



2015 International Conference on “Physics and Mechanics of New Materials and Their Applications” (PHENMA 2015)

devoted to 100-year Anniversary of the

Southern Federal University

Azov, Russia, May 19-22, 2015

<http://phenma2015.math.sfedu.ru>



**2015 International Conference
on "Physics and Mechanics of New Materials and Their Applications" (PHENMA 2015)
devoted to 100-year Anniversary of the Southern Federal University
Azov, Russia, May 19-22, 2015**

2015 International Conference on “Physics and Mechanics of New Materials and Their Applications” (PHENMA 2015)

devoted to 100-year Anniversary of the

Southern Federal University

Azov, Russia, May 19-22, 2015

<http://phenma2015.math.sfedu.ru>

Abstracts & Schedule

Abstracts and Schedule of the 2015 International Conference on Physics and Mechanics of New Materials and Their Applications (PHENMA 2015). I. A. Parinov, S.-H. Chang (Eds.). Southern Federal University Press: Rostov-on-Don, 2015. – 306 p.

ISBN 978-5-9275-1560-8

Advanced materials and composites, including piezoelectrics, nanomaterials, nanostructures, functional materials, polymeric composites and so on, have very importance for modern sciences, technologies and techniques. The success of the Russian-Taiwanese Symposium “Physics and Mechanics of New Materials and Their Applications”, PMNM-2012 (Russia, 2012, <http://pmnm.math.rsu.ru/>), 2013 International Symposium “Physics and Mechanics of New Materials and Underwater Applications”, PHENMA 2013 (Taiwan, 2013, <http://phenma.math.sfedu.ru>) and 2014 International Symposium “Physics and Mechanics of New Materials and Underwater Applications”, PHENMA 2014 (Thailand, 2014, <http://phenma2014.math.sfedu.ru>) predefined objectives and scientific directions of the new conference PHENMA 2015, devoted to 100-year Anniversary of the Southern Federal University (Russia). The following PHENMA abstracts are divided into four scientific directions: (i) processing techniques of new materials, (ii) physics of new materials, (iii) mechanics of new materials, and (iv) applications of new materials. These are present by scientists from 20 countries, demonstrating strong scientific collaboration, formed for last years.

The present studies have been supported in partially by the Russian Foundation For Basic Research and the Ministry of Education and Science of the Russian Federation.

Published in author's edition.



Preface.....	22
--------------	----

TABLE OF ABSTRACTS

Arnold Abramov, Anna Abramova, Leonid Belevtsov, Chunlin Ji, Ruopeng Liu. Propagation of Electromagnetic Wave through 1D Periodic Structure Consisting of Linearly Changing Dielectric Permittivity Layers.....	23
A.G. Abubakarov, M.B. Manuilov, Y.M. Noykin, I.A. Verbenko, L.A. Reznichenko, M.S. Zakrieva. Features Microwave – Absorption of Electromagnetic Radiation Ferroelectric Niobium Complex Oxides.....	24
A.G. Abubakarov, A.V. Pavlenko, L.A. Reznichenko, I.M. Aliev, L.A. Shilkina, A.V. Nazarenko, I.A. Verbenko, G.M. Konstantinov. Features of the Microstructure and Dielectric Properties of $(Ba_{0.50}Sr_{0.50})Nb_2O_6$ Ceramics.....	26
Achmad Daengs, GS, Nanang Sandi Wahyudi. The Planning of Preventive Maintenance Schedule to Save the Repairing Cost on Blow Moulding Department (Case Study at the Manufacturer Company in Surabaya).....	27
O.A. Ageev, A.A. Fedotov, V.S. Klimin, O.I. Ilin, Trinh Van Muoi, K.S. Sergienko, A.S. Semenov, V.Yu. Yanenko. Thermodynamic Analysis of Interaction in Structures Suitable for the Growth of Arrays of Carbon Nanotubes by PECVD.....	27
O.A. Ageev, O.I. Ilin, A.A. Fedotov, V.S. Klimin, M.V. Rubashkina, N.N. Rudyk, D.A. Suchkov. Development of Technology for Local Growing Single-Placed CNT.....	28
O.A. Ageev, O.I. Ilin, M.V. Rubashkina, V.A. Smirnov, V.V. Polyakova. Research on the Electric Parameters of Vertically Aligned Carbon Nanotubes by Scanning Tunnel Microscopy.....	29
O.A. Ageev, A.S. Kolomiytsev, A.V. Bykov, V.A. Smirnov, I.N. Kots. Use of Focused Ion Beam for Fabrication of Advanced Probes for Atomic Force Microscopy.....	30
O. A. Ageev, M. S. Solodovnik, S. V. Balakirev, I. A. Mikhaylin. InAs/GaAs(001) Quantum Dot Array MBE Formation Model Considering V/III Flux Ratio.....	31
O. A. Ageev, M. S. Solodovnik, S. V. Balakirev, I. A. Mikhaylin. Model of the Initial Stage of GaAs Homoepitaxial Growth by MBE Considering V/III Flux Ratio.....	32
V. O. Ageev, M. V. Rubashkina. Study of the Elasticity Human Epithelial Cells and Soft Materials in AFM Indentation Experiments.....	33
O. A. Ageev, E. G. Zamburg, I. A. Shipulin. Research of Parameters of Nanostructured ZnO Films during Chemisorption of Varius Gases.....	35
G.M. Akbaeva, V.G. Gavrilyachenko, A.F. Semenchev. Dynamic Fatigue during the Switching of Relaxor PZT-Based Ferroelectrics.....	36
Pavel Akishin, Evgeny Barkanov, Alexey Bondarchuk. Finite Element Modeling and Analysis of Curing and Pultrusion Processes.....	37
V.A. Akopyan, S.N. Shevtsov, I.A. Parinov, V.A. Chebanenko, Jiing-Kae Wu. Numerical and Experimental Study of Power Piezoelectric Stack Actuator for Rotorcraft Vibration Control.....	38
A.A. Alekseenko, V.E. Guterman, V.A. Volochaev. Optimization of Microstructure of Pt/C Catalysts for PEMFC.....	39

E. V. Andreev, A. S. Bogatin, Y. A. Ignatova, S. A. Kovrigina, A. L. Bulanova, T. Y. Privalova, I. O. Nosachev. Determination of the Parameters of the Relaxation Polarization.....	40
E. V. Andreev, A. S. Bogatin, S. A. Kovrigina, Y. A. Ignatova, V. N. Bogatina, A. L. Bulanova, I. O. Nosachev An Extrapolation Method for the Definition of Distribution.....	41
E. V. Andreev, A. S. Bogatin, S. A. Kovrigina, Y. A. Ignatova, V. N. Bogatina, A. L. Bulanova, I. O. Nosachev. Extrapolation Method for Determining the Type of the Distribution with Limited Relaxation Times.....	42
K. P. Andryushin. New Anisotropic Materials.....	43
I. N. Andryushina. Correlation Bonds. Structure – Electrophysical Properties of the Binary PZT System.....	44
Anuwit Sonsiri, Thana Radpukdee. Automation and Process Control of a Rotary Dryer in a Granular Organic Fertilizer Drying Process.....	44
V.I. Avilov, V.A. Smirnov, O.G. Tsukanova. Correlation between Memristive Effect and Height of Titanium Oxide Nanostructures Produced by Atomic Force Microscopy.....	45
A. D. Azarov, D. A. Azarov. Description of Non-Linear Viscoelastic Deformations by the 3D Mechanical Model.....	46
Evgeny Barkanov, Pavel Akishin, Tony McNally, Mikhail Chebakov. Investigation of Mechanical Properties of Aluminum Alloys with Carbon Nanotubes.....	47
E.M. Bayan, T.G. Lupeiko, L.E. Pustovaya, A.G. Fedorenko. Synthesis of Titanium Dioxide: The Influence of Process Parameters on the Structural, Size and Photocatalytic Properties.....	48
T. A. Bednaya, T. V. Semenistaya. Prediction of Functional Characteristics of Gas Sensor Based on Co-containing Polyacrylonitrile by Artificial Neural Networks.....	49
Alexander K. Belyaev, Vladimir Polyanskiy, Anatoli Polyanskiy, Yuriy Yakovlev. Constitutive Law of Non-linear Continuum with Solute Hydrogen.....	50
T.I. Belyankova, V.V. Kalinchuk, O.M. Tukodova. Peculiarities of the Surface SH-Waves Propagation in the Weakly Inhomogeneous Pre-stressed Piezoelectric Structures.....	50
G.S. Bezuglova, G.M. Chechin, I.P. Lobzenko, D.S. Ryabov. In-Plane Discrete Breathers in Deformed Graphene.....	51
E. A. Bikyashev, M. I. Tolstunov, E. A. Reshetnikova, I. O. Ryush. Effect of heterovalent doping on temperature and phase transformations in $Pb_{1-p}La_p[Zr_{0.9}Mg_{(0.1+p)/3}Nb_{(0.2-p)/3}]O_3$ solid solutions.....	52
E. A. Bikyashev, M.I. Tolstunov, E.A. Reshetnikova, I.O. Ryush. Stabilization of Unpolar Phases of the $Pb[Zr_{0.9}(Mg_{1/3}Nb_{2/3})_{0.1}]O_3$ Solid Solution.....	54
O. V. Bocharova, V. V. Kalinchuk, I. E. Andjikovich, A. V. Sedov. Investigation of the Features of the Surface Wave Fields in Media with Inhomogeneities.....	55
A. S. Bogatin, E. V. Andreev, Y. A. Ignatova, S. A. Kovrigina, V. N. Bogatina, A. L. Bulanova, I. O. Nosachev. Strong and Weak Relaxation Polarization in the Dielectric Statistical Mixtures of Unstretched Particles.....	56
A. S. Bogatin, E. V. Andreev, S. A. Kovrigina, Y. A. Ignatova, V. N. Bogatina, A. L. Bulanova, I. O. Nosachev. Strong and Weak Relaxation Polarizations: Reasons.....	57
N.A. Boldyrev, A.V. Pavlenko, L.A. Reznichenko. Dielectric Properties and Phase Transitions in Solid Solutions Based on Sodium Niobate at Cryogenic Temperature.....	58
N.A. Boldyrev, A.V. Pavlenko, L.A. Reznitchenko. Obtaining, Grain Structure and Dielectric Characteristics of $PbFe_{0.5}Nb_{0.5}O_3+xMnO_2$ Ceramics.....	59

