

PROCEEDINGS OF SPIE

Fundamental Problems of Optoelectronics and Microelectronics III

**Yuri N. Kulchin
Jinping Ou
Oleg B. Vitrik
Zhi Zhou**
Editors

**12–14 September 2006
Harbin, China**

Sponsored by
SPIE Russia Chapter
Russian Foundation for Basic Research

Published by
SPIE—The International Society for Optical Engineering

Volume 6595
Part One of Two Parts



The International Society
for Optical Engineering

Proceedings of SPIE—The International Society for Optical Engineering, 9780819467270, v. 6595

SPIE is an international technical society dedicated to advancing engineering and scientific applications of optical, photonic, imaging, electronic, and optoelectronic technologies.

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Fundamental Problems of Optoelectronics and Microelectronics III*, edited by Yuri N. Kulchin, Jinping Ou, Oleg B. Vitrik, Zhi Zhou, Proceedings of SPIE Vol. 6595 (SPIE, Bellingham, WA, 2007) Article CID Number.

ISSN 0277-786X
ISBN 9780819467270

Published by
SPIE—The International Society for Optical Engineering
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone 1 360/676-3290 (Pacific Time) • Fax 1 360/647-1445
<http://www.spie.org>

Copyright © 2007, The Society of Photo-Optical Instrumentation Engineers

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at <http://www.copyright.com>. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/07/\$18.00.

Printed in the United States of America.

Contents

xvii	Conference Committees
xix	Introduction

Part One

KEYNOTE PAPERS

- 659502 **Quantum electronics 50th jubilee (Keynote Paper)** [6595-95]
O. N. Krokhin, P.N. Lebedev Physical Institute (Russia)
- 659503 **Optic fiber Bragg grating based sensing technologies and their applications in structural health monitoring (Keynote Paper)** [6595-164]
J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China);
Z. Zhou, Harbin Institute of Technology (China)

SESSION 1 INTERACTION OF LASER RADIATION WITH MATTER AND NONLINEAR OPTICS

- 659504 **Influence of energy-transfer up-conversion on diode-end-pumped Q-switched Tm,Ho:YLF lasers** [6595-01]
X. Zhang, Harbin Engineering Univ. (China) and Harbin Institute of Technology (China);
J. Cui, L. Li, S. Yu, Harbin Engineering Univ. (China); Y. Ju, Y. Wang, Harbin Institute of Technology (China)
- 659505 **Evaluation and testing of semiconductor laser reliability in optic system** [6595-02]
W. Tang, X. Fan, H. Sun, Harbin Institute of Technology (China)
- 659506 **Temporal characteristics of output pulses in Brillouin fiber-optical ring laser** [6595-03]
Y. Lü, X. Chong, L. He, Harbin Engineering Univ. (China) and Harbin Institute of Science and Technology (China)
-

Pagination: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication.

SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages.

- 659507 **Theoretical study of transient thermal nonlinear refraction induced by nonlinear optical absorption** [6595-04]
W. Jiao, X. Zhang, Y. Wang, Y. Song, Harbin Institute of Technology (China)
- 659508 **Third-order nonlinear optical properties and optical limiting property of metallonaphthalocyanine** [6595-05]
C. He, Heilongjiang Univ. (China) and Harbin Institute of Technology (China); W. Duan, Y. Wu, Heilongjiang Univ. (China); Y. Wang, X. Zhang, Y. Song, Harbin Institute of Technology (China)
- 659509 **Nonlinear errors of passive homodyne polarized laser interferometer** [6595-06]
J. Yang, B. Wu, Z. Liu, L. Yuan, Harbin Engineering Univ. (China)
- 65950A **Interaction of partially coherent laser radiation with matter** [6595-07]
A. N. Starodub, S. I. Fedotov, A. A. Kozhevnikova, B. V. Kruglov, S. V. Mal'kova, M. V. Osipov, V. N. Puzyrev, A. T. Sahakyan, B. L. Vasin, O. F. Yakushev, P.N. Lebedev Physical Institute (Russia)
- 65950B **Resonator-enhanced low-power all-optical switch with a nonlinear ratio-variable coupler** [6595-08]
L. Li, Harbin Engineering Univ. (China) and Harbin Institute of Technology (China); J. Li, Harbin Institute of Technology (China); X. Zhang, Harbin Engineering Univ. (China); L. Chen, Harbin Institute of Technology (China)
- 65950C **Large aperture nonlinear elements from KDP and DKDP crystals: making and using** [6595-09]
A. A. Babin, Institute of Applied Physics (Russia)
- 65950D **Realizing all-optical full-adder logic operation with photorefractive crystal phase conjugation** [6595-10]
X. Fan, College of Second Aviation (China); G. Lv, Z. Jiang, H. Wang, Y. Yu, Heilongjiang Univ. (China)
- 65950E **Conoscopic methods of optic crystal research** [6595-96]
A. V. Syuy, V. I. Stroganov, V. V. Krishtop, Far Eastern State Transport Univ. (Russia); V. V. Lihtin, Komsomolsk-on-Amur State Technical Univ. (Russia)
- 65950F **Distribution of light pulses from several oscillations in an untuned nonlinear medium** [6595-148]
M. I. Voitjk, G. V. Kostina, A. I. Livashvili, Far Eastern State Transport Univ. (Russia)
- 65950G **Experimental and theoretical research of propagation of the double-circle laser beam in Kerr-medium** [6595-97]
C. Shen, F. Chen, China Jiliang Univ. (China); B. Yin, R. Miao, Shanxi Normal Univ. (China)
- 65950H **Optimization of discharge circuit of the TEA CO₂ laser with two discharge channels** [6595-149]
X. Y. Hu, L. Zhang, D. Ren, Y. Qu, W. Zhao, B. Song, Harbin Institute of Technology (China)
- 65950I **A novel all-fiber self-organization coherent erbium-doped fiber laser** [6595-98]
X. J. Jia, F. N. Liu, S. G. Fu, J. Zhang, Y. G. Liu, Z. C. Guo, S. Z. Yuan, G. Y. Kai, X. Y. Dong, Institute of Modern Optics, Nankai Univ. (China)

