Second International Conference on
Advanced Optoelectronics and Lasers

Igor A. Sukhoivanov
Vasily A. Svich
Yuriy S. Shmaliy
Editors

Sergey A. Kostyukevych
Technical Editor

12–17 September 2005
Yalta, Ukraine

Organized by
IEEE LEOS Ukraine Chapter • IEEE AP/MTT/ED/AES/GRS/NPS/EMB East Ukraine Joint Chapter • SPIE Ukraine Chapter • Institute of Semiconductor Physics (Ukraine) • Ministry of Education and Science of Ukraine • National Academy of Sciences of Ukraine • University of Guanajuato (Mexico) • Kharkiv National University of Radio Electronics (Ukraine) • V.N. Karazin Kharkiv National University (Ukraine) • Academy of Sciences of Applied Radio Electronics (Ukraine) • V.J. Vernadskii Tavrida National University (Ukraine) • National Training Center for Microelectronics (USA) • Laboratoire de Chronométrie Electronique Piézoélectricité (France) • Laboratoire de Physique et Metrologie des Oscillateurs (France)

In cooperation with
IEEE/LEOS Belarus Chapter • IEEE/LEOS Moscow Chapter (Russia) • IEEE/LEOS Poland Chapter • Kharkiv National University of Radio Electronics IEEE Student Branch (Ukraine) • SPIE Ukraine Chapter

Sponsored by
IEEE/LEOS Ukraine Chapter • Union Radio-Scientifique Internationale, Commission “D” • IEEE AP/MTT/ED/AES/GRS/NPS/EMB East Ukraine Joint Chapter • European Office of Aerospace Research and Development, AFOSR, AFRL • Office of Naval Research (USA)

Published by
SPIE

Volume 7009
Contents

xi  Conference Committees
xiii  Introduction

PHOTONICS ACTIVE DEVICES

7009 02  Quantum dot photonics: edge emitter amplifier, and VCSEL [7009-01]
F. Hopfer, M. Kurfz, M. Lämmin, G. Fiol, Technische Univ. Berlin (Germany); N. N. Ledentsov, Technische Univ. Berlin (Germany) and NL Nanosemiconductor GmbH (Germany); A. R. Kovsh, S. S. Mikrin, NL Nanosemiconductor GmbH (Germany); I. Kliaiber, Technische Univ. Berlin (Germany); V. Hasler, Technische Univ. Berlin (Germany) and Institute of Semiconductor Physics (Russia); A. Lochmann, A. Mutig, Technische Univ. Berlin (Germany); C. Schubert, Fraunhofer Heinrich-Hertz-Institut Berlin (Germany); A. Umbach, U2T Photonics AG (Germany); V. M. Ustinov, A.F. Ioffe Physico-Technical Institute (Russia); U. W. Pohl, D. Bimberg, Technische Univ. Berlin (Germany)

7009 03  VCSEL polarization control by monolithic surface gratings: a survey of modelling and experimental activities [7009-02]
P. Debernardi, Politecnico di Torino (Italy); J. M. Ostermann, Politecnico di Torino (Italy) and Univ. of Ulm (Germany); R. Michalzik, Univ. of Ulm (Germany)

7009 04  Silicon optical bench for flip-chip integration of high speed widely tunable lasers [7009-03]
M. Chacinski, Royal Institute of Technology (Sweden); A. Scholes, Acreo AB (Sweden); R. Schatz, Royal Institute of Technology (Sweden); P. Ericsson, Acreo AB (Sweden); M. Isaksson, Royal Institute of Technology (Sweden) and Syntune AB (Sweden); S. Hammerfeldt, Syntune AB (Sweden)

7009 05  Frequency tuning of diode laser radiation by surface acoustic wave [7009-04]

7009 06  Some electro-physical properties of InSb and InAs layers that were received with the help of methods of relaxed optics [7009-05]
P. P. Trokhimchuck, Lesya Ukrainka Volyn State Univ. (Ukraine) and International Scientific Technical Univ. (Ukraine)

7009 07  A new compact high brilliance diode laser type [7009-06]
F. Bammer, B. Holzinger, Vienna Univ. of Technology (Austria)

