

Glukhova O. E., Kolesnikova A. S. *Stability of the Thin Bamboo-Like Carbon Nanotubes* 2

The theoretical search of the stable nanostructures was carried out by the determination of the distance between the atoms after the optimizing process of the structure by the tight-binding method. The search of the stability of the bamboo-like nanotubes has been confirmed in more detail after the finding of the local strain of the atomic network by the empirical method. The map of the strain was calculated for the bamboo-like nanotubes with the different diameters. It is shown that the bamboo-like nanotube with diameter of 2,024 nm are stable nanotubes and their the diameter is smallest. These nanotubes are not destroyed after the optimization process.

Keywords: synthesis, bamboo-like nanotube, local tension, destruction, bulk energy density

Malyshev K. V. *Probe Dielectrophoresis of Nanoparticles in Liquids*. 6

The assembly process of the conductive nanoparticles clusters during the probe dielectrophoresis in liquids was investigated by molecular dynamics. Dielectrophoretical force was calculated by the boundary element method that uses Green's functions. The main stages of the assembly — the slow diffusion and fast drift were considered. The benefits of probes with a large 100 nm radius of the tip were described. The results will be used in probe nanotechnology methods, nanomechanics and nanofluidics.

Keywords: nanoparticle, probe nanotechnology, dielectrophoresis, nanofluidics, molecular dynamics, Green's function

Erofeev A. S., Zotov D. A., Yaminskij I. V., Kiselev G. A. *Nanoweighing and Nanomeasure*. 13

The cantilever, which is used in atomic-force microscopy, can be used as sensitive element in determination of mass of nanoparticles. Mass sensor, based on variation resonance frequency of cantilever has excellent sensitivity: from 1 to 10^{-21} ng, depending on resonator used. Now there are no appropriate metrological equipment for testing devices with such a high sensitivity. In this work is suggested measure of mass of 0,17 ng and method of calibrating mass cantilever sensor.

Keywords: cantilever, weighing of nanoparticles, measure of mass

Grebennikov E. P., Adamov G. E., Poroshin N. O., Kurbangaleev V. R., Orlov Yu. S., Malyshev P. B., Shmelin P. S. *Structural and Technological Solutions of the Optical 3D Multilayer Structures for Advanced Information Systems* 17

The article focuses on technical solutions and data analysis of functional characteristics of advanced 3D optical multilayer fluorescent information carriers. The assessment of the geometric parameters of the parallel readout of data has been given, taking into account the probability of error, and identified ways to improve the considered device.

Keywords: fluorescent multilayer information carrier, two-photon recording, parallel data read, diffraction grating, planar waveguide

Voytsehovskiy A. V., Nesmelov S. N., Kulchitskiy N. A., Melnikov A. A., Maltsev P. P. *Detection in Terahertz Range* 28

In this paper issues associated with the development of terahertz radiation detector technology are discussed. The basic physical phenomena and recent progress in different types of terahertz detection (direct detection and heterodyne detection) were considered. The advantages and disadvantages of direct detection detectors and heterodyne detection detectors are discussed.

Keywords: terahertz radiation, detector, direct detection, heterodyne detection, frequency band, sensitivity

Timoshenkov S. P., Gaev D. S., Boyko A. N., Gorshkova N. M. *Application of Porous Silicon for Fabrication of Getters Structures for MEMS*. 35

In this article the methods of application of porous silicon at creation getters structures as a part of microelectromechanical systems are considered. The methods offered by us allow to create getters structures with high value of an effective surface and sorption capacity and compatible with microsystems technologies.

Keywords: porous silicon, MEMS, getters structures, getters, nanostructuring

Nazarova T. N., Sergienko D. V., Petrov V. V., Kravchenko E. I. *Study of Physical and Chemical, Electro-physical Properties and Gas Sensitive Characteristics of SiO₂ZrO_x Nanocomposite Films* 38
In the work formation of SiO₂ZrO_x thin sol-gel films was studied. Investigation of their physical and chemical and electrophysical properties were carried out. Gas sensitive characteristics also were studied. It is defined that the sensor on the base of SiO₂ZrO_x films shows the selective sensitivity to NO₂ in a range of working temperatures 30–200 °C.

Keywords: sol-gel method, gas-sensitive material, nitrogen dioxide

Gavrilenko V. P., Zaitcev S. A., Kuzin A. Yu., Novikov Yu. A., Rakov A. V., Todua P. A. *Ellipsometric Characterization of Si–SiO₂ Structures*. 42
Diagnostic possibilities of ellipsometry method in reference to system consisting of silicon oxide film on silicon which is widely used in nano-electronics are considered. For the specific samples consisting of silicon oxide film on silicon substrate main parameters of film and substrate such as film thickness, refraction coefficient of film and substrate, extinction coefficient of substrate are identified with high accuracy. It is shown experimentally that by means of ellipsometry method it is possible to control the presence (or absence) of transition layer between film and substrate.

Key words: ellipsometry, measurement error, a transition layer in the "film-substrate system"

Blagov E. V., Aravin V. V., Amelichev V. V., Gavrilov R. O. *Integrated Nanoelectromechanical System of Motion Parameters* 46
Results of investigation of structural and technological components for the implementation of integrated nanoelectromechanical systems. The methods of creating a miniature magnetic dipole on the basis of hard magnetic films and Co₈₀Ni₂₀ Fe₁₉Ni₈₁. The dependence of the sensitivity of thin film magnetoresistive transducer from the current in the control conductor.

Keywords: integrated nanoelectromechanical system, a miniature magnetic dipole, the magnetoresistive transducer, thin film

Kukhareno B. G., Ponomarev D. I. *Remote Manipulator Based on MEMS Accelerometer as Sensitive Element*. 49
Remote manipulator based on MEMS accelerometer is under study, which alternates computer mouse. Remote manipulator block-diagram, functional schema, and connection schema features of MEMS accelerometer in use influence on additive noise magnitude. The MEMS accelerometer microstructure analysis determines operating regime of manipulator. Manipulator used by operator influences on additive noise characteristics and magnitude in its control signal. Program shadows motions of manipulator user under controlling computer mouse.

Keywords: MEMS applications, remote manipulator, MEMS accelerometer, control signal, noise, filtering

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