- 65950J **Analytical descriptions of damage threshold of dielectric materials irradiated by femtosecond pulses** [6595-99]
G. Zhao, Q. Hao, W. Qi, J. Chen, J. Zhang, Sichuan Univ. (China)
- 65950K **Thermal behavior of thin metal films irradiated by ultra-short pulse laser** [6595-100]
Q. Hao, G. Zhao, W. Qi, Sichuan Univ. (China)
- 65950L **An improvement on the 4f coherent imaging system for measuring the nonlinear refraction** [6595-150]
Y. Li, X. Zhang, Harbin Institute of Technology (China); Y. Wang, Suzhou Univ. (China); Y. Song, Harbin Institute of Technology (China)
- 65950M **Laser generation and reception of acoustic ultrasonic waves in solids** [6595-151]
V. I. Arkhipov, P. V. Bazylev, V. A. Lugovoy, Dalstandart, RSRI (Russia)
- 65950N **Hologram image storage in the methyl-red doped nematic liquid crystal films** [6595-101]
K. Gu, H. Gao, D. Gong, Z. Zhou, Harbin Institute of Technology (China)
- 65950O **Influence of the Mollow triplet on the spectrum of the scattered radiation by a multiatom system** [6595-152]
B. B. Averbukh, Tihooceansky State Univ. (Russia)

SESSION 2 MICROELECTRONIC AND NANOELECTRONIC STRUCTURES FOR OPTOELECTRONICS

- 65950P **Effect of In ions on photorefractive properties in Fe:In:LiNbO₃ crystals** [6595-11]
T. Zhang, T. Geng, W.-M. Sun, Harbin Engineering Univ. (China)
- 65950Q **Transmission characteristic of photonic crystals coupler** [6595-12]
C. Guan, D. Xie, L. Yuan, Harbin Engineering Univ. (China)
- 65950R **Experimental study on femtosecond laser micromaching of grooves in spring steel** [6595-13]
L. Qi, X. Wu, Y. Wang, Harbin Institute of Technology (China)
- 65950S **Formation of azimuthally and radially polarized Bessel light beams in one-dimensional photonic crystals having photorefractive properties** [6595-14]
S. Kurilkina, V. Belyi, N. Kazak, Institute of Physics (Belarus); S. Shandarov, Tomsk State Univ. of Control Systems and Radioelectronics (Russia); P. Ropot, Institute of Physics (Belarus)
- 65950T **Nanosecond reverse saturable absorption in metal cluster *cis*-Cp*₂Mo₂S₄Cu₂I₂[(CH₂Cl)₂] solution** [6595-15]
J. Yang, J. Gu, Suzhou Univ. (China); G. Shi, Y. Li, Harbin Institute of Technology (China); Y. Song, Z. Ren, J. Lang, Suzhou Univ. (China)
- 65950U **Study on trap states in polyvinylcarbazole by thermally stimulated current spectrum** [6595-16]
L. He, X. Wang, W. Zhang, X. Wang, Harbin Univ. of Science and Technology (China)
- 65950V **Temperature influence on all-optical poling of glasses** [6595-17]
V. A. Smirnov, L. I. Vostrikova, I. A. Ishimov, Institute of Semiconductor Physics (Russia)

- 65950W **Study on holographic image storage and reconstruction in azo-dye-doped liquid-crystal films** [6595-18]
H. Gao, Z. Zhou, Harbin Institute of Technology (China)
- 65950X **New self-developed holographic media-dichromated gelatin with isopropanol** [6595-19]
A. N. Malov, A. V. Neupokoeva, Irkutsk Higher Military Aviation Engineer School (Russia)
- 65950Y **Temperature dependences of optical absorption and its light-induced changes in sillenite crystals** [6595-20]
S. M. Shandarov, L. E. Polyakova, A. E. Mandel, M. G. Kisteneva, J. Vidal, Tomsk State Univ. of Control Systems and Radioelectronics (Russia); Yu. F. Kargin, A. V. Egorysheva, N.S. Kurnakov Institute of General and Inorganic Chemistry (Russia)
- 65950Z **The influence of forms and sizes of heterogeneous systems on the band bending in AgBr-AgI** [6595-21]
A. V. Khaneft, A. S. Poplavnoi, B. A. Sechkarev, L. V. Sotnikova, Kemerovo State Univ. (Russia)
- 659510 **A new type of dynamic infrared image modulator based on the MEMS technique** [6595-22]
F. Sun, C. Li, Harbin Institute of Technology (China); W. Jiang, S. Zhang, D. Wu, Y. Shi, Heilongjiang Bada Universal Semiconductor Inc. (China)
- 659511 **Electro-mechanical properties of carbon black filled EP/PI conductive films** [6595-23]
X. Ji, H. Li, J. Ou, Harbin Institute of Technology (China)
- 659512 **Atomic motion in the thermal field of dissipative matter near the surface of material** [6595-102]
B. B. Averbukh, I. B. Averbukh, Tihooceansky State Univ. (Russia)
- 659513 **Microring resonator-coupled Mach-Zehnder interferometer as trigger pulse generator, optical differentiator, and integrator** [6595-103]
L. Li, Harbin Engineering Univ. (China) and Harbin Institute of Technology (China); X. Zhang, P. Sun, Harbin Engineering Univ. (China); L. Chen, Harbin Institute of Technology (China)
- 659514 **Influence of composition ratio on the nonlinear optical properties of $\text{AgGa}_{1-x}\text{In}_x\text{Se}_2$ and $\text{Hg}_{1-x}\text{Cd}_x\text{Ga}_2\text{S}_4$** [6595-104]
G. Ji, T. Shen, J. Huang, B. Zhao, Harbin Univ. of Science and Technology (China); Yu. M. Andreev, Institute for Monitoring of Climatic and Ecological Systems (Russia); V. V. Atuchin, Institute of Semiconductor Physics (Russia); G. Lanskiy, Institute for Monitoring of Climatic and Ecological Systems (Russia)
- 659515 **Waveguiding in air with left-handed material** [6595-105]
D. Xie, C. Guan, L. Yuan, Harbin Engineering Univ. (China)
- 659516 **Optical limiting properties and nonlinearity of a novel cubane-like shaped Mo/S/Cu cluster polymer** [6595-106]
J. Xu, N. Liu, J. Fang, Y. Song, J. Lang, J. Yang, Z. Ren, Suzhou Univ. (China)
- 659517 **Pulse LDA-pumped passively Q-switched mode locked Nd:YVO₄ laser with a GaAs saturable absorber** [6595-153]
X. Liu, R. Fu, Institute of Modern Optics, Nankai Univ. (China)