Boris V. Bondarev. New Theory of Superconductivity. Method of Equilibrium Density Matrix.....	60
P.A. Borzov, V.Yu. Topolov, A.A. Vorontsov. Piezoelectric Performance of Novel Composites Based on Ferroelectric ZTS-19 Ceramics.....	61
P.A. Borzov, V.Yu. Topolov, A.A. Vorontsov, O.E. Brill. Microgeometry – Piezoelectric Response Relations in Novel Ferroelectric Ceramic / Polymer Composites.....	62
N. V. Boyev. Theory and Experiment in Ultrasonic Nondestructive Testing of Spatial Defect Clusters in Elastic Materials.....	63
A.P. Budnyk, A.A. Guda, K.A. Lomachenko, A.N. Kravtsova, C. Lamberti, A.V. Soldatov. X-Ray Absorption Spectroscopy Studies of Ti-Coordination in Silica-Titanium Mesoporous Vitreous Composites.....	64
Aram L. Bugaev. <i>In Situ</i> Investigation of the Hydride Phase Formation in Industrial Pd Nanocatalysts.....	65
S. I. Builo. Diagnostics of the State Predestruction Based on Invariants of Acoustic Emission Signals.....	66
S. I. Builo, D. M. Kuznetsov, V. L. Gaponov. Monitoring of the Catalytic Decomposition of Hydrogen Peroxide by the Parameters of Acoustic Emission.....	67
I. Zh. Bunin, V. A. Chanturiya, M. V. Ryazantseva, E. V. Koporulina. Structural Modification of Sulfide Minerals Irradiated by High-Power Nanosecond Pulses.....	68
M. A. Bunin, A. N. Rybyanets, A. E. Fedorovskiy, D. I. Sukhomlinov, A. A. Naumenko. Piezoresponse Force Microscopy of the Dense Piezoceramics.....	69
N. I. Buravchuk, O. V. Guryanova. The Use of Waste Production and Combustion of Coal in the Ceramics Industry.....	70
Chang-Mao Hung, Chiu-Wen Chen, Yu-Jhe Jhuang, Cheng-Di Dong. Constructing Carbon Black Coated Magnetite Nanoparticles: Fabrication, Characterization and Heterogeneous Persulfate Oxidation of Methylene Blue Applications.....	71
Chayanon Wisate, Ratchaphon Suntivarakorn, Thana Radpukdee, Sorayut Winitchai. Air Ventilation Efficiency Improvement for a Broiler House with Multi Inlet System and Air Deflectors.....	72
M. I. Chebakov, A. A. Lyapin, I. V. Kolesnikov. Modeling of Thermal-Physical Processes in Friction Units of Train.....	73
G. M. Chechin, S. V. Dmitriev, I. P. Lobzenko, D. S. Ryabov. Study of Discrete Breathers in Graphene with the Aid of the Density Functional Theory.....	73
Chien-Erh Weng. The Performance Study of Markov Chain with Direct/Cooperative Strategy in WLAN.....	74
Chin-Feng Lin, Jin-De Zhu, Shun-Hsyung Chang, Chan-Chuan Wen, Ivan A. Parinov, Sergey N. Shevtsov. Hilbert-Huang Transformation based Time-frequency Features of Berardius Bairdii Whistles.....	75
D. V. Chirkova, T. G. Lupeiko, I. V. Lisnevskaya. The Doping of Antimony Sulphoiodide by Bromide Anions in Aqueous Solution.....	76
Chitsan Lin, Totsaporn Boonsong, Siwalee Yotapukdee, Pongpaitoon Sukkee, J.P. Wang. Applications of Nanomaterials in Environmental Engineering.....	77
T. S. Dembelova, B. B. Badmaev, D. N. Makarova, A. B. Tsyrenzhapova, B. B. Damdinov. Nonlinear Shear Properties of Colloidal Suspensions of Nanoparticles.....	78
M. V. Demyanenko, M. N. Grigoryev, A. M. Svetlichnyi, O. B. Spiridonov, I. L. Jityaev. Gas Sensitivity of Graphene Films on Silicon Carbide Surface to NH ₃ and (CH ₃) ₂ CH(OH) Vapours.....	78
V. G. Dneprovski, G. Ya. Karapetyan. Features of Technology of SAW Devices.....	79

D. R. Dzhuraev. Variations of Dielectric Constants of Superconducting Niobium Nitride Thin Films with Temperature.....	80
V.V. Eremkin, V.G. Smotrakov, M.A. Marakhovskiy, A.E. Panich. Fabrication of Piezoelectric Ceramics with Lowered Sintering Temperature for MEMS.....	81
Erni Puspanantasari Putri. Cluster Development of Small and Medium Manufacturing Industry in Surabaya City, East Java, Indonesia.....	82
I. V. Ershov, V. V. Ilyasov, I. G. Popova. Magnetism and Half-Metallicity of MnO Polar Surfaces.....	83
Yu. V. Esipov, E. V. Saulina, A. I. Cheremisin. The Analysis of Functional and Test Deformation Responses of Frame-Rod Dummies for Early Diagnostic of Complete Metallic Construction.....	84
A.A. Fedotov, V.S. Klimin, O.I. Ilin, Trinh Van Muoi, K.S. Sergienko, A.S. Semenov, N.N. Rudyk, V.Y. Yanenko. Development and Investigation of Gas Sensors on a Vertically Aligned Carbon Nanotubes.....	84
S.E. Filippov, A.A. Vorontsov, V.Yu. Topolov, P. Bisegna, O.E. Brill, A.E. Panich. Piezoelectric Properties of a Novel ZTS-19 Ceramic/Clay Composite.....	85
E.G. Fridman, E.A. Ryndin. Physical and Topological Modeling of High Electron Mobility Transistors.....	86
D. D. Fugarov, O. A. Purchina, V. S. Sivochkin, E.V. Lyashova. The Current Regulator for Diagnostics of Switching Devices.....	87
A.O. Funik, T. N. Myasoedova, Y.V. Grishina, G.E.Yalovega. Morphological Spectroscopic Investigation of CuO _x Organo-Metallic Thin Films.....	88
A. N. Gerasimenko, Yu. Ya. Gerasimenko, E. Yu. Gerasimenko, A. I. Emelyanov. Mathematical Modeling of Plane-Parallel Electrochemical Electrolytic Cell with Perforated Cathode.....	89
A. N. Gerasimenko, Gerasimenko Ya. Yu., E. Yu. Gerasimenko, M. A. Mezis. Mathematical Modeling Electrolytic Cell Taking into Account Capacitances of Electric Double Layer.....	89
A. N. Gerasimenko, Yu. Ya. Gerasimenko, E. Yu. Gerasimenko, T. L. Zharovskaya. Mathematical Modeling of Electrolytic Cell, Connected to Specific Power Source.....	90
A. Y. Gerasimenko, L. P. Ichkitidze, V. M. Podgaetsky, S. V. Selishchev. High Specific Conductivity of Composite Nanomaterials with Albium and Carbon Nanotubes.....	91
A. Y. Gerasimenko, L. P. Ichkitidze, V. M. Podgaetsky, S. V. Selishchev. Nanocomposite Solders for Laser Welding of Biological Tissues.....	92
A. Y. Gerasimenko, L. P. Ichkitidze, A. A. Polohin, E. V. Blagov, A. A. Pavlov, E. P. Kitsuk, Y. P. Shaman. Photosensitive Element Based on the Structures with Multiwalled Carbon Nanotubes.....	93
T. E. Gerasimenko. <i>On One Two-dimensional Model of Polarization of Polycrystalline Ferroelectric Materials</i>	94
V. Yu. Gershanov, T. A. Latynina, S. I. Garmashov. Visualization of KDP-Crystal Growth from Solution.....	94
V.Yu. Gershanov, A.A. Skorynina, S.I. Garmashov. Conditions for Experimental Determination of the Equilibrium Shape of a Negative Crystal.....	95
E.V. Glushkov, N.V. Glushkova, A.A. Eremin, A.A. Evdokimov. Ultrasonic Guided Wave Characterization and Inspection of Laminate Fiber-Reinforced Composite Plates.....	96
E.V. Glushkov, N.V. Glushkova, Ch. Zhang. Surface and Pseudo-Surface Acoustic Waves in Diamond-Based Components with Piezoelectrical Coatings.....	97