7009 08  Magnetic field influence on MQW laser [7009-07]
A. F. Boya, Salahaddin Univ. (Iraq); A. I. Abdullah, Mosul Univ. (Iraq)
Reflection spectrum of the top mirror in ICOC VCSELs taking into account uniform temperature distribution [7009-08]
A. A. Dyomin, Kharkiv National Univ. of Radio Electronics (Ukraine); V. V. Lysak, Kharkiv National Univ. of Radio Electronics (Ukraine) and Gwangju Institute of Science and Technology (South Korea); I. O. Zinkovska, Kharkiv National Univ. of Radio Electronics (Ukraine)

Calculation of the spontaneous emission spatial dependency in semiconductor lasers using transmission line model [7009-09]
M. Razaghi, Tarbiat Modares Univ. (Iran); V. Ahmadi, Tarbiat Modares Univ. (Iran) and Atomic Energy Organization of Iran (Iran); B. H. S. Mahalleh, Tarbiat Modares Univ. (Iran); A. Zarifkar, Iran Telecommunication Research Ctr. (Iran)

Influence of laser diode parameters on the performance of Mach-Zehnder modulator [7009-10]
S. Q. Mawlud, Univ. of Salahaddin (Iraq); M. I. Azawi, Univ. of Mosul (Iraq)

Analysis of facet heating in semiconductor lasers [7009-11]
D. Wawer, T. J. Ochalski, K. Pierścień, M. Szymański, M. Bugajski, Institute of Electron Technology (Poland); Ł. Piskorski, K. Gutowski, Technical Univ. of Łódź (Poland); A. Kozłowska, A. Maląg, Institute of Electronics Materials Technology (Poland)

The influence of photonic crystal parameters on photonic band-gaps [7009-12]
A. V. Dyogtyev, Kharkiv National Univ. of Radio Electronics (Ukraine); I. A. Sukhoivanov, Kharkiv National Univ. of Radio Electronics (Ukraine) and Univ. of Guanajuato (Mexico); R. M. De La Rue, Univ. of Glasgow (United Kingdom)

New phenomena at stimulated Brillouin scattering of Laguerre-Gaussian laser modes: theory, calculation, and experiments [7009-13]
F. A. Starikov, Yu. V. Dolgopolov, A. V. Kopalkin, G. G. Kochemasov, S. M. Kulikov, S. A. Sukharev, Russian Federal Nuclear Ctr. - VNIIEF (Russia)

Collisions of spatial solitons in optically induced lattices [7009-14]
O. G. Romanov, Belarusian State Univ. (Belarus)

Soliton solution of nonlinear Schrödinger equation with application to Bose-Einstein condensation using the FD method [7009-15]
K. Abedi, V. Ahmadi, Tarbiat Modares Univ. (Iran) and Atomic Energy Organization of Iran (Iran); S. Gholmohammadi, Tarbiat Modares Univ. (Iran) and Iran Telecommunication Research Ctr. (Iran); E. Darabi, Atomic Energy Organization of Iran (Iran); M. H. Yavari, Tarbiat Modares Univ. (Iran)

Photonic molecule modes in coupled spherical microcavities with CdTe nanocrystals [7009-16]
K. I. Rusakou, A. A. Gladyschuk, S. V. Chugunov, Brest State Technical Univ. (Belarus); Y. P. Rakovich, Brest State Technical Univ. (Belarus) and Trinity College Dublin (Ireland); J. F. Donegan, Trinity College Dublin (Ireland); A. L. Rogach, Univ. of Hamburg (Germany); N. Gaponik, Ludwig-Maximilians-Univ. München (Germany)
Whispering gallery modes in axisymmetric resonators [7009-17]
M. L. Gorodetsky, A. E. Fomin, Moscow State Univ. (Russia)

Optical formation of waveguiding elements at the interaction of laser beams in transparent photopolymerizable media [7009-18]
S. N. Mensov, Yu. V. Polushtaytsev, Nizhny Novgorod State Univ. (Russia)

Saturated laser Fourier-amplifier as a source for half-tone images in laser projection [7009-19]
A. F. Kornev, I. G. Kuchma, V. P. Pokrovski, L. N. Soms, S.I. Vavilov State Optical Institute (Russia)