- 659518 **Research of photoprocesses in compositions of the polymer-semiconductor** [6595-154]
D. S. Shtarev, I. Ju. Prosanov, Far Eastern State Univ. of Means of Communication (Russia);
A. A. Tsiganenko, St. Petersburg State Univ. (Russia)
- 659519 **Highly birefringent index-guiding photonic crystal fibers with two big circular holes in elliptical-air-hole cladding** [6595-107]
Y. Yue, G. Kai, Z. Wang, L. Jin, T. Sun, Y. Lu, C. Zhang, Y. Li, J. Liu, Y. Liu, S. Yuan, X. Dong,
Institute of Modern Optics, Nankai Univ. (China)
- 65951A **Polarization characteristics of the large-mode-area fiber amplifier applied in coherent combination** [6595-108]
Z. Guo, Institute of Modern Optics, Nankai Univ. (China) and Inner Mongolia Normal Univ. (China); S. Fu, Y. Liu, X. Jia, L. Si, Y. Jin, S. Yuan, X. Dong, Institute of Modern Optics, Nankai Univ. (China)
- 65951B **Goos-Hänchen shift in anisotropic left-handed materials** [6595-109]
Y. Jiang, Y. Zhang, Y. Fu, C. Hou, Z. Zhou, X. Sun, Harbin Institute of Technology (China)
- 65951C **Cumulative UV-monitoring using chemically modified ZnO or TiO₂ layers** [6595-110]
I. Prosanov, Far Eastern Transport Univ. (Russia); P. Bogdanoff, S. Fiechter, H. Tributsch, Hahn-Meitner-Institut (Germany)

SESSION 3 COHERENT OPTICS AND OPTIC METHODS FOR MEASUREMENT AND INFORMATION PROCESSING

- 65951D **Algorithm study of phase diverse speckle corrective technique** [6595-24]
A. Zhang, T. Wang, Z. Li, J. Zhang, B. Liang, Harbin Institute of Technology (China)
- 65951E **Successive elimination motion estimation algorithm based on multi-resolution** [6595-25]
B. Zhang, Y. Zhao, Z. Zhong, Harbin Institute of Technology (China)
- 65951F **Recording of incoherent reflective volume Fourier holograms for optical correlators** [6595-26]
V. G. Rodin, S. N. Starikov, Moscow Engineering Physics Institute (Russia)
- 65951G **Study on memories of temporal lobes and the principles of lateralization using near infrared spectroscopy** [6595-27]
K. Kamakura, Kokushikan Univ. (Japan)
- 65951H **Detection algorithm for space dim moving object** [6595-28]
H.-B. Pan, W. Zhang, M.-Y. Cong, Harbin Institute of Technology (China)
- 65951I **Estimation and optical diagnostics of combustion with high temperature air** [6595-29]
K. Kishimoto, Kokushikan Univ. (Japan)
- 65951J **Simulation and experimental research on spherical dome by 3D laser-forming of square feet** [6595-30]
L. Yang, Y. Wang, Harbin Institute of Technology (China)
- 65951K **ICF laser target alignment sensor calibration system** [6595-31]
L. Bao, Z. Zhang, G. Liu, B. Liu, Z. Pu, Harbin Institute of Technology (China)

- 65951L **Correlation method of processing single fiber multimode interferometer (SFMI) signals using a charge coupled device** [6595-32]
Yu. N. Kulchin, O. B. Vitrik, A. D. Lantsov, Institute for Automation and Control Processes (Russia)
- 65951M **Example of using small falling weight deflectometer (FWD) for Earth structures and low cost road pavement in Japan** [6595-33]
H. Shibata, Y. Tanaka, I. Ono, Kokushikan Univ. (Japan); T. Okano, Tokyosokkikenkyujo Co., Ltd. (Japan)
- 65951N **Application of modified Kohnen's network to optimization problems** [6595-34]
T. Shimizu, Kokushikan Univ. (Japan)
- 65951O **The application of data fusion in optical theodolite coordinate measurement system** [6595-35]
Z. Tong, W. Tang, Harbin Institute of Technology (China)
- 65951P **A novel ultrasonic phased array inspection system to NDT for offshore platform structures** [6595-36]
H. Wang, B. Shan, X. Wang, J. Ou, Harbin Institute of Technology (China)
- 65951Q **LPCC invariant correlation filters: variants of application** [6595-37]
S. Yu. Shelestov, Moscow Academy of Employment Market and Information Technologies (Russia); A. V. Shevchuk, S. I. Sirotkin, R. S. Starikov, Moscow Engineering Physics Institute (Russia)
- 65951R **Optoelectronic vector-matrix processors: technical limitations** [6595-38]
R. S. Starikov, Moscow Engineering Physics Institute (Russia)
- 65951S **Analysis of the nonlinear mechanisms of light absorption in transparent materials under the ultrashort pulse laser action** [6595-39]
I. N. Zavestovskaya, P.N. Lebedev Physical Institute (Russia); P. G. Eliseev, P.N. Lebedev Physical Institute (Russia) and Ctr. for High Technology Materials, Univ. of New Mexico (USA); O. N. Krokhin, P.N. Lebedev Physical Institute (Russia)
- 65951T **Computer holography by means of the laser diodes** [6595-40]
A. N. Borodin, Irkutsk Air Force Engineering Higher School, Military Institute (Russia); V. V. Ilchenko, Technical Univ. of Munich (Germany); A. N. Malov, A. V. Sychevskiy, Irkutsk Air Force Engineering Higher School, Military Institute (Russia)
- 65951U **Image segmentation algorithms using the model of the system with abruptly changing random structure** [6595-41]
A. N. Malov, B. M. Mironov, Irkutsk Air Force Engineering Higher School, Military Institute (Russia)
- 65951V **Digital Foucault knife as a phase manipulation in the Walsh-Hadamard image transformations** [6595-42]
A. V. Bronnikov, A. N. Malov, A. N. Onackiy, Irkutsk Air Force Engineering Higher School, Military Institute (Russia)