Mikhail V. Golub, Chuanzeng Zhang. Numerical Simulation of Elastic Wave Propagation in Layered Phononic Crystals: Band-Gaps, Resonance Scattering by Cracks and Wave Localization.....	98
A. V. Gorokhovskiy, E. E. Orozaliev, M. S. Shevtsova. Preparation of the Coatings Photocatalytically Active in the Visible Spectrum Based on the Composite Materials of Protonated Potassium Polytitanate Doped with Nikel Ions – Polyvinylbutyral.....	99
A.A. Gusev, I.P. Raevski, E.G. Avvakumov, V.P. Isupov, S.I. Raevskaia, S.P.Kubrin, D.A. Sarychev, V.V. Titov, H. Chen, C.-C. Chou, V.Yu. Shonov. The Effect of Mechanical Activation on the Properties of Multiferroic PbFe _{0.5} Ta _{0.5} O ₃ Ceramics.....	99
E. Yu. Gusev, J. Y. Jityaeva, A. S. Kolomiytsev, V. A. Gamaleev, I. N. Kots, A. V. Bykov. Wet Etching of Silicon Dioxide Sacrificial Layer for MEMS Structures Forming.....	100
Harjo Seputro, Muslimin Abdulrahim. Microstructure at the Interface of Aluminum Metal Matrix Composites with Coal Bottom Ash Reinforcement.....	101
Hsiao-Wen Tin, Fu-Tai Wang, Chin-Feng Lin, Chan-Chuan Wen, Shun-Hsyung Chang. A Fractal Wavelet OFDM Based Underwater Acoustic Image System.....	102
Hung-Yu Wang, Shun-Hsyung Chang. Singular Nullor and Mirror Elements for Circuit Design.....	103
Ian Y.Y. Bu, Cheng-Xun Kuo, Jenny Chih-Yu Lee, Shih-Fong Chao, J.-K. Wu, S. Shevtsov, M. Shevtsova, Shun-Hsyung Chang. Underwater Acoustics of a High-Sensitivity Piezoelectric Film Applied to the Development of Acoustic Sensing Element.....	104
L. Ichkitidze. Josephson Medium-Based Magnetic Field Sensor.....	105
Y. A. Ignatova, A. S. Bogatin, E. V. Andreev, S. A. Kovrigina, T. Y. Privalova, A. L. Bulanova, I. O. Nosachev. Strong and Weak Relaxation Polarizations in a Double-Layer Capacitor.....	106
Y. A. Ignatova, A. L. Bulanova, T. Y. Privalova, A. S. Bogatin, E. V. Andreev, S. A. Kovrigina, I. O. Nosachev. Impedance as a Characteristic of a Relaxation Polarization.....	107
L.A. Igumnov, A.A. Belov, A.A. Ipatov. Boundary Element Method in Solving Problems of Poroviscoelasticity.....	108
L.A. Igumnov, S.Yu. Litvinchuk, A.N. Petrov, A.A. Ipatov, A.V. Amenitskiy, I.V. Vorobtsov. Numerically-Analytically Modeling the Dynamics of a Prismatic Body of Two- and Three-Component Materials.....	109
L.A. Igumnov, I.P. Markov. Boundary-Element Modeling of Three-Dimensional Anisotropic Viscoelastic Solids.....	110
V. V. Ilyasov, I. V. Ershov, I. G. Popova, A. V. Ilyasov. Band Structure and Energy Adsorption of Graphene on Al ₂ O ₃ (0001) Substrate.....	110
V. V. Ilyasov, B. C. Meshi, V. Ch. Nguyen, I. G. Popova. Modulation of the Band Structure and Transport Properties of the 8-ZGNR/h-BN(0001) Heterostructure with Electric Fie....	111
V.V. Ilyasov, D.K. Pham, O.M. Holodova. DFT Study and Nanostructuring of the TiC Surface by Laser Radiation.....	112
Jian-Chuan Shern. Wave Decay Performance and Application of New Type Porous Columnar Armored Blocks.....	113
I. L. Jityaev, A. M. Svetlichnyi, O. B. Spiridonov, M. V. Demyanenko. Design Features of Rectangular Nanoscale Graphene/SiC Field Emission Cathodes.....	116
Jong-Gul Yoon, O.A. Ageev, E. G. Zamburg, D. A. Khakhulin. Production of ZnO Based UV-Detector.....	117
Yu. Kabirov, V. Gavril'yachenko, A. Bogatin, T. Gavril'yachenko, I. Nosachev. Magnetoresistive Properties of (1 – x)La _{0.7} Sr _{0.3} MnO ₃ /x(GeO ₂ , WO ₃ , Sb ₂ O ₃ , SiO ₂) Composites.....	118

E.M. Kaidashev, D.N. Karpinsky. Calculation of Zinc Oxide Nanopillar Detachment from Substrate.....	119
Kannika Khongsatit, Sorayut Winitchai, Thana Radpukdee. Design of Hybrid Ventilation System in a Broiler House by Using CFD.....	119
G. Ya. Karapetyan, V. G. Dneprovski, I. A. Parinov, Guido Parchi. Effect of Electric Field on the EMF in the System Electrode-Electrolyte-Capacitor Electrode.....	120
V. E. Kaydashev, D. A. Zhilin, A. L. Nikolaev, E. M. Kaidashev. Photo-Induced Electronic Processes in ZnO Covered by Plasmonic Nanoparticles under UV-Visible Light Illumination.....	122
O.K. Kaznacheeva, O.A. Burtceva, A.V. Cherpakov. Parameter Identification of Nonlinear Elastic Stiffness of the Reinforced Beams.....	122
S.V. Khasbulatov, A.A. Pavelko, L.A. Reznichenko, L.A. Shilkina, G.G. Hajiyev, A.G. Bakmaev, M.-R.M. Magomedov, Z.M. Omarov, V.A. Aleshin. Crystal and Grain Structures, Features of Dielectric and Thermal Properties of $\text{Bi}_{1-x}\text{Dy}_x\text{FeO}_3$ Multiferroics.....	124
S.V. Khasbulatov, A.A. Pavelko, L.A. Shilkina, V.A. Alyoshin, I.A. Verbenko, G.G. Gadjev, Z.M. Omarov, A.G. Bakmaev, O.N. Razumovskaya, L.A. Reznichenko. Preparation, Structure, Microstructure, Dielectric and Thermal Properties of Bismuth Ferrite with Holmium and Erbium.....	125
Khwantri Saengprachatanaruga, Saree Wongpicheta. Comparison of Tillage Systems for Primary Plowing in Sugarcane Cultivation in Thailand.....	129
E.V. Kirillova. Mechanical Multi-Scale Modeling and Simulation of Textiles.....	129
E.V. Kirillova, P.V. Syromyatnikov, A.V. Didenko. Optimization of Calculation Methods of Thermoelectroelastic Composite Materials.....	130
V. S. Klimin, K. S. Sergienko, A. S. Semenov. Development and Study of the Formation of an Array of Pores in Aluminum, Two-Step Anodization Method for Growth an Array of Vertically Aligned Carbon Nanotubes.....	131
Yu. V. Klunnikova, S. P. Malyukov. Study of the Bubbles Ascent Dynamics in the Sapphire Growth Process.....	132
E.M. Kolosova, A.A. Lyapin, M.I. Chebakov. Parameters Optimization of Composite Sliding Bearing in the Non-stationary Contact Interaction Taking into Account the Heat from Friction.....	133
G.M. Konstantinov, A.N. Rybyanets, Y.B. Konstantinova, N.A. Shvetsova, N.O. Svetlichnaya. Diffusion of Ferroelectric Phase Transition and Glass-Dipole State in the PZT-Based Solid Solutions.....	134
G. M. Konstantinov, A. N. Rybyanets, Y. B. Konstantinova, N. A. Shvetsova, N. O. Svetlichnaya. Structural Peculiarities of Porous Ferroelectric Ceramics.....	135
Korb Srinavin, Patipat Tunming. Physical and Thermal Properties of Bricks and Concrete Blocks Mixed with Rice Hush Ash, Fly Ash, Foam Beads and Kaolin.....	136
V.I. Korotkin. Phase Stresses in the Geometrical Stress Concentrators of Teeth of Novikov Gearing.....	136
E.E. Kosenko, V.V. Kosenko, A.V. Cherpakov. Application of Statistical Methods to Estimate the Capacity of the Station Technical Inspection of Vehicles.....	137
E.E. Kosenko, V.V. Kosenko, A.V. Cherpakov. On the Strength of Steels Applied in Transport Networks Working under Pressure.....	138
D.A. Kovalenko, V.V. Petrov, V.G. Klinduhov. The Research of Structural Properties of the Thin Films of Lead Titanate Zirconate Based on Silicon Oxide.....	139
A.I. Kozinkina, Y.A. Kozinkina. Determination of Strain Characteristics.....	139

