

# **2015 IEEE 35th International Conference on Electronics and Nanotechnology**

## **(ELNANO 2015)**

**Kyiv, Ukraine  
21-24 April 2015**



**IEEE Catalog Number:** CFP1505U-POD  
**ISBN:** 978-1-4673-6535-2

# C O N T E N T S

## SECTION I. MICRO- AND NANOELECTRONICS:

<b>Microwave Passive and Active Composites Based on Dielectrics</b>	17
Tatarchuk D.D., Poplavko Y.M., Kazmirenko V.A., Borisov A.V.	
<b>Physical Mechanisms Determining Microwave Dielectrics Properties (Part 1. Thermal Stability Nature)</b>	23
Y.M. Poplavko, Y.V. Didenko, Y.I. Yakimenko	
<b>Physical Mechanisms Determining Microwave Dielectrics Properties (Part 2. Dielectric Losses Nature)</b>	29
Y.M. Poplavko, Y.V. Didenko, Y.I. Yakimenko	
<b>Simulation of Digital Circuits Using Ternary Decisions Diagrams</b>	35
Vladimir Bespalov, Alexey Glebov, Alla Mindeeva	
<b>Application of Neural Networks to Detect Metal Bodies</b>	38
D. Lyasota, V. Morozov, V. Magro	
<b>Design of High-Efficiency Digital-Control Multi-Topology Step-Down Switched Capacitor Converter</b>	42
Melikyan Vazgen Sh., Galstyan Vache A.	
<b>Q-Factor of Micromechanically Tuned Microstrip Resonator</b>	46
Pavlo Sergienko, Victor Kazmirenko, Yuriy Prokopenko	
<b>Thermal Stability of Oscillatory Systems Based on Split Dielectric Resonator</b>	51
Shmygin D.A., Tatarchuk D.D., Molchanov V.I., Poplavko Y.M.	
<b>Simplest Models To Explain Dielectric Nonlinearity</b>	55
I.S. Vorotiahin , Y.M. Poplavko, Y.M. Fomichov	
<b>Spin Waves in a Ferromagnetic Nanotube in The Presence of a Spin-Polarized Current</b>	61
Volodymyr V. Kulish	
<b>Surface Modification of Mesoporous Silicon for Nanoelectronics Applications</b>	65
Y. Kutovyi, R. Dybovskyi, I. Gavrilchenko, V. Skryshevsky, Y. Milovanov, Yu. Skryshevski, O. Vahnin	
<b>Landauer – Datta – Lundstrom Generalized Electron Transport Model for Micro- and Nanoelectronics</b>	70
Kruglyak Yu., Strikha M.	
<b>Heat Flow By Phonons in Landauer – Datta – Lundstrom Transport Model For Micro- and Nanoelectronics</b>	75
Kruglyak Yu., Strikha M.	
<b>Thermal Growth and Optical Properties of Zinc Germanate Microrods</b>	81
P. Hidalgo, B. Méndez, A. López and J. Piqueras	
<b>Amplification of Surface Plasmon-Polariton by Pumping of an Active Layer at the Surface</b>	84
Oleksandr Grynko, Valeri Lozovski, Andrew Tsykhyona	
<b>ZnO Nanostructures Via Hydrothermal Synthesis on Atomic Layer Deposited Seed-Layers</b>	89
Anatolii Orlov, Veronika Ulianova, Oleksandr Bogdan, Genadzi Pashkevich, Necmi Biyikli, Eda Goldenberg, Ali Haider	
<b>Energy-Efficient Optically Transparent Coating Based on a Metal-Dielectric Composites</b>	93
A. Borisova, B. Babych, V. Verbitskiy, A. Machulyansky, M. Rodionov, Y. Yakimenko	
<b>Influence of Spatial Nonhomogeneity on the Boundary Friction Regime</b>	97
Iakov A. Lyashenko, Natalia N. Manko	
<b>Electron Transport Through Nanocomposite SiO<sub>2</sub>(Si) Films Containing Si Nanocrystals</b>	101
A. Evtukh, O. Bratus, O. Steblova, V. Prokopchuk	
<b>Optical and Photoluminescence Properties of Powdered Silica Aerogel ar-SiO<sub>x</sub></b>	105
Anna Karlash, Ivan Ivanov	
<b>THz Wave Scattering by a Circular Dielectric Cylinder with a Graphene Shell</b>	109
Elena A. Velichko	
<b>Plasmonic Properties of Coupled Metal Wires in the Cluster with Triangular or Square Configuration</b>	112
Nadiia P. Stognii, Nataliya K. Sakhnenko	

