PROCEEDINGS OF SPIE

International Conference on Micro- and Nano-Electronics 2016

Vladimir F. Lukichev
Konstantin V. Rudenko
Editors

3-7 October 2016
Zvenigorod, Russian Federation

Organized by
Institute of Physics and Technology (Russian Federation)

Sponsored by
SC "Molecular Electronics Research Institute" (Russian Federation)
Russian Foundation for Basic Researches (Russian Federation)
Russian Academy of Sciences (Russian Federation)
TechnoInfo Ltd. (United Kingdom/Russian Federation)
NIX Company (Russian Federation)

Published by
SPIE

Volume 10224

Proceedings of SPIE 0277-786X, V. 10224

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

International Conference on Micro- and Nano-Electronics 2016, edited by Vladimir F. Lukichev, Konstantin V. Rudenko
Proc. of SPIE Vol. 10224, 1022401 · © 2016 SPIE · CCC code: 0277-786X/16/$18 · doi: 10.1117/12.2270028

The papers 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. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers 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 these proceedings:
Author(s), "Title of Paper," in *International Conference on Micro- and Nano-Electronics 2016*, edited by Vladimir F. Lukichev, Konstantin V. Rudenko, Proceedings of SPIE Vol. 10224 (SPIE, Bellingham, WA, 2016) Seven-digit article CID Number.

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510609495
ISBN: 9781510609501 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445
SPIE.org

Copyright © 2016, 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 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/16/$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIE. DIGITAL LIBRARY
SPIEDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five 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.

Contents

xi *Authors*

xv *Conference Committee*

xxi *Introduction*

MICRO- AND NANOELECTRONIC MATERIALS AND FILMS I

10224 02 **HfO_2/Pr_2O_3 gate dielectric stacks** [10224-45]

10224 03 **Low resistance Ti/Si/Ti/Al/Ni/Au ohmic contact for AlGaN/GaN HEMT** [10224-66]

10224 04 **Tungsten alloyed with rhenium as an advanced material for heat-resistant silicon ICs interconnects** [10224-10]

10224 05 **Metal-assisted chemical etching of silicon with different metal films and clusters: a review** [10224-54]

10224 06 **Mechanical properties of bimetallic one-dimensional structures** [10224-94]

10224 07 **Optical coefficients of nanometer-thick copper and gold films in microwave frequency range** [10224-26]

10224 08 **Effective optical constants of silver nanofilms calculated in wide frequency range** [10224-77]

10224 09 **Analysis of contribution from various order diffraction maxima to complex magneto-optical Kerr effect from three-dimensional structures like magnetophotonic crystals** [10224-16]

10224 0A **Modulation of magnetic interaction in Bismuth ferrite through strain and spin cycloid engineering** [10224-68]

10224 0B **Quantum-mechanical relaxation model for characterization of fine particles magnetic dynamics in an external magnetic field** [10224-106]

MICRO- AND NANOELECTRONIC MATERIALS AND FILMS II

10224 0C **GeSi nanocrystals formed by high temperature annealing of GeO/SiO_2 multilayers: structure and optical properties** [10224-17]

10224 0D **Hydrogenated amorphous silicon based p-i-n structures with Si and Ge nanocrystals in i-layers** [10224-22]

10224 0E **Investigation of the phase formation from nickel coated nanostructured silicon** [10224-8]

10224 0F **Chemical surface treatment of $Ge_2Sb_2Te_5$ thin films for phase change memory application** [10224-103]

10224 0G **Some important aspects in the glass structure of chalcogenide systems** [10224-47]

10224 0H **Study of morphological characteristic of *por*-Si formed using metal-assisted chemical etching by BET-method and fractal geometry** [10224-101]

10224 0I **Formation of nanoporous structure in silicon substrate using two-stage annealing process** [10224-70]

10224 0J **Application of porous alumina formed in selenic acid solution for nanostructures investigation via Raman spectroscopy** [10224-102]

10224 0K **Low-threshold field emission in planar cathodes with nanocarbon materials** [10224-92]

10224 0L **The features of CNT growth on catalyst-content amorphous alloy layer by CVD-method** [10224-65]

PHYSICS OF MICRO- AND NANODEVICES

10224 0M **Low-dimensional transit-time diodes for terahertz generation** [10224-110]

10224 0N **Efficiency of the signal detection in RF and sub THz ranges by means of GaAs tunnel diodes** [10224-73]

10224 0O **Electrically stimulated high-frequency replicas of a resonant current in GaAs/AlAs resonant-tunneling double-barrier THz nanostructures** [10224-55]

10224 0P **Photoresponse in graphene field effect transistor under ultra-short pulsed laser irradiation** [10224-24]