A.N. Kravtsova, M.A. Soldatov, A.L. Bugaev, S.A. Suchkova, A.V. Soldatov. Atomic and Electronic Structure of Quantum Dots Based on CdS and CdTe.....	140
Krittiya Lertpocasombut, Petchporn Chawakitchareon, Sununtha Kingpaiboon. Use of Wasted Natural Materials for Water Treatment.....	141
Kuan-Chun Liu, Jenny Chih -Yu Lee, Jinn-Chang Wu, Ivan A. Parinov, Shun-Hsyung Chang. Designing the LED Lighting Driver Circuit with a Boost Converter.....	142
Natalia Kudinova, Evgeniy Mukhin, Vladimir Polyanskiy, Anatoli Polyanskiy, Yuriy Yakovlev. Effect of Hydrogen on the Mechanical Stability of Nanofilms Interface on Silicon.....	143
N.V. Kurbatova, D.K. Nadolin, A.V. Nasedkin, A.A. Nasedkina, P.A. Oganesyan, A.S. Skaliukh, A.N. Soloviev. Models of Active Bulk Composites for ACELAN Finite Element Package.....	144
W. Lasoi, S. Pornpromlikit. Dynamic Time Synchronization in Underwater Sensor Networks.....	145
A. L. Lerer, P. E. Timoshenko, E. M. Kaidashev, A. S. Puzanov. Dispersion Characteristics of Zinc Oxide Nanorods Coated with Thin Silver Layer and Organized in Two-Dimensional Uniform Arrays.....	146
Lie Yang, Chien-Erh Weng. Energy-Efficient Routing Algorithms with Identification for Wireless Sensor Networks (WSNs).....	147
I. V. Lisnevskaya, I. A. Bobrova. Gel Polyvinyl Alcohol-Based Synthesis of Magnetic and Multiferroic Materials.....	148
I. V. Lisnevskaya, T. G. Lupeiko. Rod Multiferroicity Dual-Phase Structures Piezoelectric Material – Magnetostrictive Ferrite”.....	149
I. V. Lisnevskaya, T. G. Lupeiko, E. A. Bikyashev. Synthesis Problems of Multiferroic $\text{BiFe}_{0.5}\text{B}_{0.5}\text{O}_3$	150
I. P. Lobzenko, P. P. Goncharov, N. V. Ter-Oganessian. Electric Polarization of Magnetic Domain Walls in Magnetoelectrics.....	150
M.A. Lugovaya, A.A. Naumenko, E.I. Petrova, A.N. Rybyanets. Complex Parameters of Porous PZT Piezoceramics Measured for Different Vibration Modes.....	151
M.A. Lugovaya, E.I. Petrova, T.V. Rybyanets, G.M. Konstantinov, A.N. Rybyanets. Characterization Techniques for Advanced Materials and Devices.....	152
T. G. Lupeiko. The Century of Active Materials and Innovative Resource of Nanostructured Piezoceramics.....	152
I. E. Lysenko, O. A. Ezhova. Criteria of Equality of Intrinsic Vibration Frequency of Sensitive Elements of Micromechanical Gyroscopes and Accelerometers.....	153
I. E. Lysenko, O. A. Ezhova. Model of Equilibrium of Movable Elements of Micromechanical Mirrors.....	154
I. E. Lysenko, O. A. Ezhova. The Assessment Criterion on the Rigidity of Comb Electrodes of Microelectromechanical Converters.....	155
Mahjudin, Sumarno, Adinda Sandra Rosalinda. The Role of Consumer Standardization When It Comes for Online Marketing.....	156
D.I. Makariev, A.N. Rybyanets, A.N. Reznitchenko, A.A. Naumenko, E.I. Petrova. Digital Piezoelectric Material Based on Extracoarse – Grained Piezocomposite “Porous Ceramics – Polymer”.....	156
A.V. Makhboroda, A.V. Pavlenko, L.A. Reznichenko. Magnetodielectric. Effect in $\text{Bi}_{0.6}\text{La}_{0.4}\text{MnO}_3$ Ceramics.....	157

S.P. Malyukov, Yu.V. Klunnikova, T.H. Bui. Model Development of Inorganic Glassy Dielectric Laser Processing.....	158
S.P. Malyukov, Yu.V. Klunnikova, A.V. Sayenko. Study of Film Properties on Sapphire Surface.....	159
S.P. Malyukov, Y.V. Klunnikova, A.V. Saenko, D.A. Bondarchuk. Features of Glassy Dielectric and Sapphire Junction Formation.....	160
A.V. Markov, A.V. Pavlenko. Dielectric Properties of Solid Solutions of High-Temperature Multiferroics.....	160
I. P. Miroshnichenko. Method and Computer Software for Definition of Stress-Strain State in Layered Anisotropic Constructions at Pulse Loading.....	161
I.P. Miroshnichenko, I.A. Parinov, F.-T. Wang, H.-W. Tin. Mathematical Models and Computer Software to Define Distribution of Intensity of Optic Fields for Interference Pictures, Performed by Laser Interferometer.....	162
T. A. Moiseeva, Y. E. Zelenko, T.N. Myasoedova, V.V. Petrov. Optic Investigation of PANI and PANI/ZrO _x Composite.....	163
Muaffaq Achmad Jani. Material Temperature Measurement Using a Non-contacting Method.....	164
Muslimin Abdulrahim, Harjo Seputro. Microstructure and Interface Bottom Ash Reinforced Aluminum Metal Matrix Composite.....	165
Nai-Wen Hsu, Jenny Chih-Yu Lee, Ivan A. Parinov, Shun-Hsyung Chang. Designing a Smart Home Energy-Saving System via ZigBee Technology.....	165
A.V. Nasedkin, S.S. Muzyka. Numerical Analysis of a Porous Piezoelectric Tube with Helical Electrodes.....	166
A.V. Nasedkin, A.A. Nasedkina, A. Rajagopal. Homogenization of Periodic Masonry with Porous Bricks by Finite Element Method.....	167
A.V. Nasedkin, I.N. Pushkarev, A.N. Rybyanets, S.A. Shcherbinin. Finite Element Modeling of Ultrasonic Phased Plane Array Antenna with Active Elements from Porous Piezoceramics.....	168
A.V. Nasedkin, E.S. Yushutina. Axial-Torsion Vibrations of Piezoelectric Micromotors with Twisted Elastic Rods: Numerical Modeling.....	169
A.A. Nasedkina, M.V. Abramovich, J. Malachowski, K. Damaziak. Static Finite Element Analysis of a Pipeline with Volumetric Surface Defects Using MPC Approach.....	170
A.A. Nasedkina, A. Alexiev, J. Malachowski. Numerical Simulation of Ultrasonic Torsion Guided Wave Propagation for Pipes with Defects.....	171
A.A. Naumenko, M.A. Lugovaya, E.I. Petrova, I.A. Shvetsov, A.N. Rybyanets. Frequency Dependences of the Complex Material Constants for Porous PZT Piezoceramics.....	172
A.A. Naumenko, S. A. Shcherbinin, A.V. Nasedkin, A.N. Rybyanets. A Novel Approach for Optimization of Finite-Element Models of Lossy Piezoelectric Elements.....	173
N.M. Nevezorova, I. N. Leontyev, N.V. Smirnova, G.E. Yalovega. <i>In Situ</i> XAFS Investigation of the Pt Based Nanocatalysts in the H ₂ Gas-Phase Reducing Agent.....	173
N. M. Nevezorova, I. N. Leontyev, G. E. Yalovega. Local Atomic and Electronic Structure of the Pt/C Based Nanoparticles Grown in He, H ₂ and CO Gas Phase Reducing Agent.....	174
A. S. Nikulin, S. I. Peters, E. A. Ryndin, A. S. Isaeva. The Calibration of High-Sensitive Tunnel Accelerometers.....	175
M.N. Palatnikov, V.A. Sandler, O.V. Makarova, N.V. Sidorov, D.V. Ivanenko, I.N. Efremov, I.V. Birukova. Spontaneous Unipolarity and Anomaly of Dielectric, Piezoelectric Properties	