<b>Dynamics Layer of the Sliding Contact Collector Elements</b>	116
S.A. Romanishina, D.Yu. Katuk, V.S. Deeva, S.M. Slobodyan	
<b>DC and Noise Characteristics of Underlap Ultra-Thin BOX SOI nMOSFETs</b>	119
V. Kudina, N. Garbar, E. Simoen, C. Claeys	
<b>Modulation Instability of Terahertz Pulses in the Structures with <i>n</i>-InSb Layers</b>	124
Yu.G. Rapoport, V.V. Grimalsky, S.V. Koshevaya, C. Castrejon-Martinez	
<b>Modulation Instability of Terahertz Electromagnetic Pulses in SrTiO<sub>3</sub> Paraelectric</b>	128
Yu.G. Rapoport, V.V. Grimalsky, S.V. Koshevaya, D.L. Melendez-Isidoro	
<b>Nanostructured Multilayer Contact System Ti/Mo/Ag for Silicon Solar Cells</b>	132
Koval V., Ivashchuk A., Yakymenko Yu., Dusheyko M., Yasievich Yu., Getman A., Mahinko A.	
<b>Porous Silicon Thin Films with Metallic Nanoparticles on Insulator Substrates</b>	135
Tetyana Obukhova, Mykhailo Dusheiko, Tetyana Borodinova	
<b>Methods of Logical Synthesis for Library Elements and Blocks with Regular Layout Structure</b>	138
Sergey Gavrilov, Galina Ivanova, Pavel Volobuev, Aram Manukyan	
<b>Packaging Problem in Microelectronics Due to Stress and Fracture at the “Metal-Ceramic” Interface</b>	142
N. Korbova, S. Timoshenkov, O. Britkov, S. Shepelev, A. Mikheev	
<b>Nanostructured Silicon as a Multifunctional Material for Micro- and Nanoelectronics</b>	145
Luchenko A.I., Svezhentsova K.V., Melnichenko M.M.	
<b>Electrophysical Properties of Al/nanocrystalline CeO<sub>x</sub>/Si/Al structures</b>	148
N.V. Maksimchuk, L.N. Korolevych, A.V. Borisov	
<b>Multi-Modal Power Gating Structures Design with 32/28nm Educational Design Kit</b>	151
Andrey Korshunov, Pavel Volobuev	
<b>Atomistic Simulation of the Melting Behavior of the Au-Ag Nanoparticles with Core-Shell Structure</b>	155
Vadym Borysiuk, Iakov Lyashenko	
<b>Optical Properties of Nanocomposite Films with Inclusions of the Same Dimensions as the Film Thickness</b>	158
V. Lozovski, G. Strilchuk	
<b>SAW UV Sensor Based on ZnO and Al-doped ZnO Nanorods</b>	161
Anatolii Orlov, Veronika Ulianova, Yurii Yakimenko, Oleksandr Bogdan, Genadzi Pashkevich	
<b>Quality Assessment of Photovoltaic Cells with p-n Junction Structure</b>	165
Volodymyr Samotovka	
<b>ZnO Nanorods In Energy Harvesting Devices</b>	168
Anatolii Orlov, Veronika Ulianova, Andrii Zazerin, Oleksandr Bogdan, Genadzi Pashkevich, Yurii Yakimenko	
<b>Theoretical Description of Visualization of Nanoobject with Surface Plasmon Polariton Scattering</b>	171
Valeri Lozovski, Oleksandr Motornyi	
<b>Occupation of the Valleys in Multivalley Semiconductors</b>	174
Irina Bayda, Vladimir Moskaliuk	
<b>Compact Models of the Double-Barrier Resonant Tunneling Diode</b>	177
Volodymyr Moskaliuk, Tetiana Saurova	
<b>Modelling of Spectral Down-Converter Based on Cadmium-Free Quantum Dots for Photovoltaics</b>	181
Rostyslav Lesyuk, Bohdan Kotlyarchuk, Val Marinov, Yaroslav Bobitski	
<b>Plasmon Resonance of the Silver Nanoparticles with Different Shape</b>	185
Yaremchuk I.Ya., Mineckiy P.S., Fitio V.M., Bobitski Ya.V., Lesyuk R.I., Bobitski Ya.V.	
<b>Eigen Parameters of Quasiperiodic Bragg Nanostructures</b>	188
M.V. Andreev, V.F. Borulko, O.O. Drobakhin, D.V. Sidorov	
<b>Scattering of Wave Beams and Pulses by Non-periodic Bragg Nanostructures</b>	194
M.V. Andreev, V.F. Borulko, O.O. Drobakhin, D.V. Sidorov	
<b>Properties of E-plane Junctions for Six-port Measurements</b>	200
V.A. Karlov, M.V. Andreev, V. F. Borulko	