High frequency light self-modulation and pulse transformations in running wave interferometers [7009-20]
A. G. Lazarenko, A. N. Andreev, National Technical Univ. Kharkiv Polytechnical Institute (Ukraine); A. V. Kanaev, LIMHP, Univ. Paris-Nord (France)

Hermite-Laguerre-Gaussian beams in astigmatic optical systems [7009-21]
E. G. Abramochkin, E. V. Razueva, V. G. Volostnikov, P.N. Lebedev Physical Institute (Russia)

Transmission peculiarities of dielectric layer/thin metallic film/dielectric layer structure with or without periodicity in the dielectric layers [7009-22]
V. M. Fitio, Lviv Polytechnic National Univ. (Ukraine); Y. V. Bobitski, Lviv Polytechnic National Univ. (Ukraine) and Rzeszow Univ. (Poland)

ADVANCED LASERS AND APPLICATIONS

Stability of quasi-steady mode of electro-discharge XeCl lasers [7009-23]
S. Anufrik, A. Volodenkov, K. Znosko, Yanka Kupala State Univ. of Grodno (Belarus)

Some types of XeCl-excilamps [7009-24]
S. Anufrik, A. Volodenkov, K. Znosko, Yanka Kupala State Univ. of Grodno (Belarus)

Modelling of electro-discharge XeCl laser excitation systems [7009-25]
S. Anufrik, A. Volodenkov, K. Znosko, Yanka Kupala State Univ. of Grodno (Belarus)

Numerical calculations of a high power CW CO2 gas-dynamic laser [7009-26]
S. Al-Hawat, K. Al-Mutaib, Atomic Energy Commission (Syria)

Modeling of a cavity configuration of the axially diode-pumped solid-state laser with consideration of a thermal lens in the active element [7009-27]
E. N. Ofitserov, A.M. Prokhorov General Physics Institute (Russia)

Mode-locking of phenomena of external cavity lasers [7009-28]
N. Dogru, Univ. of Gaziantep (Turkey)
**OPTICAL MEASUREMENT TECHNIQUES**

7009 0U  **Method of focusing laser beam based on analysis of spatial frequencies of surface image** [7009-29]
M. Dzubenko, S. Kolpakov, O. Priyomko, D. Kulishenko, Usikov Institute of Radiophysics and Electronics (Ukraine)

7009 0V  **Registration of infrared single photons by a two-channel receiver based on fiber-coupled superconducting single-photon detectors** [7009-30]
O. Okunev, G. Chulkova, I. Milostnaya, A. Antipov, K. Smirnov, D. Morozov, A. Korneev, B. Voronov, G. Gol'tsman, Moscow State Pedagogical Univ. (Russia); W. Slys, M. Wegrzecki, J. Bar, P. Grabiec, M. Górka, Institute of Electron Technology (Poland); A. Pearlman, A. Cross, J. Kitaygorsky, R. Sobolewski, Univ. of Rochester (USA)

7009 0W  **Optical quantum non-demolition meter for gravitational-wave detection** [7009-31]
S. L. Danilishin, F. Ya. Khalili, Moscow State Univ. (Russia)

7009 0X  **Circuit model for segmented traveling-wave electroabsorption modulators** [7009-32]
K. Abedi, V. Ahmadi, Tarbiat Modares Univ. (Iran) and Atomic Energy Organization of Iran (Iran); M. H. Sheikhi, Shiraz Univ. (Iran); S. Gholmohammadi, Tarbiat Modares Univ. (Iran) and Iran Telecommunication Research Ctr. (Iran); M. H. Yavari, Tarbiat Modares Univ. (Iran)

7009 0Y  **Parametric oscillatory instability in LIGO interferometer** [7009-33]
V. B. Braginsky, S. E. Strigin, S. P. Vyatchanin, Moscow State Univ. (Russia)

7009 0Z  **Pellicle laser interferometers for exact optics test** [7009-34]
E. G. Popov, G. M. Popov, Crimean Astrophysical Observatory (Ukraine)