and Conductivity of Strongly Doped LiNbO ₃ :Zn Crystals.....	176
M.N. Palatnikov, O.B. Shcherbina, V.V. Efremov, S.M. Masloboeva. Structure and Mechanical Properties of Ceramic from Coprecipitated Nb _{2(1-y)} Ta _{2y} O ₅ Pentoxide.....	177
A.A. Pavelko, L.A. Shilkina, K.P. Andryushin, I.N. Andryushina, S.I. Dudkina, L.A. Reznichenko, O.N. Razumovskaya. Refinement of the R3C → R3M Transition Line in the Phase Diagram of PZT Solid Solutions.....	178
A.V. Pavlenko, I.M. Aliev, A.P Kovtun, G.N. Tolmachev, L.I. Kisileva, L.A. Reznichenko, I.A. Verbenko. Preparation and Investigation Dielectric Properties of BSN Thin Films, Prepared Using a Discharge with Runaway Electrons.....	179
A.V. Pavlenko, A.V. Turik, L.A. Reznitchenko, Yu. S. Koshkid'ko. Magnetodielectric Interactions in Bi _{0.5} La _{0.5} MnO ₃ Ceramic in Temperature Range of 10 – 120 K.....	180
C. Pawattana. Floodwater Storage Development Planning Using Improved DEM for Dry Season Requirements in the Chi River Basin.....	181
Petchporn Chawakitchareon, Rewadee Anuwattana, Jitrerra Buates. Production of Slow Release Fertilizer From Waste Materials.....	182
E.I. Petrova, A.A. Naumenko, M.A. Lugovaya, A.N. Rybyanets. New Ceramic Matrix Piezocomposites for Underwater Ultrasonic Applications.....	182
E.I. Petrova, A.A. Naumenko, S.A. Shcherbinin, A.N. Rybyanets. Experimental Study of General Relationships between Ultrasonic Attenuation and Dispersion for Ceramic Matrix Composites.....	183
I.V. Pisarenko, E.A. Ryndin. Physical and Topological Modeling of the P-I-N Photodetector for Integrated Optical Commutation Systems.....	184
Po-Hsun Lei, Min-Yen Yeh , Chyi-Da Yang , I-Jen Chen, Meng-Chyi Wu. Growth of Silver-Nanoparticle-Distributed Zinc Oxide Thin Film Using Spin-Coating Technology to Improve the Efficiency of InGaP/GaAs/Ge Solar Cells.....	185
Po-Min Cheng, Yuan-Long Jeang, Te-Jen Su, Hung-Yu Wang. Design of a Novel Current-Mode Wheatstone Bridge.....	186
A.A. Polovodova, A. O. Vatulyan. Determination of the Inhomogeneous Polarization Piezoceramic Beam Using Acoustic Sounding Data.....	186
V.V. Polyakov, A.S. Kovalenko, V.V. Polyakova, V.D. Svyatchenko. Dental Materials' Modification by Carbon Nanoparticles.....	187
V.V. Polyakov, V.N. Vyazmitin, A.N. Dmitriev. Technological and Design Particularity of the Hybrid Sensors Nano- and Microsystems.....	188
V.V. Polyakova, V.A. Smirnov. Profiling of the surface of silicon substrate using the method of local anodic oxidation.....	189
T. Y. Privalova, Y. A. Ignatova, A. L. Bulanova, A. S. Bogatin, E. V. Andreev, S. A. Kovrigina, I. O. Nosachev. Impedance Spectroscopy: A Method to Describe Processes of Electromigration in Materials.....	190
V.V. Pryadchenko, V.V. Srabionyan, E.B. Mikheykina, L.A. Avakyan, V.E. Guterman, L.A. Bugaev. Atomic Structure of Bimetallic Nanoparticles in PtAg/C Catalysts.....	191
O. A. Purchina, A.Y. Poluyan, D. D. Fugarov, Y.N. Bugaeva. Algorithm of Redistribution of Connections between Outputs on the Base of Swarm Intellect.....	192
Puttiporn Thiamsinsangwon, Pasakorn Jutakridsada, Khanita Kamwilaisak. The Effect of Carbon Loading on the Characterization of TiO ₂ /AC Composite Catalyst.....	193
S.I. Raevskaya, V.V. Laguta, M. Marysko, S.P. Kubrin, V.V. Titov, H. Chen, C.-C. Chou, M.A. Malitskaya, I. P. Raevski, A.V. Blazhevich, D.A. Sarychev, L.A. Pustovaya, I.N. Zakharchenko, E.I. Sitalo, V.Yu. Shonov. Effect of Zr and (Ti, Zr) Doping on Ferroelectric and Magnetic Phase Transitions in Pb(Fe _{1/2} Nb _{1/2})O ₃	194

A.G. Razumnaya, E.D. Gorkovaya, V.M. Mukhortov, Yu.I. Yuzyuk. Giant Upshift of Ferroelectric Phase Transition Temperate in Barium Strontium Titanate Thin Film.....	195
R.A. Retno Hastijanti. Sustainable Livelihood Framework Analysis for Improving Local Sector Industries. Case Study: Local Sector Industries at Ledok Kulon, East Java-Indonesia.....	196
A.N. Rybyanets. Advanced Functional Materials: Modeling, Technology, Characterization and Applications.....	196
A.N. Rybyanets. New Combinational Method and Ultrasonic Transducer Designs for Body Aesthetics Applications.....	197
A.N. Rybyanets, D.I. Makariev, T.V. Rybyanets, A.N. Reznitchenko. HIFU Transducers Designs and Treatment Methods for Hemostasis of Deep Arterial Bleeding.....	198
A.N. Rybyanets, S.A. Shcherbinin, N.A. Shvetsova, D.I. Makariev. New Methods and Transducers Designs for Ultrasonic Diagnostics and Therapy	199
E.V. Sadyrin, L.I. Krenev, B.I. Mitrin, I.Yu. Zabiyaka, S.M. Aizikovich. Investigation of the Indenter Temperature and Speed Effects during Nanoindentation on the Mechanical Properties of Carbon Steels.....	199
V. G. Safronenko. Vibroacoustics of Composite Polymeric Shells of Rotation Reinforced with Discrete Circular Ribs.....	201
E.V. Saulina, Y.V. Esipov, A.V. Cherpakov, V.V. Gritsenko. Informative Parameter for Identifying the State of Stress of Complex Structures.....	201
A.F. Semenchev, T.A. Minasyan, I.P. Raevski, H. Chen, C-C Chou, S.I. Raevskaya, M.A. Malitskaya, V. V. Titov. Effect of Dynamic Fatigue on Pyroelectric and Piezoelectric Properties of PFN-PT Ceramics.....	202
T. V. Semenistaya, D. E. Sennikova, V. V. Petrov, M. M. Brzhezinskaya. Microstructure of Gas-Sensing Nanocomposite Metal-Contacting Polyacrylonitrile Films.....	203
S.A. Shcherbinin, G.M. Chechin, D.S. Ryabov. On the Theory of Exact Interactions between Vibration Modes in Physical Systems with Discrete Symmetry.....	204
S.A. Shcherbinin, A.A. Naumenko, N.A. Shvetsova, A.N. Rybyanets. Theoretical Modeling and Experimental Study of High Intensity Focused Ultrasound Transducers.....	205
S.A. Shcherbinin, I.A. Shvetsov, A.N. Rybyanets, M.A. Lugovaya. Electromechanical Response Characterization of Ferro- and Piezoelectric Materials.....	206
S.N. Shevtsov, V.A. Akopyan, E.V. Rozkov, V.A. Chebanenko, C.-C. Yang, C.-Y. Jenny Lee, C.-X. Kuo, Suey-Yueh Hu. Optimization of the Electric Power Harvesting System Based on the Piezoelectric Stack Transducers.....	207
S.N. Shevtsov, O.D. Alexeeva, Y.-M. Liu, Y.-L. Cheng. On the Experimental Determination of Interlaminar Shear Module of the Multilayered Composite with Orthotropic Symmetry.....	208
L. A. Shilkina, G. M. Konstantinov, I. A. Verbenko, S. I. Dudkina, A. V. Pavlenko, L. A. Reznichenko. Features of the Phase Formation, Microstructure Formation and Properties of $PbMn_{1/2}Nb_{1/2}O_3$	209
V.B. Shirokov, V.V. Kalinchuk, R.A. Shakhovoy, Yu. I. Yuzyuk. Changing the Properties of Barium Titanate Film under in Plane Electric Field.....	213
V.A. Shmatko, E.S. Bogoslavskaja, T.A. Mikhailova, G.E.Yalovega. Morphology, Electronic Structure of Nanoparticles CuO_x and Nanocomposites CuO_x/CNT : SEM and X-Ray Spectroscopy Studies.....	214
A.G. Shpenev, A.M. Kenigfest, A.K. Golubkov. Theoretical and Experimental Study of Carbon Brake Disks Frictionally Induced Thermoelastic Instability.....	214