10224 0Q **Dielectric influence on IV curve of graphene field effect transistor** [10224-18]

10224 0R **Sn nanothreads in GaAs: experiment and simulation** [10224-109]

10224 0S **Thin film ruthenium microstructures for transition edge sensors** [10224-19]

10224 0T **Investigation of memristor effect on the titanium nanowires fabricated by focused ion beam** [10224-78]

10224 0U **Resistive switching of vertically aligned carbon nanotube by a compressive strain** [10224-40]

MODELING AND SIMULATION

10224 0V **Simulation of field-effect transistors and resonant tunneling diodes based on graphene** [10224-14]

10224 0W **Ensemble Monte Carlo simulation of electron transport in GaAs/AlAs quantum wire structure under the effect of terahertz electric field** [10224-43]

10224 0X **Thermo injecting electrical instability in the AlxGa1-xAs/GaAs heterostructures with tunnel-nontransparent potential barriers** [10224-64]

10224 0Y ***I-V* characteristics simulation of silicon carbide Ti/4H-SiC Schottky diode** [10224-80]

10224 0Z **Development of drift-diffusion numerical models of high-speed on-chip photodetectors with heterojunctions** [10224-33]

10224 10 **Numerical modeling of microwave switchers with subpicosecond time delay** [10224-29]

10224 11 **Ambipolar memristor-based oscillator** [10224-57]

10224 12 **The spatially dispersive eigenvalues of permittivity operator and frequency-dependent surface impedance for conductors without the dc dissipation** [10224-79]

10224 13 **Calculation of the high-frequency conductivity and the Hall constant of a thin semiconductor film** [10224-13]

10224 14 **A simple calculation method for heavy ion induced soft error rate in space environment** [10224-99]

10224 15 **Compact modeling of radiation-induced drain leakage current** [10224-104]

10224 16 **Total ionizing dose effects modeling in common-gate tri-gate FinFETs using Verilog-A** [10224-56]

10224 17 **Application of triple modular redundancy for soft error mitigation in 65-28 nm CMOS VLSI** [10224-98]

10224 18 **Layout-aware simulation of soft errors in sub-100 nm integrated circuits** [10224-58]

MICRO- AND NANOELECTROMECHANICAL SYSTEMS

10224 19 **Silicon ohmic lateral-contact MEMS switch for RF applications** [10224-82]

10224 1A **A low actuation voltage bistable MEMS switch: design, fabrication and preliminary testing** [10224-23]

10224 1B **Research of the micromechanical three-axis accelerometer** [10224-42]

10224 1C **Simulation of heavy charged particles damage on MEMS** [10224-38]

10224 1D **Anchored multi-DOF MEMS gyroscope having robust drive mode** [10224-89]

10224 1E **Highly sensitive devices for primary signal processing of the micromechanical capacitive transducers** [10224-31]

10224 1F **Integral planar supercapacitor with CNT-based composite electrodes for heat-sensitive MEMS and NEMS** [10224-75]

10224 1G **Biosensor platform based on carbon nanotubes covalently modified with aptamers** [10224-71]

10224 1H **Angular MET sensor for precise azimuth determination** [10224-72]

10224 1I **The simulation model of planar electrochemical transducer** [10224-76]

10224 1J **The planar silicon-based microelectronic technology for electrochemical transducers** [10224-84]

10224 1K **The precision seismometer based on planar electrochemical transducer** [10224-85]

10224 1L **3D simulation of silicon micro-ring resonator with Comsol** [10224-44]

MICRO- AND NANOELECTRONIC TECHNOLOGIES I

10224 1M **Electro-optical converter of zero-order and second-order Bessel laser beams for the photolithography systems** [10224-9]

10224 1N **The formation of photoresist film with thicknesses from 0.7 microns to 100 microns on surfaces with considerable relief by spray coating on the heated substrate** [10224-11]

10224 1O **Problems and prospects of maskless (B)EUV lithography** [10224-91]

10224 1P **Resistless lithography - selective etching of silicon with gallium doping regions** [10224-20]

10224 1Q **Features of local anodic oxidation process** [10224-6]

10224 1R **Deposition of polymers on structures with nano-gaps fabricated between carbon nanotubes by focused ion beam etching** [10224-37]

10224 1S **Direct laser patterning of graphene-based biosensors** [10224-93]

MICRO- AND NANOELECTRONIC TECHNOLOGIES II

10224 1T **III-Nitride advanced technologies and equipment for microelectronics** [10224-100]

10224 1U **Plasma parameters and active species kinetics in $CF_4/O_2/Ar$ gas mixture: effects of CF_4/O_2 and O_2/Ar mixing ratios** [10224-21]