7009 10  **Comparative study of noninterferometric measurement schemes for determination of optical fiber nonlinear coefficient** [7009-35]
B. Batagelj, P. Ritosa, Univ. of Ljubljana (Slovenia)

**NANOSTRUCTURES AND NEW MATERIALS**

7009 11  **Analysis for the characteristics of a voltage tunable functional quantum structure optoelectronic integrated device** [7009-36]
E. Darabi, Amirkabir Univ. of Technology (Iran) and Atomic Energy Organization of Iran (Iran); V. Ahmadi, Atomic Energy Organization of Iran (Iran) and Tarbiat Modares Univ. (Iran); K. Mirabbasazadeh, Amirkabir Univ. of Technology (Iran)

7009 12  **Atomic dynamics and heat conduction of metal-dielectric and metal-semiconductor nano-interfaces** [7009-37]
A. Feher, P.J. Safarik Univ. (Slovak Republic) and Institute of Experimental Physics (Slovak Republic); Y. S. Syrkin, A. G. Shkorbatov, Institute for Low Temperature Physics and Engineering (Ukraine); M. L. Polyakov, Consultant (USA); P. A. Minayev, Imperial College London (United Kingdom)
Extraordinary enhanced absorptivity of gold surface ablated with femtosecond laser pulses [7009-38]
A. Y. Vorobyev, C. Guo, The Institute of Optics, Univ. of Rochester (USA); V. S. Makin, Research Institute for Complex Testing of Optoelectronic Devices (Russia); N. G. Kokody, V. M. Kuzmichev, V.N. Karazin Kharkov National Univ. (Ukraine)

Characterization of new metallized polyimide films with high electrooptical performances [7009-39]
S. K. Kudaikulova, R. M. Iskakov, Institute of Chemical Sciences (Kazakhstan); I. V. Razumovskaja, S. L. Bazhenov, V. N. Koptsev, Moscow State Pedagogical Univ. (Russia); O. Y. Prikhodko, A. P. Kurbatov, T. Z. Akhmetov, Al-Farabi Kazakh National Univ. (Kazakhstan); B. A. Zhubanov, Institute of Chemical Sciences (Kazakhstan); M. J. M. Abadie, Montpellier Univ. 2 (France)

Electric field-induced color switching of luminescence from ZnO nanoparticle/polymer [7009-40]
G. N. Panin, Dongguk Univ. (South Korea) and Institute of Microelectronics Technology (Russia); A. N. Baranov, Moscow State Univ. (Russia); T. W. Kang, Dongguk Univ. (South Korea)

Structure properties of copper-containing nanoparticles in polyethylene matrix [7009-41]
M. N. Zhuravleva, Saratov State Technical Univ. (Russia); K. V. Zapsis, Institute of Radio Engineering and Electronics (Russia); Ju. G. Konyukhova, Saratov State Univ. (Russia); I. D. Kosobudsky, Saratov State Technical Univ. (Russia); V. I. Kochubey, Saratov State Univ. (Russia); N. M. Ushakov, Institute of Radio Engineering and Electronics (Russia)

Overview of optically driven antenna systems [7009-42]
P. Ritoša, B. Batagelj, Univ. of Ljubljana (Slovenia)

A novel protection scheme for Ethernet PON FTTH access network [7009-43]
W. T. P'ng, M. K. Abdullah, S. Khatun, S. B. Ahmad-Anas, Univ. Putra Malaysia (Malaysia); S. Shaari, Univ. Kebangsaan Malaysia (Malaysia)

Analysis of photon density distribution in three section DBR tunable laser diode [7009-44]
M. H. Yavari, Tarbiat Modares Univ. (Iran); V. Ahmadi, Tarbiat Modares Univ. (Iran) and Atomic Energy Organization of Iran (Iran); A. Zarifkar, Iran Telecommunication Research Ctr. (Iran); K. Abedi, Tarbiat Modares Univ. (Iran) and Atomic Energy Organization of Iran (Iran)

Monitoring of physical parameters by fiber-optic recirculation sensor [7009-45]
A. V. Poliakov, Belarusian State Univ. (Belarus)