V.A. Shuvaeva, I. P. Raevskii, O.E. Polozhentzev, Y.V. Zubavichus, V.G. Vlasenko. The Local Structure of Barium Iron Niobate.....	215
I.A. Shvetsov, M.A. Lugovaya, A.N. Rybyanets, N.A. Shvetsova, G.M. Konstantinov. Experimental Study of High-Temperature Porous Piezoceramics.....	216
N.A. Shvetsova, A.N. Reznitchenko, A.N. Rybyanets, I.A. Shvetsov, E.I. Petrova. Surface Acoustic Waves Method for Piezoelectric Material Characterization.....	217
N.A. Shvetsova, M.A. Lugovaya, A.N. Rybyanets, I.A. Shvetsov, D.I. Makariev. Dielectric, Piezoelectric and Elastic Properties of PZT/PZT Ceramic Piezocomposites.....	218
E.N. Sidorenko, V.G. Smotrakov, V.V. Eremkin, I.I. Natkhin, M.E. Agarkova, D.S. Agarkova. The Study of Microwave Energy Absorption by Multiferroic Crystals.....	218
E. N. Sidorenko, V. G. Smotrakov, V. V. Eremkin, I. I. Natkhin, M. E. Agarkova, A. A. Naumenko, E. I. Petrova. Absorption Spectra of Microwave Energy of Piezoelectric Ceramics Synthesized at Different Sintering Temperatures.....	219
M.A. Sirota, K.G. Abdulvakhidov, S.V. Zubkov , O.U. Koval, L.D. Chernykh, M.A. Vitchenko. Formation of the Physical Properties of $Pb(Zr_{1-x}Ti_x)O_3$ by Mechanical Activation.....	220
T. P. Skakunova, Yu. Ya. Gerasimenko, A. R. Gamduaev, I. V. Tarasov. Mathematical Modeling of Processes of Electric Mass Transfer in Controllable Electrochemical Resistance.....	221
A. Skaliukh. About the Class of an Anisotropy of Partially Poled Ceramic Materials.....	222
A. Skaliukh, G. Li. The General Theory of Polarization of Ferroelectric Materials.....	223
A. Skaliukh, V. Naprasnikov, A. Soloviev. Review of Mathematical Models of the Irreversible Processes of Polarization.....	224
A.N. Soloviev, I.V. Baranov, S.-H. Chang, C.-L. Huang. Optimization Algorithm for Inverse Problems with Complex Target Function.....	225
A.N. Soloviev, S. V. Biriukov , A.A. Solovieva, J.-P. Wang, W.-L. Hong. The Realization of the SPH Method for ACELAN (FEM-Package).....	226
A. N. Soloviev, A. V. Cherpakov. Modeling of Identification of Multiple Defects in Bars.....	227
A.N. Soloviev, R. U. Gruzdev, V.V. Naprasnikov, Y.-M. Liu, H.-C. Huang. Identification of Nanomaterials on the Base of the Molecular Dynamics Method Using LAMMPS Package.....	228
A.N. Soloviev, Le V. Duong, E.V. Kirillova, P.-C. Wu, M.-Y. Yeh. Efficiency of the Piezoelectric Energy Storage Device Based on PMN – 0.33PT Relaxor.....	229
A.N. Soloviev, Nguen D.T. Giang, Le The Anh, A. Aleksiev, J.-C. Liu. Incremental Algorithm for Defects Identification in the Hollow Cylinder on the Base of Artificial Neural Networks.....	231
A.N. Soloviev, P.A. Oganesyan, T.G. Lupeiko, E.V. Kirillova, S.-H. Chang, C.-D. Yang. Modeling of Non-uniform Polarization for Multi-layered Piezoelectric Transducer for Energy Storage Devices.....	232
Somchai Chuan-udom. Grain Separation in a Transverse Axial Threshing Unit of Thai Combine Harvester.....	233
Somjai Kajorncheappunngam, Aroonrat Punmalee, Apinya Yaemprai. Extraction of Lycopene from Gac Fruit by Supercritical Carbon Dioxide.....	234
V.V. Srabionyan, V.V. Pryadchenko, T.A. Lastovina, S.V. Belenov, L.A. Avakyan, V.E. Guterman, L.A. Bugaev. EXAFS Study of Bimetallic Nanoparticles in PtCu/C Catalysts.....	234

H.A. Sudykov, G.M. Konstuntinov, I.A. Verbenko, L.A. Reznichenko. Microstructure (Grain Structure) of Ceramic Solid Solution of $Ba_{1-x}Sr_xTiO_3$ ($0 \leq x \leq 1.0$).....	235
H.A. Sudykov, I.A. Verbenko, G.M. Konstantinov, L.A. Reznichenko. Effects of Modification of Solid Solutions Based on the $(Na_{1-x}Li_x)NbO_3$ System.....	236
Sukangkana Talangkun, Nattapat Kanchanaruangrong. Mechanical Properties of A356 Aluminum-Al ₂ O ₃ Composite Produced by Sand Casting.....	238
M. A. Sumbatyan, M. Yu. Remizov. An Acoustically Active Material Containing A Triple-Periodic System of Thin Plane Cracks in an Elastic Matrix.....	238
M. A. Sumbatyan, A. Scalia, E. A. Usoshina. Dynamic Contact Problem for a Heterogeneous Layer with a Liquid Sheet on a Non-Deformable Foundation.....	239
R. Sunder. The Science behind the Residual Stress Effect in Metal Fatigue.....	240
Sung-Tsun Shih, Lui Kam. A Multi-fractal Multi-permuted Multinomial Measurement for Unsupervised Image Segmentation.....	240
Sununtha Kingpaiboon, Prawit Uang-aree. Variability of GPS Precipitated Water Vapor in the Northeast of Thailand.....	241
Syuan-Main Huang, Wei-Yu Chen, Huang-Chu Huang. The Study of Using PLC and Fuzzy System to Implement Real-Time Remote Monitoring Thermostat of Automated Aquaculture Systems.....	242
M.V. Talanov, L.A. Shilkina, L.A. Reznichenko. Lead-Free Piezoceramic Materials for Ultrasound Applications.....	243
I.V. Tarasov, S.N. Shevtsov, I.V. Zhilyaev, A.V. Evlanov, Jiing-Kae Wu. Modeling and Optimization of Polymeric Composite Cure at the Autoclave Processing.....	243
N.A.Teplyakova, S.V.Titov, I.A.Verbenko, N.V.Sidorov, L.A.Reznichenko. Search for a Structure Ordering in Ceramic $Bi_{1-x}La_xFeO_3$ Solid Solutions by Raman Spectra.....	244
Yu. A. Tikhonov, A.G. Razumnaya, E.D. Gorkovaya, I.N. Zakharchenko, Yu. I. Yuzyuk, N. Ortega, A. Kumar, R.S. Katiyar. Strain Engineering of Ferroelectric Superlattices.....	246
P.E. Timoshenko, V.V. Kalinchuk, V.B. Shirokov, M.O. Levi, A.V. Pan'kin. Finite Element Modeling of Dispersion Relation and Resonant Frequencies in Surface Acoustic Waves Excited in Barium-Strontium Titanate Thin Films Fabricated on Magnesium Oxide Substrate.....	247
S. V. Titov, I. A. Verbenko, L. A. Shilkina, A. P. Kovtun, V. A. Alyoshin, S. I. Shvetsova, V. V. Titov, V. M. Shabanov, L. A. Reznichenko. The Influence of Praseodymium Doping on the Structure and Composition of the Bismuth Ferrite Ceramics.....	248
V.Yu. Topolov, C.R. Bowen, P. Bisegna. New Effects in 1–3-Type Composite Based on Relaxor-Ferroelectric Single Crystals.....	249
V.Yu. Topolov, C.R. Bowen, A.N. Isaeva. Figures of Merit and Related Parameters of Modern Piezo-Active 1–3-Type Composites for Energy-Harvesting Applications.....	250
V.Yu. Topolov, C.R. Bowen, F. Levassort. Piezoelectric Sensitivity and Anisotropy of Novel Lead-Free Composites.....	251
G. N. Trepacheva. Oscillations of the Compressible Fluid Free Surface in the Finite Size Wave Setup Caused by Plate.....	252
Irina Trubchik, Lubov' Podkolzina. Modeling the Effect of Alternating Gradient Elastic Properties of Thin Coating of the Rigid Foundation on Stress State near the Contact Region of the Coating with Non-deformable Stamp.....	252
A.V. Turik. Negative Permittivity in Nanoparticle Aggregates.....	253
A.V. Turik, A.S. Bogatin. Negative Permittivity in $CaCu_3Ti_4O_{12}$ Family Ceramics.....	254
Z. S. Umkhaeva. Peculiarities of Magnetic Phase Transition in the $Gd_{1-x}Zr_xCo_2$ Laves Phase in the Curie Temperature Region.....	255