10224 1V **Technology for fabrication of sub-20 nm silicon planar nanowires array** [10224-87]

10224 1W **Comparative study of CF_4- and CHF_3-based plasmas for dry etching applications** [10224-35]

10224 1X **Cellular-automata model of oxygen plasma impact on porous low-K dielectric** [10224-32]

10224 1Y **Investigation of the reactive ion etching of $Ge_2Sb_2Te_5$ thin films** [10224-97]

10224 1Z **A study of the vertical walls and the surface roughness GaAs after the operation in the combined plasma etching** [10224-90]

10224 20 **Low-damage plasma etching of porous low-k films in CF_3Br and CF_4 plasmas under low-temperature conditions** [10224-88]

10224 21 **Elements for hard X-ray optics produced by cryogenic plasma etching of silicon** [10224-25]

10224 22 **Temperature switching waves in a silicon wafer on lamp-based heating** [10224-30]

10224 23 **Critical parameters of silicon wafer lamp-based annealing in high power flux of incoherent radiation** [10224-69]

10224 24 **Evolution of structural properties of Si(001) subsurface layer containing He bubbles by low temperature annealing** [10224-62]

METROLOGY AND DIAGNOSTICS

10224 25 **Application of spectral ellipsometry to in situ diagnostics of atomic layer deposition of dielectrics on silicon and AlGaN** [10224-34]

10224 26 **Non-destructive determination of thickness of the dielectric layers using EDX** [10224-12]

10224 27 **TDR method for determine IC's parameters** [10224-67]

10224 28 **Determination of mechanical stress in the silicon nitride films with a scanning electron microscope** [10224-1]

10224 29 **Method of stress and measurement modes for research of thin dielectric films of MIS structures** [10224-107]

10224 2A **Numerical simulation of thin-film microthermocouple for the research of dissipation in tunneling contact** [10224-36]

10224 2B **Classification automation of thermoplastic particles in a cured epoxy matrix according to their size on microscopic images** [10224-81]

10224 2C **Fundamentals of the fast neutral beams diagnostics** [10224-59]

10224 2D **Optical emission 2D-tomography of plasma: case of rectangular two-view scanning and diagonal symmetry of inhomogeneities** [10224-49]

QUANTUM INFORMATICS

10224 2E **Experimental and theoretical investigations of quantum state transfer and decoherence processes in quasi-one-dimensional systems in multiple-quantum NMR experiments** [10224-4]

10224 2F **Quantum entanglement and quantum discord in dimers in multiple quantum NMR experiments** [10224-5]

10224 2G **Multifunctional quantum node based on double quantum dot in laser and cavity fields** [10224-51]

10224 2H **Diamond chip under single-photon driving as a high spatial resolution quantum magnetometer and electrometer** [10224-53]

10224 2I **Stark-shift based quantum dot-cavity electrometer** [10224-96]

10224 2J **Single-photon transmission and spectroscopy of diamond microring isomers** [10224-48]

10224 2K **Single-electron solitons in magnetic field** [10224-111]

10224 2L **Continuous-time quantum walk of two interacting fermions on a cycle graph** [10224-83]

10224 2M **Quantum-classical crossover in quantum walks mixing time** [10224-112]

10224 2N **Broadband biphotons in the single spatial mode through high pump focusing and walk-off effect** [10224-61]

10224 2O **Quantum states tomography with noisy measurement channels** [10224-63]

10224 2P **Schmidt decomposition and multivariate statistical analysis** [10224-60]

10224 2Q **Study of higher order correlation functions and photon statistics using multiphoton-subtracted states and quadrature measurements** [10224-52]

10224 2R **Analysis of quantum tomography protocol efficiency for triphoton polarization states** [10224-46]

10224 2S **Numerical characteristics of quantum computer simulation** [10224-74]

10224 2T **Effective computation of quantum discord in a multiqubit spin chain** [10224-86]

10224 2U **Effect of crosstalk on QBER in QKD in urban telecommunication fiber lines** [10224-39]

10224 2V **Single photon detector design features** [10224-50]

10224 2W **Fast polarization QKD scheme based on $LiNbO_3$ phase modulators** [10224-28]

10224 2X **Computer simulation of quantum effects in Tavis-Cummings model and its applications** [10224-108]

10224 2Y **Dark states of atomic ensembles: properties and preparation** [10224-7]

