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It is shown the possibility of complete absorption electromagnetic radiation in wide spectral an interval — infra-red (IR), sub-millimetre (SMM) and superhigh-frequency range by experiment. Absorption occur the most intensity in mediums with quisione-dimensional metallic nanostructures.

The term of complete absorption is used while coefficient of reflection is nearly by -20 dB.

Obtained results agree with theoretical estimation.

Keywords: niello, thinfilm coating for absorption of radiation, smal metallic, particles, wide range of lengths of waves, nanostructures.

Bashorov M. T., Kozlov G. V., Ovcharenko E. N., Mikitaev A. K. *A Nanostructures in Polymers: Synergetics of Nonequilibrium Phase Transition "Shear-Crazing"* 5

The transition from shear mechanism to crazing mechanism was considered within the frameworks of synergetics as non-equilibrium phase transition. It was shown that the indicated transition is connected with self-organizing criticality effect of polymeric nanostructures.

Keywords: polymer, nanoclusters, shear, crazing, synergetics.

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In the present paper the connection between parameters of electric discharge in water and size of silver colloidal nanoparticles was performed. The type of electric discharge in water was determine. Correlation between energy of electric discharge in water and concentration of colloidal silver solutions was shown.

The development of machine, which able to start electric discharge in water and product silver colloidal nanoparticles was described. This machine also can control the size of discharge space in electrode system.

Keywords: impulse electric discharge in water, silver nanoparticles, colloidal solution, clean area, sterilization of medical devices and water, individual protective gear.

Zhigalina O. M., Vorotilov K. A., Khmelenin D. N., Sigov A. S. *Structural Behaviour of PZT Films Prepared by Chemical Solution Deposition with Different Lead Content* 17

Ferroelectric lead zirconate titanate (PZT) films prepared by chemical solution deposition technique on Si—SiO₂—Ti—Pt substrates are studied by electron microscopy and XRD. Microstructure of the films are studied as a function of lead excess in film-forming solution (5, 10, 30, 50 mol. %). Correlation between microstructure and phase composition with electrical properties is established.

Keywords: ferroelectric films, electron microscopy, microstructure, phase composition, electrical properties.

Tarnavsky G. A., Anishchik V. S. *Software Suites for Computer Design of Microelectromechanical Systems* 23

We cite (with direction of Internet-addresses) and analyse a number of program tools for computer support of scientific researches and applied design of microelectromechanical systems in silicon electronics.

Keywords: silicon electronics, semiconductor materials, microelectromechanical systems, computer design, program tools.

Loktev D. V., Andreev V. M., Zinoviev D. V., Tuzovsky K. A., Shyshkova I. N. *Investigation of Heat Transfer at the Air Pressure in MEMS* 29

The article lies in the course of several publications about single crystal sensitive elements.

The limit of macro thermal fluids science equations was discussed.

Based on molecular — kinetics Boltzmann equatation, the structuring of boundary layer at high gradient zone was represented.

The new mechanism of heat transfer was confirmed by a set of unusual effects.

Keywords: microheater, thermoresistor, MEMS, molecular-kinetics Boltzmann equatation.

Babayevsky P. G., Reznichenko G. M., Zhukov A. A., Zhukova S. A., Grinkin E. A. *Electromechanical Transducers of Sensor Micro- and Nanosystems: Physical Foundations and Scaling Effects. Part 1. Sensing Mechanical Elements and Actuators.* 32

First part of the review involves analytical treatments of physical operational principles and behavior in different conditions of different types of two main MEMS and NEMS elements — sensing mechanical elements and actuators. Relationships between force and deformation in sensing mechanical elements shows that transfer to nanoscale causes changes of their behavior significantly. From one point of view this provides possibility to increase their deformability and resonance frequency markedly but from another — increases influence on them different side effects such as internal and surface stresses. Analysis of relationships between electrical and thermal stimuli and mechanical response of electrostatic and thermal actuators respectively as well as their scaling effects shows potential efficiency of their applications in NEMS sensing mechanical elements.

Keywords: sensor MEMS, NEMS, electromechanical transducers, sensing mechanical elements, actuators, physical foundations, scaling effects.

Spirin V. G. *Study of Thin-Film Resistor Resistance Error due to Elimination of Resistive and Conductive Layers Overlapping Contact Pads* 44

A relationship between a thin-film resistor resistance error and mask misalignment with a substrate conductive layer at the second photolithography stage for a thin-film resistor design in which the resistive element does not overlap conductor pads is studied. The error value is at a maximum when the resistor aspect ratio is equal to 1.0.

Keywords: thin-film resistor; overlapping contact pad.

Afonin S. M. *Absolute Stability for Control System of Deformation a Piezoactuator for Nano- and Micrometric Movement* 47

Problems of using criterion absolute stability of automatic control system of deformation a piezoactuator are discussed. Main features and principles of absolute stability of these systems are given. Characteristics of criterion absolute stability of automatic control systems of deformation a piezoactuator are proposed.

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