavity Enhanced Absorption Spectroscopy	117
R. Medrzycki, J. Wojtas, Military University of Technology, Warsaw (Poland)		
P4	Interferometric Heat-Load Sensing of High Power Solid Laser Medium	123
M. Baumgart, C. Glassl, A. Tortschanoff, G. Kroupa, CTR Carinthian Tech Research AG, Villach, (Austria)		
P5	Optical Immune Biosensors Based on the Nanostructured Silicon and Intended for the Diagnostics of Retroviral Bovine Leucosis	127
N. F. Starodub, J. A. Sitnik, National University of Life and Environmental Sciences, Kyiv; M. M. Mel'nichenko, Taras Shevchenko Kiev National University, Kyiv; O.M. Shmyryeva, National Technical University, Kyiv (Ukraine)		
P6	Complex of Optical Biosensors for Control of Total State of Vegetables and Estimation of their Loading by Viruses	133
V. O. Romanov, I. P. Galelyuka, V. M. Glushkov Institute of Cybernetics of National Academy of Sciences, Kyiv; N. F. Starodub, R. V. Son'ko, V. O., National University of Life and Environmental Sciences, Kyiv (Ukraine)		
P7	Optical Immune Biosensor Based on SPR for the Detection of <i>Salmonella Typhimurium</i>	139
N. F. Starodub, J. A. Ogorodnijchuk, National University of Life and Environmental Sciences, Kyiv; V. O. Romanov, V. M. Glushkov Institute of Cybernetics of National Academy of Sciences, Kyiv (Ukraine)		
P8	Low Cost, Autonomous and Wireless Enabled Liquid Level Sensor Based on a Multi-Segmented Polymer Optical Fiber	145
D. Dimas, S. Katsikas, Prisma Electronics S. A, Athens; C. Riziotis, The National Hellenic Research Foundation, Athens; A. C. Boucouvalas, University of Peloponnese, Tripoli (Greece)		
P9	Sampling Procedure for Optical Measurements in Wire Cloth Production	151
W. Hinrichs, Materialprüfanstalt (MPA) für das Bauwesen, Braunschweig (Germany)		
P10	Analog Driver for Synchronized Resonant and Quasistatic MOEMS Mirrors	155
M. Lenzenhofer, A. Frank, A. Kenda, A. Tortschanoff, Carinthian Tech Research AG, Villach (Austria); T. Sandner, Fraunhofer Institute for Photonic Microsystems, Dresden (Germany)		
P11	Polarization and Spectral Filter Arrays Based on Sub-Wavelength Structures in CMOS	161
St. Junger, W. Tscheikalinskij, N. Verwaal, N. Weber, Fraunhofer Institute for Integrated Circuits -IIS-, Erlangen (Germany)		
P12	Optical-Based Low-Cost Reference System for the Indoor Navigation	166
M. Haid, Ch. Schüller, E. Günes, Th. Chobtrong, Hochschule Darmstadt (Germany)		
Key Words		170