

Table of Contents

Preface, Committees and Sponsors

Chapter 1: Semiconducting and Metal Nanoheterostructures: Self-Organization, Structure, Modeling and Characterization

Optical Properties of Quantum Dashes

G. Sek, A. Musiał, P. Mrowiński, A. Maryński, J. Andrzejewski, J. Misiewicz, A. Somers, A. Forchel and S. Höfling

3

DFT Simulation of the Extra Me Adatom Diffusion on the Ge(111) $\sqrt{3} \times \sqrt{3}$ 1/3 ML Me Induced Surfaces

Y.V. Luniakov

12

The Optical Spectra of a-Si:H and a-SiC:H Thin Films Measured by the Absolute Photothermal Deflection Spectroscopy (PDS)

Z. Remes, R. Vasudevan, K. Jarolimek, A.H.M. Smets and M. Zeman

19

Theoretical Study of the Lithium Diffusion in the Crystalline and Amorphous Silicon as well as on its Surface

A.S. Fedorov, A.A. Kuzubov, N.S. Eliseeva, Z.I. Popov, M.A. Visotin and N.G. Galkin

29

Syntheses and Structural Control of Silicide, Oxide and Metallic Nano-Structured Materials

H. Tatsuoka, W. Li, E.C. Meng, D. Ishikawa and K. Nakane

35

Phase Transformation in Titanium Nanoparticles from First Principles

A.N. Chibisov

42

Adsorption Configuration of CH₄ on Fe/SiO₂ Surface: First-Principles Calculations

M.A. Chibisova and A.N. Chibisov

47

The Influence of Seed Layer on Growth of Magnetite Films on the SiO₂/Si (001) Surface

T.A. Pisarenko, V.V. Korobtsov, V.A. Vikulov, A.A. Dimitriev and V.V. Balashev

51

Electrical Transport Features in Fe₃O₄/SiO₂/*n*-Si Hybrid Structures

V.A. Vikulov, A.A. Dimitriev, V.V. Balashev, T.A. Pisarenko, A.M. Maslov and V.V. Korobtsov

56

Multi-Walled Carbon Nanotubes Synthesized by Methane Pyrolysis: Structure and Magnetic Properties

N.S. Saenko and A.M. Ziatdinov

60

Sodium Doping of Bi/Si(111) Ultra-Thin Films

M.V. Ryzhkova, D.V. Gruznev, E.A. Borisenko and D.A. Tsukanov

65

Structure and Optical Properties of Ca Silicide Films and Si/Ca₃Si₄/Si(111) Heterostructures

N.G. Galkin, D.A. Bezbabnyi, S.A. Dotsenko, K.N. Galkin, I.M. Chernev, E.A. Chusovitin, P. Nemes-Incze, L. Dózsa, B. Pécz, T.S. Shamirzaev and A.K. Gutakovski

71

Fabrication of Nano-Sized Silicon Powder by Adiabatic Compression

G.A. Pozdnyakov, V.N. Yakovlev and A.I. Saprykin

80

Ab Initio Calculation of Cobalt Interlayer Size Influence on Tensile Strength in WC-Co Hard Alloy

A.A. Gnidenko

86

Influence of Preliminary Plasma Processing on Luminescent Properties of Porous Silicon

N.G. Galkin, D. Yan, E.A. Chusovitin, A.B. Rasin, K.N. Galkin, M.V. Bozhenko, V.V. Mararov, V.M. Astashinsky and A.M. Kuzmitsky

90

Electron Spin Lifetime Control in GaAs Quantum Well by Means of Electrically Induced Lateral Traps

A.V. Larionov and A.I. Il'in

96

Chapter 2: Nonlinear Optical Mediums, Biomaterials, Nanocomposites, Nanostructured Coatings and their Applications