<b>Preparation and Some Properties of Pure and Doped Barium Titanate Thin Films</b>	204
N. Korobova, S. Timoshenkov, E. Artemov, G. Kosolapova, V. Petrova	
<b>Modeling of Stratified Graphene-Dielectric Structures Using the Generalized Boundary Conditions: THz Wave Scattering by a Thin Sandwiched Disk</b>	207
Mikhail V. Balaban	
<b>Wave Propagation Collapse in the Polariton Negative Dielectric Band of Crystal</b>	211
S.G. Felinskyi, G. S. Felinskyi	
<b>Nanostructured Sensors in Application to Computer-based Systems and Electronics</b>	214
Klym H., Kochan R., Karbovnyk I.	
<b>Hollow-Cathode Plasma-Assisted Atomic Layer Deposition: a Novel Route for Low-Temperature Synthesis of Crystalline III-Nitride Thin Films and Nanostructures</b>	218
Necmi Biyikli, Cagla Ozgit-Akgun, Eda Goldenberg, Ali Haider, Seda Kizir, Tamer Uyar, Sami Bolat, Burak Tekcan, Ali Kemal Okyay	
<b>Basic Equations of LEP for a Silver Strip Nanolaser</b>	222
Olga V. Shapoval	
<b>Elements for Photodetectors Based on Epitaxial Layers In<sub>4</sub>Se<sub>3</sub>, In<sub>4</sub>Te<sub>3</sub> and CdSb</b>	225
George Vorobets, Olexandr Vorobets, Volodymyr Strebezhev, Viktor Strebezhev, Yuriy Khalavka, Vitaliy Balazyuk	
<b>Analysis of the Modes of a Core-Shell Plasmonic Nanowire Laser with a Silver Core</b>	228
Denys M. Natarov, Jiří Čtyroký	
<b>Microwave Dielectric Measurement Methods on the Base of the Composite Dielectric Resonator</b>	231
Tatarchuk D.D., Molchanov V.I., Pashkov V.M., Franchuk A.S.	
<b>Microstrip Microwave Devices with Traveling Wave Resonator</b>	235
Eduard Glushechenko	
<b>Thermal Analysis of High-Power Multi-Finger FET</b>	239
Vladimir Timofeyev, Elena Semenovskaya, Elena Faleeva	
<b>Multi-Rate Clock-Data Recovery Solution in High Speed Serial Links</b>	242
Melikyan Vazgen, Sahakyan Arthur, Shishmanyan Aram, Hekimyan Arsen	
<b>Modeling, Fabrication and High Power Optical Characterization of Plasmonic Waveguides</b>	245
A. Lavrinenko, O. Lysenko	
<b>Modification of Silicon Surface for Solar Cells</b>	249
Anatoly Druzhinin, Valeriy Yerokhov, Stepan Nichkalo, Yevhen Berezhanskyi	
<b>Interrupted Mode of the Boundary Friction in the Model of Shear Melting with Asymmetric Potential</b>	252
Iakov Lyashenko, Anton Zaskoka	
<b>Controlling Susceptibilities of Quantum Dots Influenced by Electromechanical Effects</b>	256
Sanjay Prabhakar, Roderick Melnik	
<b>Electrical Characteristics of the Carbon Nanotube Field-Effect Transistors With Extended Contacts Obtained Within <i>ab-initio</i> Based Model</b>	261
Artem Fediai, Dmitry A. Ryndyk, Gianaurelio Cuniberti	