- 65951W **Experimental modeling of high accuracy measurement of circular and radial harmonics** [6595-43]
N. N. Evtikhiev, S. N. Litovchenko, A. V. Shevchuk, R. S. Starikov, E. Yu. Zlokazov, Moscow Engineering Physics Institute (Russia)
- 65951X **Research on frame capture of high speed and image storage** [6595-44]
D. Hao, H. Ju, Harbin Institute of Technology (China)
- 65951Y **Development of automated inspection system for highway surface distress** [6595-45]
X. Hou, H. Wang, Q. Wang, Z. Wang, Harbin Institute of Technology (China)
- 65951Z **Adaptive photodetectors for vibration monitoring** [6595-46]
I. A. Sokolov, M. A. Bryushinin, V. V. Kulikov, A.F. Ioffe Physico-Technical Institute (Russia); K. T. V. Grattan, City Univ. (United Kingdom); A. S. Abyzov, A. V. Rybka, L. N. Davydov, V. V. Slezov, Kharkov Institute of Physics and Technology (Ukraine)
- 659520 **The analysis of the thermal effects arising at interaction of laser radiation with the multilayered biomaterial by using Monte Carlo method** [6595-47]
A. Yu. Setejkin, I. V. Krasnikov, Amur State Univ. (Russia)
- 659521 **A study on building a wireless acceleration sensor network for global monitoring on the cable-stayed bridge of Songhua River** [6595-48]
Y. Yu, Harbin Institute of Technology (China) and Tsinghua Unigroup Ltd. (China); J. Ou, Harbin Institute of Technology (China)
- 659522 **The application of ultrasonic phased array system to the inspection of fillet weld of flat plate** [6595-49]
B. Shan, H. Wang, X. Wang, Z. Duan, Harbin Institute of Technology (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China)
- 659523 **A star tracking algorithm suitable for star sensor** [6595-50]
B. Li, Y. Zhang, H. Li, C. Wang, Harbin Institute of Technology (China)
- 659524 **The backscattering property experiment research of wake bubbles** [6595-111]
L. Su, W. Zhang, D. Ren, X. Hu, Harbin Institute of Technology (China)
- 659525 **Experimental research on water-jet guided laser processing** [6595-112]
L. Li, Y. Wang, L. Yang, J. Chu, Harbin Institute of Technology (China)
- 659526 **Theoretical analysis of multiprobe confocal 3D detection system** [6595-113]
H. Li, Z. Pu, Harbin Institute of Technology (China)
- 659527 **Approach to retina optical coherence tomography image processing** [6595-114]
J. Yuan, Harbin Engineering Univ. (China); R. Liu, Eye Hospital, First Affiliated Hospital of Harbin Medical Univ. (China); G. Xuan, Second Affiliated Hospital of Harbin Medical Univ. (China); J. Yang, L. Yuan, Harbin Engineering Univ. (China)
- 659528 **Experimental research on power spectrum processing in joint transform correlator image recognition** [6595-155]
W. Sun, Y. Yang, Harbin Engineering Univ. (China)
- 659529 **Grain effect on imaging of spatial optical system** [6595-115]
D. Wu, Y. Zhou, S. Guo, Harbin Institute of Technology (China)

- 65952A **Neural-like optoelectronic processing system** [6595-116]
N. A. Rybalchenko, I. V. Denisov, V. A. Sedov, I. K. Vernigora, Maritime State Univ. (Russia)
- 65952B **PZT active health monitoring for fatigue accumulative damage of concrete beam containing nano-particles for pavement** [6595-117]
M. Zhang, H. Li, J. Ou, Harbin Institute of Technology (China)
- 65952C **High resolution interrogation technique based on linear photodiode array spectrometer for fiber Bragg grating sensors** [6595-118]
S. Zhang, Y. Liu, F. Li, Institute of Semiconductors (China)
- 65952D **Introduction of a four-step modulation used in PGC method** [6595-119]
Y. Liu, M. Zhang, Y. Liao, Tsinghua Univ. (China)
- 65952E **Analysis and application for a new type of optical fiber interferometer with three-beam system** [6595-120]
K. Yin, L. Wang, T. Ding, M. Zhang, Y. Liao, Tsinghua Univ. (China)
- 65952F **Method of surface roughness measurement based on interferometry** [6595-121]
X. F. Zhang, Z. P. Wang, Y. E. Zhang, L. H. Wang, Y. M. Zhang, Harbin Engineering Univ. (China)