10224 2Z **Selective measurement of quantronium qubit states by using of mesoscopic non-linear oscillator** [10224-95]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Abdullaev, D. A., 1P, 26
Abramov, Igor I., 0V
Ageev, Oleg A., 0T, 0U, 1Z
Aleksanyan, A. A., 0O
Alekseyev, A., 1F
Alexeev, A. N., 1T
Amirov, Ildar I., 1A
Andreev, Dmitrii V., 29
Andreev, Valery G., 06, 07, 08
Andreev, Vladimir V., 29
Antonov, Alexander, 1H
Avilov, V. I., 0T
Avosopyants, G. V., 2Q, 2R
Baklanov, M., 20
Balbekov, A., 18
Bantysh, B. I., 2O
Belinsky, L. V., 2Q, 2R
Belov, A. N., 04, 1Q
Berezkina, Alexandra Yu., 0E
Blinov, Yuriy F., 0U
Bobkov, S., 18
Bobrinetskiy, Ivan I., 0P, 1G, 1R, 1S
Bochkin, G. A., 2E
Bogdanov, Yu. I., 2O, 2P, 2Q, 2R
Bogdanova, N. A., 2O, 2P, 2Q
Bondarev, F., 1B
Borshchevskaya, N. A., 2R
Borzdov, Andrei V., 0M, 0W
Borzdov, Vladimir M., 0M, 0W
Boyko, Anton N., 0H
Bugaev, A., 0R
Bulyarskii, S., 0L
Chaly, V. P., 1T
Chaplygin, Yu. A., 04, 0K, 1Q
Chekmachev, Vadim G., 2I
Cherkov, A. G., 0C
Chernyaev, A. P., 12
Chernyavskiy, A., 2S, 2T
Chesnokov, Yury M., 24
Chkhalo, N. I., 1O
Chuev, M., 0B
Ciesielski, R., 0L
Clemente, Iosif E., 20, 25
Cohn, I. A., 0S
Davydov, F., 0M
Dedkova, A. A., 28
Degtyarev, S. A., 1L
Denisenko, M. V., 2Z
Denisenko, M., 1E
Denisenko, Yuri I., 0I
Djuzhev, N. A., 28
Dolgov, A. N., 1J
Doronin, S. I., 2E
Dresvyannikov, M. A., 0N, 12
Drosdetsky, M. G., 15
Dubkov, S., 0L
Dudin, Alexander A., 05, 0E
Duplinskiy, A., 2W
Dvurechendkii, A. V., 0D
Efremov, A., 1U, 1W
Egorchikov, A. E., 1J
Egorov, I. V., 1J
Elushov, I. V., 14
Emelianov, Aleksei V., 0K, 0P, 1R
Eskov, Andrey V., 1Z
Ezhova, O., 1B
Fadeev, A. V., 2D
Fajgar, R., 0D
Fastovets, D. V., 2P
Fedichkin, Leonid E., 0M, 2L, 2M
Fedorova, A. V., 2E
Fel'dman, E. B., 2E
Filippov, S., 2K
Fomchenkov, S. A., 1D
Gaev, Dahir S., 0H
Galimov, A. M., 14
Gavrilin, I., 1F
Gavrilov, Sergey A., 05, 0E, 0H, 0J, 0L
Gerasev, S. A., 2F
Gergel, V. A., 0X
Glukhenkaya, V. B., 0F
Glushko, A., 1C
Golishnikov, A. A., 04
Golovin, A. V., 1G, 1S
Gorbunov, Maxim S., 16, 18
Gornev, E. S., 1I, 1J
Gornev, Evgeny S., 1X
Gorshkova, N. M., 0X
Gromov, D., 0J, 0L, 1F, 1Y
Gusev, E. E., 28
Gutshin, Oleg P., 1X
Ilin, A. S., 0S
Ilin, Oleg I., 0U
Ilina, Marina V., 0U
Isaeva, A., 1E
Jityaev, I. L., 0T
Kalmykov, Rustam M., 0H
Kalnov, V., 19