## SECTION II. BIOMEDICAL ELECTRONICS AND SIGNAL PROCESSING:

<b>Parameter Optimization of the Single Channel Late Reverberation Suppression Technique</b>	269
Arkadiy Prodeus	
<b>Noninvasive Evaluation of Glucose Concentration in the Human Blood Based on Electrocardiograms</b>	275
Anatolii A. Pulavskyi, Sergey S. Krivenko, Stanislaw A. Krivenko	
<b>The System of Ultrasonic Diagnostics Using Phase Information of the Secondary Sound Field</b>	278
Ogir A.S., Chemeris A.A., Tarapata V.V., Ogir E.A.	
<b>Effect of Mechano-Chemical Processing in the Synthesis of Weakly Agglomerated Ferromagnetic La<sub>1-x</sub>Sr<sub>x</sub>MnO<sub>3</sub> Nanoparticles on their Properties</b>	282
Y. Shlapa, S. Solopan, A. Belous	

<b>The Operated Localization of Magnetic Nanoparticles Under the Influence of a Constant Magnetic and Electromagnetic Field</b>	287
Shepelyuk K.D., Pastushenko V.I., Orel V.E., Orel V.E., Romanov A.V.	
<b>Computer System for Forecasting Surgery on the Eye Muscles</b>	291
D. Kukharenko, V. Mospan	
<b>Registration of Structural Changes of Water under Influence of Physical Factors</b>	297
V. V. Taranov, A. Yu. Kurlantseva	
<b>Wideband Bioimpedance Meter with an Active Electrodes</b>	300
Mosiychuk V. S., Timoshenko G.V., Sharpan O. B.	
<b>A Method for Predicting Denoising Efficiency for Color Images</b>	304
Oleksii S. Rubel, Ruslan O. Kozhemiakin, Sergey S. Krivenko, Vladimir V. Lukin, Benoit Vozel, Kacem Chehdì	
<b>Digital Filter Design By Micro-Cap Tools</b>	310
Vitalii Artuhov, Oleksii Brytov	
<b>Dependence of Destruction From the Characteristics of Radiofrequency Impact And Length of The Electrode</b>	314
Sychyk M.M., Maksymenko V.B., Perepeka E.O., Kravchuk B.B., Batsak B.V.	
<b>The Q-Band Low Noise Reference Oscillator Based on Bipolar Transistor Designed for The Pulse ESR Spectrometer</b>	317
A.A. Sitnikov, E.N. Kalabukhova, V.V. Oliynik, M.V. Kolisnichenko	
<b>Effect of the Virus Shell Parameters on the Interaction in the System "Virus-Surface"</b>	321
Valeri Lozovski, Natalia Rusinchuk	
<b>Noninvasive Localization of Ectopic Ventricular Activity Using BSPM and Different Patient Torso Models</b>	325
Milan Tysler, Jana Svehlikova, Olena Punshchykova, Peter Kneppo, Vitaliy Maksymenko	
<b>Nano-Structured Silicon Based Lab on a Chip For Diagnostics</b>	330
Karpiuk A.D., Starodub N.F., Luchenko A.I., Melnichenko M.M.	
<b>The Local-Field Effects in Optical Response of Nanocomposite Thin Films. An Implementation in Sensorics of Biospecific Interactions</b>	333
V. Lozovski, M. Razumova	
<b>X-Ray 4D Stereoscopic Technology</b>	337
Miroshnychenko S.I., Volkov E.V.	
<b>Improved Multisensors Signal Processing</b>	341
Natalia Roshchupkina, Serhii Balovsiak, Anatoliy Sachenko, Oleksiy Roshchupkin, Radislav Smid, Volodymyr Kochan	
<b>Acoustic Theory Problems of Speech Production in the Light of the Discovery of the Formula for the Middle Ear Norm Parameter</b>	347
Sergey Naida	
<b>Detection of COPD's Diagnostic Signs Based on Polyspectral Lung Sounds Analysis of Respiratory Phases</b>	351
Anna Poreva, Yevgeniy Karplyuk, Anastasiia Makarenko, Anatoliy Makarenkov	
<b>Peculiarities of T Wave Alternans Detection and Evaluation</b>	356
Karpelyuk Y., Ivanko K., Ivanushkina N.	
<b>CT Reconstruction in the System Point Source and Planar Receiver</b>	362
Netreba A. V., Radchenko S. P., Trinchuk V. A.	
<b>Quantitative Characterization of Tissue State Using Ultrasonic Backscatter Features</b>	366
Netreba A. V., Radchenko S. P.	
<b>Right Whale Detection Using Artificial Neural Network and Principal Component Analysis</b>	370
Kostiantyn Pylypenko	
<b>Design Methodology of Piezoresonant Sensors Construction with a Modulated Interelectrode Gap</b>	374
Alla Taranchuk, Segey Pidchenko, Olena Skovryha	
<b>Effect of Geometry on Propagation of Action Potentials in Neurons; An In Silico Analysis</b>	378
Fahimeh Mohagheghian, Pezhman Sasanpour, Hashem Rafii-Tabar	
<b>Efficiency of Piecewise Polyline Planar X-Ray Detectors for Cone Beam Computed Tomography</b>	381
Miroshnichenko S., Ukho N.	