Part Two

SESSION 4 OPTICAL FIBER SENSORS AND THEIR APPLICATIONS

- 65952G **Stabilized fiber optic sensor for remote measuring angle of inclination** [6595-51]
Y. N. Kulchin, O. B. Vitrik, A. V. Dyshlyuk, Institute for Automation and Control Processes (Russia)
- 65952H **An optical voltage sensor based on the theory of Fabry-Perot interferometer** [6595-52]
Y. Liu, H. Zhao, X. Yu, Harbin Univ. of Science and Technology (China)
- 65952I **All-fiber system based on Fabry-Perot sensor for partial discharges in transformer oil** [6595-53]
M. Li, H. Zhao, Harbin Univ. of Science and Technology (China)
- 65952J **Study of FBG sensing demodulation in AC voltage sensing with CWDM** [6595-54]
J. Zhang, Harbin Univ. of Science and Technology (China) and Harbin Normal Univ. (China); H. Zhao, Y. Xiong, Z. Zhang, Harbin Univ. of Science and Technology (China)
- 65952K **A fiber Bragg grating strain sensor based on ASE light source demodulation technology** [6595-55]
Y. Xiong, Harbin Univ. of Science and Technology (China); Z. Yang, Harbin Normal Univ. (China); H. Zhao, Harbin Univ. of Science and Technology (China); J. Zhang, Harbin Normal Univ. (China); M. Xiao, Harbin Univ. of Science and Technology (China)
- 65952L **Fiber Bragg grating sensors array based on optical frequency domain reflectometry technology** [6595-56]
Y. Xiong, L. He, T. Chen, X. Wang, W. Yang, Harbin Univ. of Science and Technology (China)

- 65952M **Temperature-insensitive strain sensor based on the measurement of reflected bandwidth from tapered fiber grating by a scanning FBG** [6595-57]
X. Yang, Q. Zhang, Harbin Institute of Technology (China); Y. Yu, Jilin Univ. (China); S. Sun, Harbin Institute of Technology (China)
- 65952N **Research on temperature independent FBG obliquity sensor** [6595-58]
Y. Cao, X. Ma, W. Fang, Tianjin Univ. of Technology (China); G. Kai, X. Dong, Institute of Modern Optics, Nankai Univ. (China)
- 65952O **Laser interferometer used for nanometer vibration measurements** [6595-59]
J. Sun, J. Yang, Z. Liu, L. Yuan, Harbin Engineering Univ. (China)
- 65952P **A portable interrogation system based on the linear InGaAs photodiode array and volume phase grating** [6595-60]
G. Li, J. Zhang, B. Liu, S. Yuan, G. Kai, X. Dong, Institute of Modern Optics, Nankai Univ. (China)
- 65952Q **Multiparameters measurement by using a four-core fiber** [6595-61]
L. Yuan, X. Wang, Harbin Engineering Univ. (China)
- 65952R **The strain measurement and analysis of fluorescence fiber** [6595-62]
H. Jiang, W. Sun, C. Zhang, Z. Liu, F. Jiang, Y. Zhang, Harbin Engineering Univ. (China)
- 65952S **The investigation of liquid analysis method based on fiber micro-drop sensor** [6595-63]
W. Sun, X. Li, Y. Zeng, Harbin Engineering Univ. (China)
- 65952T **The distributed Brillouin sensor system based on offset locking two DFB lasers** [6595-64]
Y. Li, X. Bao, L. Zou, F. Ravet, Univ. of Ottawa (Canada)
- 65952U **Fiber bragg grating sensors for arch bridge suspender health monitoring** [6595-65]
D. Li, Z. Zhou, N. Deng, J. Ou, Harbin Institute of Technology (China)
- 65952V **Health diagnosis of arch bridge suspender by acoustic emission technique** [6595-66]
D. Li, J. Ou, Harbin Institute of Technology (China)
- 65952W **Study on fabrication of smart FRP-OFBG composite laminates and their sensing properties** [6595-67]
Y. Wang, Z. Zhou, Harbin Institute of Technology (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China)
- 65952X **Liquid refractive index and temperature measurement based on LPFG** [6595-68]
C. Wang, Z. P. Wang, Harbin Engineering Univ. (China); G. S. Zhang, Harbin Engineering Univ. (China) and Beijing Institute of Graphic Communication (China); R. D. Ma, Y. M. Zhang, Harbin Engineering Univ. (China)
- 65952Y **FBG bending gauge on bridges: an effort toward standardization of bridge structural health monitoring** [6595-69]
I-W. Wu, Prime Optical Fiber Corp. (Taiwan); C.-Y. Wang, M.-H. Chen, H.-L. Wang, National Central Univ. (Taiwan); A. Cheng, P. Tsai, D. Wu, H.-W. ChangChien, H. Shang, Prime Optical Fiber Corp. (Taiwan)