Role of Ag⁺ Ion Concentration on Metal-Assisted Chemical Etching of Silicon

O.V. Volovlikova, S.A. Gavrilov, A.A. Dronov, Y.S. Grishina and A.N. Belov

103

Fibrous Noble Opals: Electron and Atomic-Force Microscopy and Spectrometry Data	109
A.V. Aseeva, S.V. Vysotskiy, K.N. Galkin, K.Y. Bushkareva, A.A. Karabtsov and A.S. Okrugin	
Self-Accommodating Nature of Martensite Formation in Shape Memory Alloys	114
O. Adiguzel	
Simulation of Electron Injection and Charging Processes in Ferroelectrics Modified with the SEM-Techniques	
A. Maslovskaya and A.V. Sivunov	119
Incorporation of Zirconia and Silica Nanoparticles into PEO-Coatings on Magnesium Alloys	
I.M. Imshinetsky, S.V. Gnedenkov, S.L. Sinebryukhov, D.V. Mashtalyar, A.V. Samokhin and Y.V. Tsvetkov	125
Tungsten Carbide Decarburation by Electrical Discharges	
A.A. Burkov and S.A. Pyachin	131
Diamond-Like Carbon Films Formed by Pulsed Supersonic Plasma Flow Deposition	
Y.V. Nastaushev, T.A. Gavrilova, E.V. Fedosenko, G.A. Pozdnyakov and F.N. Dultsev	137
Features of the Magnesium Alloys Corrosion in the Chloride-Containing Media	
A.S. Gnedenkov, S.L. Sinebryukhov, D.V. Mashtalyar and S.V. Gnedenkov	143
Plasma Electrolytic Oxidation Coatings on Titanium Formed with Microsecond Current Pulses	
S.V. Gnedenkov, S.L. Sinebryukhov, A.M. Puz', A.S. Gnedenkov, I.E. Vyaliy, D.V. Mashtalyar and V.S. Egorkin	149
Fabrication of Battery Cathode Material Based on Hydrolytic Lignin	
D.P. Opra, S.V. Gnedenkov, S.L. Sinebryukhov, A.K. Tsvetnikov and V.I. Sergienko	154
Growth of Na₂W₂O₇ Single Crystals as Possible Optical Host Material	
T.A. Gavrilova, N.V. Ivannikova, V.N. Shlegel, V.D. Grigorieva, S.F. Solodovnikov, T.B. Bekker and V.V. Atuchin	160
Synthesis and Micromorphology Transformation of Monoclinic α-Gd₂(MoO₄)₃	
T.A. Gavrilova, O.P. Andreeva, V.V. Atuchin, I.V. Korolkov and I.S. Soldatenkov	165
Photorecording Polymeric Waveguide Film Based on 2,2-difluoro-4-(9-anthracyl)-6-methyl-1,3,2-dioksaborine for Photonics	
A.Y. Zhizhchenko, Y.N. Kulchin, O.B. Vitrik, A.G. Mirochnik and E.V. Fedorenko	170
Protective Properties of the Nanocomposite Coatings on Mg Alloy	
S.V. Gnedenkov, S.L. Sinebryukhov, V.S. Egorkin, I.E. Vyaliy, A.M. Emelyanenko and L.B. Boinovich	176
Study of Biopolymer Chitosan as Resist for Submicron Electronic Lithography	
S.S. Voznesenskiy, A. Nepomnyaschiy and Y.N. Kulchin	180
Photodynamic Effects in Nanocomposites Based on Quantum Dots of Cadmium Sulfide Embedded in a Silicate Matrix, in their Interaction with the Laser Beam	
A.A. Sergeev, S.S. Voznesenskiy, A.N. Galkina, A. Nepomnyaschiy and K.M. Sergeeva	186
Current Source Based on Photoelectric Effect with Enhanced Efficiency	
S.P. Timoshenkov, A.A. Sherchenkov, A.A. Nalsky and A.A. Revina	192
High Anionic Conductivity of Solids with Different Structure	
A.B. Podgorbunsky, S.L. Sinebryukhov and S.V. Gnedenkov	200
Near-Field Optical Probe Based on the Fiber Fabry-Perot Interferometer with Protruding Evanescent Light Source	
A.A. Kuchmizhak, O.B. Vitrik and Y.N. Kulchin	204
Optical Dielectric Apertureless Probe for Surface Laser Modification with λ/15 Lateral Resolution	
A.A. Kuchmizhak, O.B. Vitrik, Y.N. Kulchin and A.G. Savchuk	210
The Structural Characteristics Features of the Nanocomposite Systems of CdS Quantum Dots in the Gel Matrix Obtained by the Method of Small-Angle X-Ray Scattering	
A.N. Galkina and A.A. Sergeev	216
Nonlinear Optics with Backward Waves: Extraordinary Features, Materials and Applications	
A.K. Popov, V.V. Slabko, M.I. Shalaev, I.S. Nefedov and S.A. Myslivets	222
The Effect of Heating on the Magnetic Properties of Fe_{71,5}Cu₁Nb₅Si_{16,5}B₆ Amorphous Film	
V. Pechnikov and R.V. Solodovnikov	226