<b>An Influence of Constant Magnetic Field on the Electrical Resistance of Blood Serum of Cancer Patients during the Treatment with Nanocomplex and Electromagnetic Irradiation</b>	384
Orel V.E., Rykhalskiy A.Y., Kruchkov E.I., Romanov A.V.	
<b>The Probability Increasing of the Low-Contrast Structures Detection in X-Ray Images by Using the Software that Enhances the Contrast and Signal/Noise Ratio</b>	389
Miroshnichenko N.	
<b>Using a Noninvasive Index of Local Segmental Electromechanical Delay in the Evaluation of left Ventricular Myocardium Dyssynchrony</b>	393
Zakharchuk N.V., Bilynskyi Ye.O., Vitovskyi R.M., Batsak B.V.	
<b>Analysis of a Handshake Between Humans Using Wavelet Transforms</b>	397
Artem Melnyk, Patrick Hénaff, Anton Popov	
<b>Ischemic Heart Disease Recognition by <math>k</math>-NN Classification of Current Density Distribution Maps</b>	402
Yevhenii Udovychenko, Anton Popov, Illya Chaikovsky	
<b>Dynamic Errors of Forced Expiration Measurements by Spirometers</b>	406
Viktor Lopata, Anton Popov, ElShabbah M., Roman Tomashevskiy, Ivan Myasnyi	
<b>Fuzzy Classification of Alzheimer's Disease Using Statistical Moments</b>	409
Igor Krashenyi, Anton Popov, Javier Ramirez, Juan Manuel Gorriz	
<b>A Transform Domain Sparse LMS-type Algorithm for Highly Correlated Biomedical Signals in Sparse System Identification</b>	413
Cemil Turan, Mohammad Shukri Salman, Cemil Turan, Hatem Haddad	
<b>On Potential Effectiveness of Integration of 3M Littmann 3200 Electronic Stethoscopes into the Third-Party Diagnostic Systems with Auscultation Signal Processing</b>	417
Valery Oliynik	
<b>Automated Identification of Cardiac Signals after Blind Source Separation for Camera-Based Photoplethysmography</b>	422
Daniel Wedekind, Hagen Malberg, Sebastian Zaunseder, Frederik Gaetjen, Klaus Matschke, Stefan Rasche	
<b>Improved Heart Rate Detection for Camera-Based Photoplethysmography by means of Kalman Filtering</b>	428
Fernando Andreotti, Alexander Trumpp, Hagen Malberg, Sebastian Zaunseder	