- 65952Z **A low cost multiplexed 1.331 μm spectroscopic remote methane sensor system** [6595-70]
J. Ni, T. Liu, J. Chang, Shandong Academy of Science (China) and Shandong Micro-Sensor Photonics Ltd. (China); Q. Wang, X. Han, Y. Zhang, Shandong Academy of Science (China)
- 659530 **Effect of the dispersion of the reflection-induced retardance upon the sensitivity of an optical current sensor** [6595-71]
Z. P. Wang, Y. Qi, X. Y. Liu, Y. M. Zhang, Harbin Engineering Univ. (China)
- 659531 **Effect of the dispersion of Verdet constant upon the sensitivity of an optical current sensor** [6595-72]
Z. P. Wang, Y. Qi, X. Y. Liu, Y. M. Zhang, Harbin Engineering Univ. (China)
- 659532 **Research on construction monitoring of the Third Nanjing Yangtze Bridge using FBG sensors** [6595-73]
Q. Hu, China Earthquake Administration, Institute of Engineering Mechanics (China) and Harbin Institute of Technology (China); Z. Zhou, Harbin Institute of Technology (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China)
- 659533 **Research and application of highway tunnel fire alarm system based on fiber Bragg grating sensor technology** [6595-74]
C. Zhou, L. Chen, D. Jiang, Wuhan Univ. of Technology (China); J. He, S. Zhang, Wuhan Optic Science and Technology Ltd. Co. (China)
- 659534 **State-of-the-art optical fiber ends: fabrication and application** [6595-75]
L. Yuan, Harbin Engineering Univ. (China)
- 659535 **Health monitor on asphalt pavement of highway based on FBG technique** [6595-76]
Q. Hu, China Earthquake Administration, Institute of Engineering Mechanics (China) and Harbin Institute of Technology (China); Z. Zhou, H. Li, Harbin Institute of Technology (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China)
- 659536 **Measuring tide and vibration of the submarine and aerial fibers by polarization mode dispersion** [6595-78]
X. Bao, Z. Zhang, D. Waddy, L. Chen, Univ. of Ottawa (Canada)
- 659537 **Current situation and prospect of distributed Brillouin sensing technology** [6595-79]
J. He, Z. Zhou, Harbin Institute of Technology (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China)
- 659538 **Effects of reciprocal parameters upon a FMOCT** [6595-80]
Z. P. Wang, C. Kang, X. Y. Liu, Y. M. Zhang, Harbin Engineering Univ. (China)
- 659539 **Experiment and analysis based on polarization optical time domain reflectometry (POTDR)** [6595-81]
Z. Li, C. Wu, Y. Liu, M. Cheng, Y. Wang, C. Tian, Beijing Jiaotong Univ. (China)
- 65953A **A novel electric current sensor based on Fiber Bragg gratings and magnetostrictive composites** [6595-82]
X. Dong, X. Guan, Harbin Institute of Technology (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China)
- 65953B **Tapered-fiber liquid dropping-speed monitoring sensors** [6595-83]
C. Zhang, W. Sun, C. Guo, X. Wang, Harbin Engineering Univ. (China)

- 65953C **Hybrid optical bistability in fiber Fabry-Perot interferometer by use of a widely wavelength-swept fiber laser** [6595-84]
G. Lv, Harbin Institute of Technology (China) and Heilongjiang Univ. (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China); Z. Zhou, Harbin Institute of Technology (China); H. Ye, C. Yang, S. Shang, C. Li, Heilongjiang Univ. (China)
- 65953D **The application of optical fiber sensors in the engineering monitoring of Dongying Yellow River Bridge** [6595-85]
T. Zhang, Harbin Institute of Technology (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China)
- 65953E **Detection blind area of infrared sensors for moving target detection** [6595-86]
K. Li, W. Zhang, C. Wu, Harbin Institute of Technology (China)
- 65953F **A novel design of CCD spectral detection circuit for FBG sensor interrogation** [6595-87]
S. Gong, Heilongjiang Univ. (China); G. Lv, Heilongjiang Univ. (China) and Harbin Institute of Technology (China); X. Li, X. Jiang, S. Shang, C. Yang, H. Wang, C. Li, Heilongjiang Univ. (China)
- 65953G **FBG sensor interrogation using fiber optical bistability in frequency domain** [6595-88]
G. Lv, Harbin Institute of Technology (China) and Heilongjiang Univ. (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China); H. Ye, Heilongjiang Univ. (China); Z. Zhou, Harbin Institute of Technology (China); S. Shang, C. Yang, H. Wang, Heilongjiang Univ. (China)
- 65953H **Design of integrated monitoring system for the Dongying Yellow River Bridge based on optical fiber sensing technique** [6595-89]
T. Zhang, Harbin Institute of Technology (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China)
- 65953I **Self-sensing concrete-filled FRP tube using FBG strain sensor** [6595-90]
X. Yan, H. Li, Harbin Institute of Technology (China)
- 65953J **Traffic-load effects calculation for arch bridge suspenders based on loading effects FBG monitoring system in-service data** [6595-91]
X. Gao, D. Li, N. Deng, Harbin Institute of Technology (China); J. Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China)
- 65953K **Study on a new kind of surface sticking strain sensor with sensitivity enhanced based on FBG** [6595-92]
J. He, Z. Zhou, H. Dong, G. Zhang, Harbin Institute of Technology (China)
- 65953L **Study on FBG-based sensor for simultaneous dual-measurement of pressure and temperature** [6595-93]
Z. Zhou, D. Wang, J. He, J. Ou, Harbin Institute of Technology (China)
- 65953M **Recent advances in fiber-optic F-P interferometric sensors** [6595-94]
Y.-J. Rao, Univ. of Electronic Science and Technology of China (China) and Chongqing Univ. (China)