I. A. Verbenko, L. A. Reznichenko, A. G. Abubakarov, L. A. Shilkina, S. I. Dudkina. Glass Ceramics Based on Alkali Metal Niobates.....	256
I. A. Verbenko, H. A. Sudykov, S. I. Dudkina, L. A. Reznichenko. Functional Materials with High Ferroelectric Hardness and Efficiency.....	257
I. A. Verbenko, L. A. Shilkina, A. G. Abubakarov, L. A. Reznichenko, O. N. Razumovskaya, T. N. Sorokun. Synthesis and Sintering Technologies of Materials Based on Bismuth Ferrite.....	258
P. Yu. Voloshchenko, Yu. P. Voloshchenko , V. G. Vavilov, V. S. Chernobrov. Symbolic Analysis of Electric Structure of Material for Analog and Digital Coherent Electronics Products.....	259
P. Yu. Voloshchenko, Yu. P. Voloshchenko, V. G. Vavilov, A. I. Zaycev. Mathematical Modeling of Electromagnetic Wave Processes in Materials of High-Speed Integrated Circuits.....	260
V. Y. Voloshchenko. The Hydro-acoustic Correlation Log.....	261
V. Y. Voloshchenko. The Parametric Navigation System.....	262
V.Y. Voloshchenko, A.P. Voloshchenko, E.V. Voloshchenko. An Impulse Radiator with Ultrasonic Waves Energy Storage for Acoustic Measurements.....	262
V.Y. Voloshchenko, E.V. Voloshchenko. The Parametric Echo-Pulse Sonar.....	263
Voravee Panyakum, Anuwit Sonsiri, Thana Radpukdee. Automation System Construction by Programmable Logic Controller: an Application for a Counter Flow Rotary Dryer.....	264
Wei-Yu Chen, Syuan-Main Huang, Huang-Chu Huang. The Study Design of Wave Power Generation System Combined with Offshore Wind Power Generation Using by Artificial Fuzzy System.....	265
Yuriy Yakovlev, Natalia Kudinova. The Finite-Element Modeling of Hydrogen-Induced Destruction.....	265
G. E. Yalovega. Metal Oxide Nanocomposites: Morphological and X-Ray Spectroscopy Studies.....	266
G. E. Yalovega, V. A. Shmatko, A. O. Funik, M. M. Brzhezinskaya. Morphology, Atomic and Electronic Structure Metal Oxide (CuO_x , CoO_x , NiO_x , SnO_x) Nanocomposites and Thin Films.....	267
A. V. Yatsenko, A. S. Pritulenko, D. Yu. Sugak, I. M. Solskii. The Effect of Post-Annealing Heat Treatments on the Electric Properties of Reduced LiNbO_3 Crystals.....	268
Yi-Long Lin, Jenny Chih-Yu Lee, Shih-Fong Chao, Jr-Ping Wang, Shun-Hsyung Chang. Designing an Automatic Power Monitoring System with LabVIEW.....	269
Yu-Lun Cheng, Jenny Chih-Yu Lee, Jinn-Chang Wu, Varvara Shevtsova, Ivan A. Parinov, Shun-Hsyung Chang. Designing the Photovoltaic Based Battery Charger with a Dual-output Buck Power Converter.....	270
A. S. Yudin, S. A. Yudin. Forced Oscillations of Shells with Auxetic Properties.....	271
Yuvarat Ngernyen, Charinee Lhapoon, Pisut Srisakultew. Solid Fuel of Biomass and Char Pellets from Pig Manure.....	272
Yu. I. Yuzyuk, R. A. Sakhovoy, F. V. Shirokov, I. N. Zakharchenko, V. B. Shirokov, J. Belhadi, M. El Marssi. Ferroelectric Phase Transitions in BaTiO_3 Thin Film and $\text{BaTiO}_3/\text{BaZrO}_3$ Superlattices.....	272
Yu.N. Zakharov, A.A. Pavelko, A.G. Lutokhin, V.G. Kuznetsov, L.A. Shilkina, L.A. Reznichenko. Pyroelectric and Dielectric Responses of the $\text{PbZr}_{1-x}\text{Ti}_x\text{O}_3$ System in the $0.37 \leq x \leq 0.57$ Range.....	273

V.B. Zelentsov, B.I. Mitrin, E.V. Berusova, S.M. Aizikovich, L.L. Ke. Thermoelastodynamic Instability of Frictional Sliding of an Infinite Punch over a Surface of an Elastic Coating Bonded with an Elastic Substrate.....	274
G. A. Zhuravlev, Y. E. Drobotov. On the Combined Effect of Separated Force Factors and Material Physical-mechanical Properties on Stress Concentration in the Body of a Loaded Ledge.....	275
S. V. Zubkov, V. G. Vlasenko, V. A. Shuvaeva. Crystal Structure and Dielectric Properties of Complex Perovskite-like Solid Solutions $\text{Bi}_7\text{Ti}_{4+x}\text{W}_x\text{Ta}_{1-2x}\text{O}_{21}$ ($x = 0 - 0.5$).....	276
 Author Index.....	278
Participating Countries and Organizations.....	284
Schedule.....	289

Nonlinear Shear Properties of Colloidal Suspensions of Nanoparticles

**T. S. Dembelova¹, B. B. Badmaev¹, D. N. Makarova¹, A. B. Tsyrenzhapova¹,
B. B. Damdinov^{1,2*}**

¹Institute of Physical Materials Science RAS (Siberian Branch), 8, Sakyanova Str., Ulan-Ude, 670047, Russia

²Buryat State University, 24a, Smolin Str., Ulan-Ude, 670000, Russia

*bdamdinov@bsu.ru

Suspensions of nanoparticles of yttrium aluminum garnet doped by neodium in ethylene glycol and silicon dioxide in polyethylsiloxane liquid were studied by the resonance acoustical method [1, 2]. The liquid investigated was placed between one end of horizontal surface of piezoquartz and rested cover. The piezoquartz have been performed tangential oscillates at the resonance frequency of 73 kHz. Thus, the liquid was subject to shear deformations. The shear viscoelastic measurements of these suspensions at various concentrations showed a nonlinear dependence of real and imaginary shear moduli on shear deformation angle. The study of the investigated liquid also revealed that shear viscoelastic properties depend on concentration and size of particles.

Acknowledgement

The work was supported by RFBR Grants Nos. 12-02-98012, 12-02-98003, 15-02-08204.

References

- [1] Badmaev, B.B., Bal'zhinov, S.A., Damdinov, B.B., Dembelova, T.S., *Acoustical Physics*, 56, 640-643 (2010).
- [2] Badmaev, T.Dembelova, B.Damdinov, D.Makarova, O.Budaev, *Colloids and Surfaces A*, 383, 90-94 (2011).

Gas Sensitivity of Graphene Films on Silicon Carbide Surface to NH₃ and (CH₃)₂CH(OH) Vapours

**M. V. Demyanenko^{1*}, M. N. Grigoryev¹, A. M. Svetlichnyi¹, O. B. Spiridonov²,
I. L. Jityaev¹**

¹*Institute of Nanotechnologies, Electronics, and Electronic Equipment Engineering, Southern Federal University, Taganrog, 347922, Russia*

²*Southern Laser Innovation Technological Center, Taganrog, 347923, Russia*

*maks_vd@mail.ru

Gas sensors that can operate in extreme conditions, are in demand in modern industry. In this report, graphene is used as a gas sensitive layer of a gas sensor, because graphene has several unique electrophysical parameters, giving it an important advantage over other materials used for gas sensitivity.

A graphene film grown by using the method for vacuum thermal degradation of silicon carbide (SiC) enables us to obtain the high-quality graphene film over the entire surface of the

substrate. The topological pattern of the gas sensor has been designed and produced by applying a mask from a dielectric Al_2O_3 film on SiC. Use of different temperature regimes of SiC vacuum thermal annealing makes it possible to state that the highest quality graphene films are produced at 1300 °C. The study of gas sensitivity, dynamic characteristics of the sensor was carried out, and the dependencies of NH_3 and $(\text{CH}_3)_2\text{CH(OH)}$ vapors desorption from the sensor temperature for graphene films prepared at different temperatures were found. The response time, recovery time, sensitivity threshold of graphene films to NH_3 gas and $(\text{CH}_3)_2\text{CH(OH)}$ vapors and the effect of the annealing temperature of SiC on the gas sensitivity of the investigated sensors were found. It was shown that graphene films obtained at the annealing temperature 1300 °C have almost two times higher sensitivity to NH_3 at a concentration 100 ppm compared to the samples obtained at the annealing temperature 1400 °C.