Kalugin, Viktor V., 0G
Kamaev, G. N., 0D
Kanapin, Alan A., 2U, 2W
Kargin, Nikolay I., 03, 0Q
Karuzskii, A. L., 0N, 0O, 12
Katamadze, K. G., 2N, 2Q, 2R
Kateev, Igor Yu., 2H, 2J
Kazakov, I. P., 0O
Kelm, E. A., 26
Khabibullin, R. A., 0R, 0X
Khabutdinov, R., 0M
Khamitov, K., 2S
Khlybov, A., 27
Khonina, S. N., 1D, 1L, 1M
Khorin, I., 07
Kireev, Dmitry M., 0P
Kiselev, Dmitrii A., 24
Kitsyuk, E., 0L, 1F
Klimin, Viktor S., 0U, 1Z
Kochubei, S. A., 0D
Kolomejtseva, Natali V., 0V
Kolomiytsev, A. S., 0T
Komarov, I. A., 1G, 1S
Konoplev, B., 10, 1B, 1E
Korobova, Natalia E., 0G
Koroleva, Olga M., 1A
Kostyukov, D. A., 04
Kovalenko, A. G., 0S
Kozmin, A., 1Y
Kozyukhin, S. A., 0F
Krasovitsky, D. M., 1T
Kravchenko, Vladislav V., 2A
Krayushkina, E., 0Y
Krishtop, T. V., 1I
Krishtop, Vladimir, 1H, 1I, 1J, 1K
Krivyakin, G. K., 0D
Kudrya, V., 2C
Kulik, S. P., 2N, 2Q
Kulyamina, Darya A., 03
Kurenya, Alexey L., 22, 23
Kurochkin, Vladimir L., 2U, 2V
Kurochkin, Yuriy V., 2U, 2V, 2W
Kuznetsov, Yu. A., 2R
Kuznetsova, E. I., 2F
Kuznetsova, I. A., 13
Kvasnyy, A. B., 2O
Kwon, Kwang-Ho, 1U, 1W
Labunov, Vladimir A., 0V
Ladunov, Vitalii Y., 2X
Lazarenko, P. I., 0F, 1Y
Lebedev, E., 1F
Lebedev, K., 19
Lee, Junmyung, 1U
Lemeshko, S., 1Q
Levin, Denis D., 1N
Lomov, Andrey A., 24
Lukichev, Vladimir F., 19, 21, 2O, 2P, 2Q
Lysenko, I., 1B, 1E
Maishev, Yu., 2C
Makarchuk, V., 1C
Malakhanov, A., 0Y
Maltsev, P. P., 0R, 0X
Mamaev, V. V., 1T
Maniecki, T., 0L
Maslovsky, Vladimir M., 29
Matyushkin, Igor V., 1X
Melnikov, Alexey A., 2L
Meshchaninov, Fedor, 2M
Miakonkikh, Andrey V., 19, 1V, 20, 21, 24, 25
Mierczynski, P., 0L
Mikhailova, M. S., 0F
Mikhaylichenko, S., 1C
Miller, Alexander V., 2U
Milovanov, R. A., 1P, 26
Minaev, Viktor S., 0G
Minkin, V. S., 0X
Mischenko, I., 0B
Mityagin, Yu. A., 0O, 12
Molchanova, A., 02
Morgunov, A., 1W
Murzin, V. N., 0O
Naumov, Victor V., 1A
Nazarkina, Y. V., 0J
Nemtseva, S. Y., 0F
Nevolin, Vladimir K., 1N
Nikitov, S. A., 0X
Novikov, A. V., 1J
Orlikovsky, N., 07
Orlov, V. V., 15
Otero, Nerea, 0P
Otsuji, T., 0R
Ovcharov, Vladimir V., 22, 23
Ozhigov, Yuri I., 2X, 2Y
Panchenko, P., 0Y
Paporkov, Vladimir A., 09
Paranin, V. D., 1M
Patiukov, N., 28
Pavelyev, V. S., 1D
Pavlov, A. Yu., 0X
Pavlov, A., 05, 0K, 0L
Pavlovskiy, V. V., 0X
Perestoronin, A. V., 0N, 0O, 12
Petrov, S. I., 1T
Petukhov, V., 0K
Petukhov, Vladimir A., 2A
Pillai, Shreeja, 0A
Pisarenko, I. V., 0Z
Podlipnov, V. V., 1L
Polkovnikov, V. N., 1O
Polohin, A. A., 0J
Ponomarev, D., 0R
Popov, V. G., 1J
Prigara, Valeriya P., 22, 23
Priimochenko, V. V., 0N
Prokaznikov, Alexander V., 09
Pronin, S., 07
Purkrt, A., 0D