- 65953N **Analysis and simulation of optical polarization fluctuation of interferometric fiber optic gyroscope** [6595-156]
H. Gu, Institute of Modern Optics, Nankai Univ. (China) and Tianjin Navigation Instrument Research Institute (China); G. Yang, Y. Yang, H. Weng, Tianjin Navigation Instrument Research Institute (China); Q. Zhao, Institute of Modern Optics, Nankai Univ. (China)
- 65953O **Study on the demodulation technique of fiber grating sensor arrays based on a tunable pulsed laser** [6595-157]
B. Dong, Q. Zhao, Institute of Modern Optics, Nankai Univ. (China); S. He, S. Hu, Beijing Univ. of Technology (China); T. Guo, L. Xue, Institute of Modern Optics, Nankai Univ. (China)
- 65953P **An optical measurement method about line width of pulse laser** [6595-158]
B. Song, W. Zhao, D. Ren, H. Zhao, S. Mo, Harbin Institute of Technology (China)
- 65953Q **Intensity-referenced and temperature-independent pressure sensing based on strain-chirped fiber Bragg grating** [6595-122]
T. Guo, Q. Zhao, L. Xue, J. Lv, H. Kang, B. Dong, S. Li, H. Gu, G. Huang, X. Dong, Institute of Modern Optics, Nankai Univ. (China)
- 65953R **Temperature-independent FBG displacement measurement based on bandwidth modulation and optical power detection** [6595-123]
T. Guo, Q. Zhao, H. Kang, J. Lv, L. Xue, S. Li, B. Dong, H. Gu, G. Huang, X. Dong, Institute of Modern Optics, Nankai Univ. (China)
- 65953S **Performance analysis of an in-line optical fiber analysis system for well crude oil** [6595-159]
D. Meng, H. Xuan, M. Zhang, S. Lai, Y. Liao, Tsinghua Univ. (China)
- 65953T **A distributed temperature-sensing system based on FBG** [6595-124]
X. Yu, H. Zhao, Y. Liu, Harbin Univ. of Science and Technology (China)
- 65953U **Temperature insensitive wheel-type FBG pressure sensor** [6595-125]
J. Luo, B. Liu, G. Kai, S. Yuan, X. Dong, Institute of Modern Optics, Nankai Univ. (China)
- 65953V **Development of the optical instrument transformer for DC voltage measurement** [6595-126]
P. Zhu, G. Zhang, Tsinghua Univ. (China)
- 65953W **The research of propagation constant in grapefruit microstructure optical fibers with lateral pressure** [6595-127]
H. Liu, Institute of Modern Optics, Nankai Univ. (China); W. Zhang, Institute of Modern Optics, Nankai Univ. (China) and Institute of Semiconductors (China); Q. Tu, M. Jiang, Z. Wang, Y. Liu, G. Kai, X. Dong, Institute of Modern Optics, Nankai Univ. (China)
- 65953X **AC current sensing with fiber Bragg grating** [6595-128]
H. Zhao, Harbin Univ. of Science and Technology (China); J. Zhang, Harbin Univ. of Science and Technology (China) and Harbin Normal Univ. (China); Y. Xiong, Z. Zhang, Harbin Univ. of Science and Technology (China)
- 65953Y **FBG current sensor based on CWDM demodulation** [6595-129]
H. Zhao, Y. Xiong, Harbin Univ. of Science and Technology (China); J. Zhang, Harbin Normal Univ. (China); H. Zhao, Harbin Univ. of Science and Technology (China)
- 65953Z **Active sensing of DBR laser with self-mixing interference** [6595-130]
J. Zhou, M. Wang, D. Han, Nanjing Normal Univ. (China)

- 659540 **Speckle feedback-injected erbium-doped fiber ring laser for velocity detecting** [6595-160]
D. Han, Nanjing Normal Univ. (China) and Nanchang Univ. (China); M. Wang, J. Zhou, Nanjing Normal Univ. (China)
- 659541 **The design and fabrication of an optical fiber MEMS pressure sensor** [6595-131]
Y. Ge, M. Wang, H. Rong, X. Chen, Nanjing Normal Univ. (China)
- 659542 **Study on the passive-drawn fiber optic liquid analysis technique** [6595-132]
A. Zhou, J. Sun, L. Yuan, H. Xiao, Harbin Engineering Univ. (China)
- 659543 **A novel fiber optic Fabry-Perot temperature sensor** [6595-133]
W. Zhang, Shijiazhuang Railway Institute (China) and Institute of Semiconductors (China); B. Sun, J. Dai, Y. Du, Shijiazhuang Railway Institute (China)
- 659544 **Investigation on pressure sensitivity of fiber optic mandrel hydrophone** [6595-134]
W. Zhang, Y. Liu, F. Li, Institute of Semiconductors (China)
- 659545 **800nm fiber Bragg grating sensing interrogation system using TFBG and CCD array** [6595-135]
B. Liu, Institute of Modern Optics, Nankai Univ. (China); R. Suo, K. Zhou, Aston Univ. (United Kingdom); L. Jin, J. Zhang, Y. Liu, G. Kai, X. Dong, Institute of Modern Optics, Nankai Univ. (China)
- 659546 **A novel fiber-mercury temperature sensor** [6595-136]
W. Zhang, Shijiazhuang Railway Institute (China) and Institute of Semiconductors (China); J. Dai, B. Sun, Y. Du, Shijiazhuang Railway Institute (China)
- 659547 **Study on the BRDF application** [6595-137]
C. Qi, Harbin Engineering Univ. (China) and Harbin Institute of Technology (China); C. Yang, J. Dai, Harbin Institute of Technology (China); G. Zhao, Harbin Engineering Univ. (China)
- 659548 **Four-core fiber square grid pattern generator** [6595-138]
L. Yuan, S. Zhao, W. Xue, Harbin Engineering Univ. (China)
- 659549 **Design of structured light by using three PM fibers for Moiré interferometric profilometry** [6595-139]
L. Yuan, Harbin Engineering Univ. (China)
- 65954A **The noise analysis and digital realization of arctangent approach of PGC demodulation for optic interferometric sensors** [6595-140]
F. Liao, M. Zhang, L. Wang, Y. Liao, Tsinghua Univ. (China)
- 65954B **Research on an improved passive demodulation method for optical fiber interferometer with 3×3 coupler** [6595-141]
K. Yin, M. Zhang, T. Ding, L. Wang, Y. Liao, Tsinghua Univ. (China)
- 65954C **Fiber optic vibration sensor based on over-coupled fused coupler** [6595-142]
J. Chang, Shandong Academy of Science (China) and Shandong Univ. (China); L. Ma, Shandong Micro-Sensor Photonics, Ltd. (China); T. Liu, Shandong Academy of Science (China) and Shandong Micro-Sensor Photonics, Ltd. (China); H. Wang, D. Huo, J. Ni, Z. Shi, Shandong Micro-Sensor Photonics, Ltd. (China)