Band model of optical fiber Raman amplifier with multiwave pumping [7009-46]
G. S. Felinskyi, Scientific Research Institute Vektor (Ukraine); P. A. Korotkov, Taras Shevchenko Kyiv National Univ. (Ukraine)

Spectroscopic multiple-vibrational modeling of Raman gain in FRA [7009-47]
G. S. Felinskyi, Scientific Research Institute Vector (Ukraine)
Processing of interference images at the control of surface parameters of optical fiber components [7009-48]
A. Filipenko, I. Nevludov, O. Sicheva, Kharkiv National Univ. of Radio Electronics (Ukraine)

**PRECISION OSCILLATION IN ELECTRONICS AND OPTICS**

Nonlinear simulation of ultrastable quartz crystal oscillators in frequency domain [7009-49]
N. E. Ratier, M. F. Bruniaux, R. G. Brendel, Institut FEMTO-ST (France)

Design issues of resonant piezoelectric sensors [7009-50]
B. Dulmet, Institut FEMTO-ST (France)

Approximate estimates of errors in wireless SAW sensing with DPM [7009-51]
Y. S. Shmaliy, Guanajuato Univ. (Mexico)

A probabilistic analysis of the crystal oscillator behavior at low drive levels [7009-52]
Y. S. Shmaliy, Guanajuato Univ. (Mexico); R. Brendel, LPMO, Univ. de Franche-Comté (France)

Application of the unbiased FIR algorithm for filtering the TIE model of a local clock [7009-53]
O. Ibarra-Manzano, L. Arceo-Miguel, J. Munoz Diaz, Guanajuato Univ. (Mexico)

Laser speckle velocimeter for a robotized vehicle [7009-54]
A. A. Aliverdiev, Institute of Physics, Dagestan Scientific Ctr. (Russia); M. A. Cañonero, ENEA Frascati (Italy); C. Moriconi, P. A. Fichera, G. Sagratella, ENEA Casaccia (Italy)

Interference sensitive selective photodetector [7009-55]
A. A. Ivanenko, V. F. Shabanov, Kirensky Institute of Physics (Russia) and Krasnoyarsk Scientific Ctr. (Russia); A. M. Sysoev, Kirensky Institute of Physics (Russia); N. P. Shestakov, Kirensky Institute of Physics (Russia) and Krasnoyarsk Scientific Ctr. (Russia)

Estimation of diffractional losses in dielectric corner reflectors [7009-56]
S. P. Tarabrin, Moscow State Univ. (Russia)

Ablation species generated by high power laser pulses from CdTe target [7009-57]
V. K. Savchuk, B. K. Kotlyarchuk, A. O. Zaginey, Ya. Pidstryhach Institute for Applied Problems of Mechanics and Mathematics (Ukraine); M. Oszwaldowski, J. Rzeszutek, Poznań Univ. of Technology (Poland)

Reasons for noises in diffraction optical elements formed in photopolymerizable compositions [7009-58]
S. N. Mensov, A. V. Romanov, Nizhny Novgorod State Univ. (Russia)

Sampling-reconstruction procedure of Gaussian processes with the mutual statistical connection between all couples of samples [7009-59]
V. A. Kazakov, D. Rodríguez S., Instituto Politécnico Nacional (Mexico)

Eigenvibrations of a piezoelectric plate of thickness-shear vibrations with an arbitrary convex surface [7009-60]
O. Yu. Shmaliy, Ukrainian Engineering-Pedagogical Academy (Ukraine)
All-optical logical gates built on optically linear bandgap structures covered with nonlinear material [7009-61]
E. Ya. Glushko, V. Lashkarev Institute of Semiconductor Physics (Ukraine); A. A. Zakhidov, Univ. of Texas at Dallas (USA)
Conference Committees

Conference Honorary Chair

M. F. Bondarenko, Kharkiv National University of Radio Electronics (Ukraine)

Conference Chair

I. A. Sukhoivanov, University of Guanajuato (Mexico) and Kharkiv National University of Radio Electronics (Ukraine)

International Advisory Committee

M. Marciniak, National Institute of Telecommunications (Poland)
R. M. De La Rue, University of Glasgow (United Kingdom)
S. Donati, University of Pavia (Italy)
W. Freude, University of Karlsruhe (Germany)
H. Kawaguchi, Yamagata University (Japan)
C. Jagadish, Australian National University (Australia)
C. Weiss, Physikalische-Technische Bundesanstalt (Germany)
R. G. Brendel, Institut FEMTO-ST, CNRS (France)