### SECTION III. ELECTRONIC SYSTEMS

<b>Conductive EMI of Class D Audio Amplifiers Prediction System</b>	437
Y. Onikienko, V. Pilinsky, M. Rodionova	
<b>Solving the Optimal Pulse Modulation Problem with THD Minimizing for Single-Phase Inverter</b>	441
Dmytro R. Ushakov	
<b>Use of Irregular Topologies for the Synthesis of Networks-on-Chip</b>	445
A. Yu. Romanov, I. I. Romanova	
<b>Backscattering of Electromagnetic Waves from Medium of Spherical Drops by Double-Frequency Radar</b>	450
Ganna Veselovska, Grigoriy Khlopov	
<b>Simulation of Technological Electron Sources with Use of Parallel Computing Methods</b>	454
A.O. Luntovskyy, I.V. Melnyk	
<b>Improving Estimation of Rising Time of High Voltage Glow Discharge Current in Triode Electrodes Systems with Taking into Account Changing of Anode Plasma Parameters</b>	461
I.V. Melnyk	
<b>Investigation of Emission Properties of Cold Cathodes in Triode Impulse High Voltage Glow Discharge Electron Guns</b>	465
S.V. Denbnovetsky, I.V. Melnyk, V.G. Melnyk, B.A. Tugai, S.B. Tuhai	
<b>Apparent Power of Three-Phase Four-Wire System in Sinusoidal Asymmetric Mode and Energy Effectiveness of Shunt Active Filters</b>	469
M.Yu. Artemenko, L.M. Batrak, N.I. Domaskina	

<b>Analog and Digital Power Factor Correction Control Investigation</b>	475
Yuriy Demchenko	
<b>Dependence of Input Current Quality on Number of Phases of Multiphase Interleaved PFC</b>	478
Pavlo S. Safronov, Iuliia V. Bondarenko, Oleksandr F. Bondarenko, Volodymyr M. Sydorets	
<b>A Subharmonic Stability of Power Factor Correctors with Dual-Loop Control System</b>	481
Yuriy Denisov, Serhii Stepenko	
<b>Simulation Peculiarities of High-Frequency Zero-Current Switching Quasi-Resonant Boost Converter</b>	486
Volodymyr Voytenko, Serhii Stepenko	
<b>Possibility of the Pipelining Technique Application in a Space/Spatial-Frequency Filter Implementation Based on the Local Frequency Estimation</b>	492
Veselin N. Ivanović, Nevena Radović, Srdjan Jovanovski, Zdravko Uskoković	
<b>Reconfigurable Decoder for Irregular Random Low Density Parity Check Matrix Based on FPGA</b>	498
Maksym Musiyenko, Yaroslav Krainyk, Oleksii Denysov	
<b>High-Performance Macromodel of the Quarter-Wavelength Solidly Mounted Resonator</b>	504
Andrii Zazerin, Anatolii Orlov, Oleksandr Bogdan	
<b>A Voltage-Controlled Oscillator Based on Negative Inductance Converter</b>	508
V.V. Ulansky, H.M. Elsherif	
<b>Management of Energy Efficient Distributed Computer Systems with Self-Contained Remote Modules Using Multi-Agent System</b>	512
Ivan Burlachenko	
<b>Control of Hydraulic System Servo Motor Converter in Mold Oscillation Waveform Formation</b>	515
Viktor O. Didenko, Oleksandr F. Bondarenko	
<b>A Novel Concept for the Tunable Cavity Comline Resonator</b>	520
Kostiantyn Savin, Irina Golubeva, Yuriy Prokopenko	
<b>General Technique for Harmonic Oscillator Synthesis</b>	523
Oleg Vityaz	
<b>Power Quality Improvement of the Matrix Converter Input Currents in the Case of Unbalanced and/or Nonsinusoidal Supply Voltages</b>	528
V.M. Mykhalskyi, V.M. Sobolev, V.V. Chopyk, S.Y. Polishchuk, I.A. Shapoval	
<b>The Calculating Algorithm of Active Power Line Conditioner with Uninterruptible Power Supply Function</b>	534
Dmytro Mikolaiets	
<b>DC to AC 3 Phase Modular Multilevel Conversion Using Chireix Outphasing Method</b>	539
Alexey Tyshko	
<b>Analysis and Mathematical Modeling of Electromagnetic Wave Propagation in Heterogeneous Lines</b>	543
I. Yu. Dmitrieva	
<b>Research Of Control Systems with Increased Potential of Robust Stability of Nonlinear Object in the Class of One-Parametric Structurally Stable Mappings</b>	547
Beisenbi M.A., Shukirova A.K	
<b>Price Formation in the Energy Markets of Ukraine</b>	553
Valerii Zhuikov, Ievgen Pichkalov, Ivan Boyko, Igor Blinov	

## INVITED PAPERS

<b>Microcavity Lasers on Polymer Materials: Boundary Integral Equation Modeling and Experiments</b>	559
A. I. Nosich, E. I. Smotrova, M. Lebental, I. O. Sukharevsky, and A. Altintas	