Sensitivity of graphene films to $(\text{CH}_3)_2\text{CH(OH)}$ vapours at a concentration 100 ppm was almost four times higher as compared to the samples obtained at the annealing temperature 1400 °C. It was found that the annealing temperature does not significantly affect the response time and recovery time of the sensor gas sensitivity. The prospects of the developed sensor for the analysis of highly toxic environments were shown.

Acknowledgement

This work was supported by The Ministry of Education and Science of Russian Federation, the State Task in the Sphere of Scientific Activities (project no.16.1154.2014/K). The equipment of the Sharing Center and REC “Nanotechnologies” of Southern Federal University was used for this study.

Features of Technology of SAW Devices

V. G. Dneprovski*, G. Ya. Karapetyan

*I.I. Vorovich Mathematics, Mechanics and Computer Science Institute,
Southern Federal University, Rostov-on-Don, Russia*

*dnepr3@rambler.ru

The most common general scheme of manufacturing the SAW devices includes the following basic operations: production of the piezoelectric acoustic line (substrate), making master drawing and mask, metallization of the substrate, formation of interdigital transducer structures and contact tires, installation, assembly and sealing of the filter. Recently, for the manufacture of a photo mask is usually used phototypesetting machine that eliminates the master drawing manufacturing operation.

For the manufacture of the SAW device, substrates can be both single-crystal and polycrystalline (piezoceramic) materials. Single crystals with structural perfection, providing a small loss on the SAW distribution (about 0.1 – 0.5 dB/cm at frequencies of 1.5 – 2 GHz). In addition, they are stable over time and have highly reproducible parameters in the serial production.

Among the number of single crystal materials promising for use in SAW filters, there are bismuth germanate $\text{Bi}_{12}\text{GeO}_{20}$, iodate, lithium silicate, bismuth paratellurid TeO_2 , selenium Se, and also zinc oxide film ZnO , aluminum nitride AlN on sapphire and others. Some of them have already been successfully used for the development of SAW devices. Recently, there was

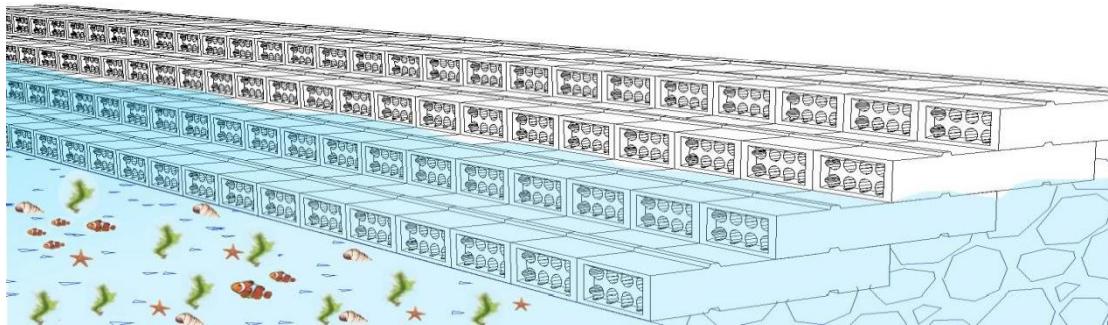


Fig. 3. Porous columnar armored blocks were arranged as decay wave revetment diagram (more clean than traditional type, more beautiful, more ecology, more hydrophilic)

Design Features of Rectangular Nanoscale Graphene/SiC Field Emission Cathodes

I. L. Jityaev^{1*}, A. M. Svetlichnyi¹, O. B. Spiridonov², M. V. Demyanenko¹

¹*Institute of Nanotechnologies, Electronics, and Electronic Equipment Engineering, Southern Federal University, Taganrog, 347922, Russia*

²*Southern Laser Innovation Technological Center, Taganrog, 347923, Russia*

*jityaev.igor@gmail.com

Carbon nanomaterials are widely used in modern field emission electronics. Graphene is one of the promising carbon materials for vacuum field emission nanoelectronics. Structures based on graphene/silicon carbide have mechanical strength, high thermal conductivity, radiation resistance, performance and stability of film parameters. Stability of the parameters of field emission cathodes depends on homogeneity of the electric field between cathode and anode, which is mainly determined by optimal design of the emitter. A model of a rectangular nanoscale field emission cathode was considered to identify features of the emission characteristics of cathodes based on graphene films on SiC and effect of geometric parameters on electric field strength at an interelectrode distance 10–50 nm was studied.

The dependences of electric field strength on thickness, height of the field emission cathode and interelectrode spacing were graphically represented according to the simulation results and analytical calculation. The curves on the graphs from the analytical calculations and simulation results have similar character. The difference of the values of electric field strength is attributed to the fact that the analytical expression does not take into account local field amplification in the cathode ends, unlike the curves plotted are based on the simulation results. Reducing the width of the field emission cathode and interelectrode spacing promotes an increase of the electric field strength. Changing the height of a field emission cathode does not make a significant impact on the value of the electric field strength: there is a slight augmentation of the electric field strength with decreasing height. Local emission of the electrons from substrate begins at the height of cathode less than 100 nm. Inhomogeneity of the electric field along the field-emission cathode was established, which at its ends was 1.5–2 times higher than in the central part of the emitting surface. This augmentation of the electric field may be one of the reasons of emission current instability and premature degradation of

devices. It was proposed to optimize the design of rectangular emitter at its ends in order to reduce the gain of the electric field strength at this location. The results of studies are to be considered, when designing elements of field emission devices.

Acknowledgement

This work was supported by the Ministry of Education and Science of Russian Federation, the State Task in the Sphere of Scientific Activities (project no.16.1154.2014/K). The equipment of the Sharing Center and REC “Nanotechnologies” of Southern Federal University was used for this study.

Production of ZnO Based UV-Detector

Jong-Gul Yoon^{1*}, O.A. Ageev², E. G. Zamburg^{2}, D. A. Khakhulin²**

¹*University of Suwon, San 2-2, Wau-ri, Bongdam-eup, Hwasung-si, Gyeonggi-do 445-743, Korea*

²*Southern federal university, Institute of Nanotechnology, Electronics and Electronics Equipment Instrumentation, Shevchenko str., 2, Taganrog, Russia*

*jgyoon@sumon.ac.kr; **egzamburg@sfedu.ru

The implementation of zinc oxide thin films for detection of UV radiation has several advantages over the current technologies. The aim of the study was to investigate the influence of substrate and deposition process parameters on the film quality and the efficiency of UV detection. Samples were prepared on silicon, ITO covered glass and sapphire substrates. The optimal process parameters were determined experimentally: the concentration of zinc acetate of 0.045 mol, the amount of ethylene glycol monoethyl ether of 30 ml. The deposition temperature was varied in the range from 300°C to 450°C. On the ZnO films, grown on sapphire substrates, golden interdigital electrodes were deposited. The optimal growth temperature of 300°C was determined by analysis of XRD and current-voltage patterns. Fig. 1 shows the current-voltage characteristics and XRD-diffraction pattern of the film.

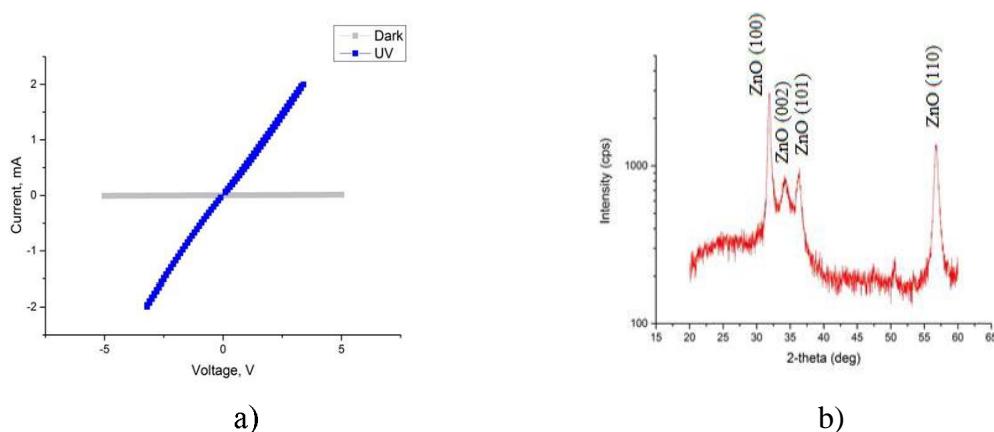


Fig. 1. Current-voltage characteristics of the UV-detector based on ZnO film, grown on sapphire with golden interdigital electrode (a) and XRD-diffraction pattern of the ZnO film grown on ITO-covered glass at 300°C