Scientific Program Committee Cochairs

V. A. Svich, V.N. Karazin Kharkiv National University (Ukraine)
M. Marciniak, National Institute of Telecommunications (Poland)
I. A. Sukhoivanov, University of Guanajuato (Mexico) and Kharkiv National University of Radio Electronics (Ukraine)

Organizing Committees

CAOL/LFNM 2005 Cochairs

V. A. Maslov, V.N. Karazin Kharkiv National University (Ukraine)
I. A. Sukhoivanov, University of Guanajuato (Mexico) and Kharkiv National University of Radio Electronics (Ukraine)

POEO 2005 Cochairs

Ya. S. Yatskiv, Main Astronomical Observatory of the National Academy of Sciences of Ukraine (Ukraine)
Yu. S. Shmaliy, University of Guanajuato (Mexico) and Kharkiv National University of Radio Electronics (Ukraine)
Secretariat

A. V. Kublik, Kharkiv National University of Radio Electronics (Ukraine)
O. V. Mashoshyna, Kharkiv National University of Radio Electronics (Ukraine)

Members

J. A. Andrade-Lucio, University of Guanajuato (Mexico)
I. V. Dzedolik, V.I. Vernadskii Tavrida National University (Ukraine)
T. B. Grischenko, Kharkiv National University of Radio Electronics (Ukraine)
I. S. Manak, Belarus State University (Belarus)
O. Ibarra-Manzano, University of Guanajuato (Mexico)
A. V. Marienko, Joint Stock Company “Meridian” (Ukraine)
S. I. Petrov, Kharkiv National University of Radio Electronics (Ukraine)
I. M. Safonov, Kharkiv National University of Radio Electronics (Ukraine)
Y. Safranov, Main Astronomical Observatory of the National Academy of Sciences of Ukraine (Ukraine)
D. M. Sazonov, Power Engineering Institute (Russia)
O. Yu. Shmaliy, Engineering-Pedagogical Academy (Ukraine)
A. V. Shulika, Kharkiv National University of Radio Electronics (Ukraine)
M. Torres-Cisneros, University of Guanajuato (Mexico)
Introduction

The Second International Conference on Advanced Optoelectronics and Lasers, CAOL 2005, was held 12 to 17 September 2005, in Yalta, Ukraine, in the resort “Russia,” which is in the immediate vicinity of Livadia Palace and situated in the luxurious park, Chukurlar. The conference covered many aspects of advanced optoelectronics, including application of theoretical methods and computer modeling of optoelectronic and laser systems, as well as tangent areas of optoelectronics research that are currently underway. We can say with great satisfaction that CAOL is receiving international recognition as one Ukraine’s first-rate English-speaking conferences on optoelectronics and laser engineering. It should be noted that this conference is unique in that it joins specialists in precision signal processing with optical engineers.

Participants from leading scientific organizations in 37 countries gathered in Yalta to present papers embracing mathematical, physical, and technical problems of modern laser physics, photonics, optics, and signal processing. The research topics with high representation were semiconductor nanoengineering and photonic crystals, and nonlinear optics, as well as optical measurements, wave distribution in optical systems, and precision oscillations.

It can be concluded that CAOL 2005 was met with success, and indeed the CAOL series continues. The Conference was held in Guanajuato, Mexico (2006) and is planned to be held again in Alushta, Ukraine in September, 2008. It holds great potential for showcasing ongoing investigations in those fields of photonics that will generate new optoelectronic devices for various applications. In particular, this potential lies in research related to photonic crystals and devices based on them, creation of new nanolasers and other active elements based on quantum-confined structures, and creation of ultrabroadband systems and data transmission devices, including those for application in optical computers.

Igor A. Sukhoivanov
Vasily A. Svich
Yuriy S. Shmaliy