Putrya, M. G., 04
Pyatilova, Olga V., 05, 0E, 0H
Radkov, A., 0Y
Rakitin, Alexander V., 11
Rakitin, Vladimir V., 11
Rana, D. S., 0A
Remes, Z., 0D
Reshi, Hilal Ahmad, 0A
Rezvanov, Askar, 1X
Rinnert, H., 0C
Rodionov, D., 27
Rogachev, Maxim S., 2J
Rogozhin, Alexander E., 02, 07, 19, 1V, 21
Romanov, D. N., 13
Romanova, Irina A., 0V
Romashkin, Alexey V., 1N, 1R
Romero, Pablo, 0P
Rozanov, Roman Yu., 1N
Rubtsova, E. I., 1G, 1S
Rudakov, Valery I., 0I, 22, 23
Rudenko, Konstantin V., 0M, 19, 1V, 20, 21, 2D
Rudenko, M., 2K
Ryazanov, R., 1F
Rybalka, S., 0Y
Ryndin, E. A., 0Z, 10, 1B, 1E
Ryzhii, M., 0R
Ryzhii, V., 0R
Ryzhuk, Roman V., 03
Sablina, Victoria A., 2B
Safonov, S. O., 04
Sagunova, I., 1Q
Salashchenko, N. N., 1O
Saletsky, Alexander M., 06
Satanin, A. M., 2Z
Savenko, O. V., 13
Savitskiy, A., 05
Semenikhin, I., 0M, 0R
Shabadarova, D., 1W
Shabalina, A. S., 1K
Shakhnov, V., 1C
Shaman, Y. P., 0J
Shamanaev, A., 0K
Shcherbachev, Kirill D., 24
Shelke, Vilas, 0A
Sherchenkov, A. A., 0F, 1Y
Shevyakov, V. I., 04, 1Q
Shilyaeva, Yulia I., 0E
Shklyaev, A. A., 0D
Shmelev, S. S., 0O
Shostachenko, Stanislav A., 03, 0Q
Shuliatyev, A., 05, 1Y
Sidorov, F., 02
Sidorov, L. N., 26
Sitnikov, Ivan I., 06
Skorobogatov, A. P., 17
Skovoroda, Nikita A., 2X
Smelova, Ekaterina M., 06
Smirnov, Dmitry I., 0E
Smirnov, Vladimir A., 0T, 1Z
Snigirev, Anatoly A., 21
Sokolov, Alexander S., 2U
Sokolov, S. A., 26
Solodovnik, Maxim S., 1Z
Stanishevskiy, Yaroslav M., 0Q
Stoffel, M., 0C
Stolyarov, Alexander A., 29
Stuchlik, J., 0D
Stuchliková, T. H., 0D
Svintsov, Dmitry, 0M, 2K
Sysa, Artem V., 05, 0E, 1F, 1Y
Tatarintsev, Andrey A., 07, 19, 1V
Teplov, A., 2S
Terekhov, V., 1C
Tereshonok, D. V., 1I
Timoshenkov, Sergey P., 0F, 0G, 0H
Timoshenkov, V., 0K, 27
Tominov, Roman V., 1Z
Toropov, M. N., 1O
Trifonov, A., 0L
Trofimov, A. A., 0X
Tsarik, K. A., 1R
Tskhovrebov, A. M., 0N, 0O
Tsukanov, Alexander V., 2G, 2H, 2I, 2J
Tsysar, Kseniya M., 06, 08
Uma, B. V., 1D
Ustimchik, V., 2W
Uvarov, Ilya V., 1A
Vaganova, Elena I., 1A
Varnavsky, Alexander N., 2B
Varnavsky, Andrei N., 2B
Vasil'ev, S. G., 2E
Vdovin, V. I., 0C
Vdovin, Vladimir A., 06, 07, 08
Vergeles, S. S., 1I
Vergnat, M., 0C
Verhovtseva, A. V., 0X
Verma, Payal, 1D, 1L
Vishnevskiy, A., 20
Voevodin, V., 2S
Voevodin, Vl., 2S
Volchkov, N. A., 12
Volodin, V. A., 0C, 0D
Vystavkin, A. N., 0S
Vyurkov, Vladimir, 0M, 0R, 0W 2K
Yachmenev, A., 0R
Yadav, Rama Shanker, 0A
Yunkin, Vyacheslav A., 21
Zaitsev, Dmitry, 1H
Zaitsev, Sergey V., 2V
Zakharchenko, Roman V., 03, 0Q
Zarev, Ivan S., 09
Zebrev, Gennady I., 0Q, 14, 15, 16
Zelensky, Vladimir S., 06
Zherikhina, L. N., 0N
Zhevnenko, D. A., 1I
Zhigalov, V., 0K
Zinchenko, L., 1C

Zubov, D., 1P
Zvezdin, Nickolay Yu., 09

Conference Committee

Conference Chairs

Evgeny P. Velikhov, Russian Scientific Center “Kurchatov Institute” (Russian Federation)

Yuri V. Gulyaev, Kotel'nikov Institute of Radio Engineering and Electronics (Russian Federation)

Conference Co-Chair

Gennadiy Ya. Krasnikov, SC "Molecular Electronics Research Institute" (Russian Federation)

International Advisory Committee

Alexander L. Aseev, Rzhanov Institute of Semiconductor Physics (Russian Federation)
Dmitri V. Averin, Stony Brook University (United States)
Mikhail R. Baklanov, International Microelectronic Center (Belgium)
Francis Balestra, Grenoble Institute of Technology (France)
Vladimir A. Labunov, Belarusian State University of Informatics and Radioelectronics (Belarus)
Konstantin K. Likharev, Stony Brook University (United States)
Alexey N. Nazarov, Institute of Semiconductor Physics (Ukraine)
Jun-ichi Nishizawa, Semiconductor Research Institute (Japan)
Konstantin S. Novoselov, University of Manchester (United Kingdom)
Taiichi Otsuji, Tohoku University (Japan)
Iwo W. Rangelow, University of Ilmenau (Germany)
Stefan E. Schulz, Fraunhofer Institute for Electronic Nanosystems (Germany)
Thomas Skotnicki, ST Microelectronics (France)
Robert A. Suris, Ioffe Institute (Russian Federation)
Akira Toriumi, University of Tokyo (Japan)