- 65954D **Study of multiple record of the optical information on photothermoplastic mediums (PTPM) in the holographic way** [6595-143]
T. I. Goglidze, I. V. Dement'ev, Moldavian State Univ. (Moldova); Y. E. Kortiukova, N. I. Matskova, Dniester State Univ. (Moldova)
- 65954E **Construction of the fiber-optical temperature measuring system** [6595-161]
V. A. Sedov, I. V. Denisov, N. A. Rybalchenko, Maritime State Univ. (Russia)
- 65954F **Ternary influences on the fiber-optical measuring network** [6595-144]
I. V. Denisov, N. A. Rybalchenko, V. A. Sedov, Maritime State Univ. (Russia)
- 65954G **The amplification of stimulated Brillouin scattering in backward pumped S band distributed fiber Raman amplifier** [6595-145]
H. Liu, Z. Zhang, China Jiliang Univ. (China); C. Li, H. Xu, China Jiliang Univ. (China) and Univ. of Shanghai for Science and Technology (China); J. Wang, China Jiliang Univ. (China); I. S. Kim, Korea Electrotechnology Research Institute (South Korea)
- 65954H **Fiber optic four-element hydrophone array** [6595-146]
Y. Jiang, Y. Zou, Beijing Institute of Technology (China)
- 65954I **A digital liquid level sensor system based on parallel fiber sensor heads** [6595-147]
B. Dong, Q. Zhao, J. Lv, T. Guo, L. Xue, S. Li, H. Gu, Institute of Modern Optics, Nankai Univ. (China)
- 65954J **Three-dimensional vision inspection based on structured light projection and neurocalibration** [6595-162]
K. Xie, W. Y. Liu, Z.-B. Pu, Harbin Institute of Technology (China)
- 65954K **Development of fibre optical sensors for structural health monitoring** [6595-163]
S. C. Por, L. J. Ping, CPG Labs. Pte Ltd. (Singapore)

Author Index

Conference Committees

Conference Chair

Jinping Ou, Harbin Institute of Technology (China) and Dalian University of Technology (China)

Conference Cochairs

Yuri N. Kulchin, Far Eastern Branch of the Russian Academy of Sciences (Russia)

Toshihiro Shimizu, Kokushikan University (Japan)

Jae Hun Han, Kangnam University (South Korea)

Conference Coordinators

Zhi Zhou, Harbin Institute of Technology (China)

Oleg B. Vitrik, Far Eastern Branch of the Russian Academy of Sciences (Russia)

International Scientific Committee

Chair

O. N. Krokhnin, Physics Institute of the Russian Academy of Sciences (Russia)

Cochairs

Yuri N. Kulchin, Far Eastern Branch of the Russian Academy of Sciences (Russia)

Xiaoyi Bao, University of Ottawa (Canada)

Chunfei Li, Harbin Institute of Technology (China)

Hong Zhao, Harbin University of Science and Technology (China)

Members

V. I. Konov, Russian Foundation for Basic Research, (Russia)

Alexander N. Malov, Irkutsk State University (Russia)

Alen Kost, University of Arizona (USA)

S. M. Shandarov, State University of Control Systems and Radioelectronics (Russia)

E. I. Akopov, SPIE Russia Chapter (Russia)

Qiming Wang, Chinese Academy of Science (China)

F. Ansari, University of Illinois at Chicago (USA)

Jinping Ou, Harbin Institute of Technology (China) and Dalian University of Technology (China)

Xiudong Sun, Harbin Institute of Technology (China)

Yingbao Liao, Tsinghua University (China)

Toshihiro Shimizu, Kokushikan University (Japan)
Sato Heihachi, National Defense Academy (Japan)
I. Yamaguchi, Gunma University (Japan)
K. Tanaka, Canon Inc. (Japan)
S. Tanaka, National Defense Academy (Japan)
Jae Hun Han, Kangnam University (South Korea)

Introduction

Global introduction of automated control systems into industry and the ever-increasing expansion of fundamental and applied scientific research horizons require various measuring devices that are suitable for real-time monitoring of physical fields, objects, and processes and are capable of being effectively integrated into sophisticated information and measuring systems (IMS). This dictates the need for new approaches to both the organization of the measurement process, and to devising of advanced high-speed IMS, as well as creating new technologies for the design and manufacture of measuring equipment having the ability to endow IMS with such fundamental properties as adaptivity, integration, self-verification, and self-correction capacities.

Modern measuring techniques and devices make wide use of optical, electric, magnetodynamic, piezoelectric, and other sensors. Recent progress in the fiber optic communication technology, both in Russia and abroad, gave birth to a fundamentally new metrology realm: fiber optic sensors (FOS). These sensors are highly advantageous when compared to conventional measuring techniques. The merits of these sensors include high sensitivity and operation speed; electromagnetic noise immunity; small size and weight; combination of measuring and communication function in a single element. There is also great potential of coupling with modern communication and computer systems to create essential prerequisites for the development of radically new distributed and branched multifunction information and measuring systems.

One of the most successful and promising application areas of fiber optic sensors is the measurement of deformation parameters where FOS have already enabled quite a few advanced and currently commercially available systems for structural health monitoring (SHM) of buildings, bridges, high-rise towers, ships, air- and spacecrafts. The rapid advancement of FOS in the field of structural health monitoring stems from the progress in a diversity of scientific areas concerned with opto and microelectronics. Among them the following are particularly worthy of note: investigations on new high-efficiency (including non-linear optical) schemes of fiber-guided light modulation by measured physical field parameters, researches on new methods of optical signal processing, exploration of novel micro- and nano-electronic structures for optoelectronics, development of new types of optical fiber sensors and further extending their application potential. The most recent results in the above mentioned fields have become the central focus of attention at the APCOM 2006 conference.

We would like to express our sincere gratitude to the organizers and sponsors of the conference as well as to all the participants.

Yuri N. Kulchin

Oleg B. Vitrik

Jinping Ou

Zhi Zhou