Program Committee

Chair

Yuri V. Gulyaev, Kotel'nikov Institute of Radio Engineering and Electronics (Russian Federation)

Co-Chairs

Igor G. Neizvestnyi, Rzhanov Institute of Semiconductor Physics (Russian Federation)

Vladimir F. Lukichev, Institute of Physics and Technology (Russian Federation)

Members

Vladimir B. Betelin, Scientific Research Institute for System Analysis (Russian Federation)
Yuri I. Bogdanov, Institute of Physics and Technology (Russian Federation)
Yuri A. Chaplygin, National Research University of Electronic Technology (Russian Federation)
Mikhail A. Chuev, Institute of Physics and Technology (Russian Federation)
Leonid E. Fedichkin, Moscow Institute of Physics and Technology, State University (Russian Federation)
Fadey F. Komarov, Belarusian State University (Belarus)
Peter S. Kop'ev, Ioffe Institute (Russian Federation)
Peter P. Maltsev, Institute on Ultra High Frequency Semiconductor Electronics (Russian Federation)
Vladislav Ya. Panchenko, Institute on Laser and Informatics Technologies (Russian Federation)
Dmitry V. Roshchupkin, Institute of Microelectronics Technology and High Purity Materials (Russian Federation)
Konstantin V. Rudenko, Institute of Physics and Technology (Russian Federation)
Alexander S. Rudy, P.G. Demidov Yaroslavl State University (Russian Federation)
Nikolay N. Salaschenko, Institute for Physics of Microstructures (Russian Federation)
Kev M. Salikhov, Kazan E.K. Zavoisky Physical-Technical Institute (Russian Federation)
Alexander S. Sigov, Moscow Technological University (Russian Federation)
Pavel A. Todua, Moscow Institute of Physics and Technology, State University (Russian Federation)
Vladimir V. Vyurkov, Institute of Physics and Technology (Russian Federation)

Organizing Committee

Chair

Vladimir F. Lukichev, Institute of Physics and Technology (Russian Federation)

Co-Chair

Konstantin V. Rudenko, Institute of Physics and Technology (Russian Federation)

Members

Igor I. Abramov, Belarusian State University of Informatics and Radioelectronics (Belarus)
Ildar I. Amirov, Institute of Physics and Technology, Yaroslavl Branch (Russian Federation)
Yuri I. Bogdanov, Institute of Physics and Technology (Russian Federation)
Anastas A. Buharaev, Kazan E.K. Zavoisky Physical-Technical Institute (Russian Federation)
Mikhail A. Chuev, Institute of Physics and Technology (Russian Federation)
Alexander A. Gorbazevitch, P.N. Lebedev Physical Institute (Russian Federation)
Eugeny S. Gornev, SC "Molecular Electronics Research Institute" (Russian Federation)
Mikhail A. Korolev, National Research University of Electronic Technology (Russian Federation)
Oleg P. Pchelyakov, Rzhanov Institute of Semiconductor Physics (Russian Federation)
Vladimir P. Popov, Rzhanov Institute of Semiconductor Physics (Russian Federation)
Vladislav Yu. Rubaev, NIX Company (Russian Federation)

Local Organizing Committee

Vladimir F. Lukichev – Chair of the Local Organizing Committee
Konstantin V. Rudenko – Co-Chair of the Local Organizing Committee
Yuri I. Bogdanov – Chair of the Extended Session "Quantum Informatics"
Vladimir P. Kudrya – Scientific Secretary
Sergey I. Skalkin – Financial Director
Alexander N. Astakhov – Administrator
Alexey M. Dianov – PR-support
Andrey Yu. Chernyavskiy – WEB design
Andrey V. Miakonkikh – Technical Support
Alexander E. Rogozhin – Technical Support
Igor A. Semenikhin – Visa support

Vladimir V. Vyurkov – Contacts to the invited speakers
Lidiya M. Besschastnova – Registration and accommodation
Irina Yu. Lukianova – Registration and accommodation
Inna V. Nikitushkina - Conference fee manager
Irina B. Novojilova – Conference fee manager

Session Chairs

Plenary Session I
Vladimir F. Lukichev, Institute of Physics and Technology
(Russian Federation)

Plenary Session II. Quantum Informatics I
Yuri I. Bogdanov, Institute of Physics and Technology
(Russian Federation)

Plenary Session III
Vladimir F. Lukichev, Institute of Physics and Technology
(Russian Federation)

1 Materials and Films I
Andrey V. Miakonkikh, Institute of Physics and Technology
(Russian Federation)

2 Physics of Nanotransistors
Vladimir V. Vyurkov, Institute of Physics and Technology
(Russian Federation)

3 Quantum Informatics II
Sergey P. Kulik, Lomonosov Moscow State University
(Russian Federation)

4 Advanced Lithography
Konstantin V. Rudenko, Institute of Physics and Technology
(Russian Federation)

5 Physics of Memory Cells
Oleg S. Trushin, Institute of Physics and Technology, Yaroslavl Branch
(Russian Federation)

6 Quantum Informatics III
Sergei A. Moiseev, Kazan Quantum Center, Kazan Scientific Research
Technical University (Russian Federation)

7 Materials and Films II
Andrey V. Miakonkikh, Institute of Physics and Technology (Russian Federation)

8 Superconducting Devices
Vladimir F. Lukichev, Institute of Physics and Technology (Russian Federation)

9 Quantum Informatics IV
Eduard B. Fel'dman, Institute of Problems of Chemical Physics (Russian Federation)

10 Superconducting and Spintronics Devices
Valery G. Andreev, Lomonosov Moscow State University (Russian Federation)

11 Meeting of the International Association of the Academies of Sciences I
Vladimir F. Lukichev, Institute of Physics and Technology (Russian Federation)

12 Quantum Informatics V
Farid M. Ablayev, Kazan Federal University (Russian Federation)

13 Plasma-Based Technologies
Konstantin V. Rudenko, Institute of Physics and Technology (Russian Federation)

14 Semiconductor Devices of Photonics
Vladimir V. Vyurkov, Institute of Physics and Technology (Russian Federation)

15 Quantum Informatics VI
Andrey Chernyavskiy, Institute of Physics and Technology (Russian Federation)

16 Modeling and Simulation of Semiconductor Devices
Vladimir V. Vyurkov, Institute of Physics and Technology (Russian Federation)

17 Metrology and Characterization
Andrey V. Miakonkikh, Institute of Physics and Technology (Russian Federation)

18 Quantum Informatics VII
Yuri I. Ozhigov, Lomonosov Moscow State University (Russian Federation)

19 MEMS and NEMS
Ildar I. Amirov, Institute of Physics and Technology, Yaroslavl Branch (Russian Federation)

20 Meeting of the International Association of the Academies of Sciences II
Vladimir F. Lukichev, Institute of Physics and Technology (Russian Federation)

Introduction

The volume contains selected papers presented at the International Conference "Micro- and Nanoelectronics – 2016" (ICMNE-2016) which has been held in Zvenigirod, Moscow Region, Russia during October 3-7, 2016. ICMNE is a biannual conference covering the main fields of micro- and nanoelectronic technologies and device physics. Since 1992 the Institute of Physics and Technology (Moscow, Russia) is the permanent organizer of ICMNE. From 2003 ICMNE is an SPIE-affiliated conference. ICMNE-2016 included the Extended Session "Quantum Informatics-2016". The ICMNE-2016 scope contained such scientific and technological fields as micro- and nanoelectronic materials and films, technologies and equipment, metrology, physics and technologies of micro- and nanodevices, simulation and modeling, MEMS and NEMS physics and technology, quantum informatics. ICMNE-2016 included three plenary sessions and 18 topical sessions covering the following areas of focus:

- Physics of Nanotransistors, Photonic Devices, and Memory Cells
- Materials and Films
- Advanced Lithography
- Superconducting and Spintronics Devices
- Plasma-Based Technologies
- Quantum Informatics
- Simulation and Modeling and Simulation of Semiconductor Devices
- MEMS and NEMS
- Metrology and Characterization

The scientific program was based on invited and contributed papers from the scientists employed at European and Siberian Regions of Russia, Azerbaijan, Belarus, Poland, Germany, France, Korea, Japan, and India. The invited lectures on the current achievements and challenges in the contemporary microelectronics were delivered by the scientists from Germany, Japan, and Russia. The contributions to the sessions of the Conference were made by academic institutions, universities as well as from the industry. More than 100 contributions were discussed at oral presentations; about 120 others were presented as posters.

We hope that helpful discussions of these works at the sessions of the Conference and during personal contacts between attendees will promote the research activity in microelectronic community. Additional information about ICMNE-2016 can be found at the conference website http://www. icmne.ftian.ru

Vladimir F. Lukichev