

**Rathkeen L. S.** *Nanotechnological Projects and Prospective Products of the Russian Academy of Science* . . . 2  
 In 2009 Russian academy of science (RAS), which celebrate the 286-th anniversary at 08.02.2010, organized specialized scientific sessions, on which, among the other questions, were discussed new projects and prospective products in the field of nanotechnologies. Much attention was paid for theoretical and practical aspects of projecting of nanoindustrial products and questions of cooperation of academician and institute science. Also were discussed the problems of commercialization of products in the field of nanoindustry and reducing the volume of financing of Federal Purpose Program (FPP) "The development of the infrastructure for the nanoindustry on 2008—2010".

**Keywords:** RAS, nanotechnologies, nanoindustry, FPP

**Seleznov V. A., Prinz V. Ya., Korneev I. A.** *Chips with Semiconductor Tube-Probes for Scanning Tunnelling Microscopy* . . . . . 5

A method of mass production of chips with tubular  $\text{In}_x\text{Ga}_{1-x}\text{As}/\text{In}_y\text{Ga}_{1-y}\text{As}$  probes for scanning tunnelling microscopy (STM) is described. This method includes standard procedures of optical lithography and selective anisotropic etching of InP substrate, that leads to the formation of rolled-up tubes from strained  $\text{In}_x\text{Ga}_{1-x}\text{As}/\text{In}_y\text{Ga}_{1-y}\text{As}$  heterofilms and simultaneous formation of chips. Created chips with semiconductor tube-probes are promising for high-vacuum scanning tunnelling microscopy and spectroscopy, spin tunnelling microscopy and near-field microscopy applications.

**Keywords:** scanning tunnelling microscopy, semiconductor tube-probes, self-rolling of strained heterofilms

**Girfanova N. A.** *The Review and Comparison of Methods for Image Quality Detection in Passive Autofocusing Systems* . . . . . 9

In the article analyzed the range of algorithms for calculation the parameter that characterizes the quality of image in passive autofocusing systems. There are: discrete wavelete transform, discrete cosine transform, one-dimensional and two-dimensional gradient. The filtration is used for several methods. To test the algorithms special videodata that represent the most difficult autofocusing situations have been used. Hardware requirements have been estimated for implementation in CMOS 0,18 micron technology.

**Keywords:** passive autofocusing system, image sharpness

**Cridchin V. A., Lobach O. V., Dikareva R. P.** *Numerical Modeling of Microelectronic Heat Flux Sensor* . . 13

The paper presents a simplified thermal and finite-element models of microelectronic heat flux sensor, features of a design are discussed. Thermal resistance is defined and expressions for a target signal of a sensor control are received. It is shown that the numerical simulation accurately describes the characteristics compared with the analytical model. A comparison of model calculations with experimental data, which confirmed the correctness of models. The proposed numerical model allows the optimization of the characteristics of the sensor.

**Keywords:** sensor, heat flow, microelectronic technology, finite element method

**Novikov S. G., Gurin N. T., Korneev I. V.** *Simulation and Investigation Negation with the Transfer N-Shaped Current-Voltage Characteristics* . . . . . 17

The paper presents a method of implementing embedded negatrons protection from current overload in the control circuit based on a combination of two elements with N-shaped volt-current characteristic. The features of appliances sold by this method are the existence of static output and transfer N-shaped CVC, as well as one or several chains of positive feedback, which allows to Limit the operating input current and output voltage within specified limits. Using this method will create a semiconductor structure with built-in protection against current overload in the control and load circuits.

**Keywords:** negatrons, negative resistance, the transfer characteristic

**Grinkin E. A., Babayevsky P. G., Zhukova S. A., Zhukov A. A., Obizhaev D. Yu.** *Effects of Regular Patterned Polyimide Surface Energy and Geometric Parameters on Water Sessile Drop Anisometry, Wetting Anisotropy and Contact Angle Hysteresis* . . . . . 21

Behavior of water sessile drop on polyimide surface with different surface energy values and two types of regular microtextures was investigated. Energy and geometrical factors defining drop form and effective contact angle in dependence on direction relative to given surface microtexture symmetry axes and surface slope were identified.

**Keywords:** wetting, contact angle, polyimide, microstructured surfaces, specific free surface energy, anisotropy of wetting, wetting hysteresis, metastable state

- Sleptsov V. V., Tyanginsky A. Yu., Artjukhov S. A., Tserulev M. V.** *Definition of Concentration of Metals in Nanostructure Liquid Environments the Laser-Optical Method. Part 2. FUZZY Simulation.* . . . . . 31  
The task solution of construction of indistinct system of the conclusion modeling dependence of concentration of a solution of silver from its light passage is considered. The analysis of results of modeling in comparison with the significances received during accounts under the empirical formula is carried out, which is the best in a certain class of formulas in sense of minimization of a sum of squares of deviations from experimental data.  
**Keywords:** fuzzy logic, fuzzy sets, empirical formulas, concentration, colloid solutions
- Smolin V. K.** *Liquid Nitrogen Use for Forming Microelectronic Structures* . . . . . 34  
There are considered the issues related to the low-temperature processing use in the process of forming microelectronic structures. Efficiency of the processing in the liquid Nitrogen under cyclic effect is presented.  
**Keywords:** low-temperature processing, material modification, heterostructure, defect rearrangement
- Agasiev A. A., Akhundov Ch. G., Mamedov M. Z., Sarmasov S. N., Mamedov H. M.** *Nanostructural and Morphological Properties of SrTiO<sub>3</sub> films* . . . . . 36  
The films of SrTiO<sub>3</sub> are obtained by the method of magnetron sputtering. The structure and morphology of the films are considered. The pseudo grain sizes on an average are determinate to be ~1–2 nm and are in good agreement with the area of coherent scattering. Interatomic distances Ti–O, Sr–O, O–O in disordered and polycrystalline films are estimated. The film surface is investigated by the atomic force and scanning electron microscopes.  
**Keywords:** thin films, magnetron sputtering, SrTiO<sub>3</sub>, surface morphology
- Voytsehovskiy A. V., Nesmelov S. N., Kulchitsky N. A., Melnikov A. A.** *Ge/Si Quantum Dot Detectors for an Infrared Range* . . . . . 39  
Questions of development of new types detectors on Ge/Si quantum dot for an infrared range are considered: detectors on a basis *p-i-n* structures, bipolar and field the phototransistor on the basis of quantum dot Ge/Si. Potential advantages of new types of detectors can be used at the further development of growth technologies of quantum dot with the set sizes, the form and density.  
**Keywords:** infrared detectors, quantum dots, quantum well
- Ehmenina I. V., Sheshin E. P., Chadaev N. N.** *Light Sources on Basis of Nanostructured Field-Emission Cathodes* . . . . . 45  
This article considers possibility of creation of basically new light sources of the general purpose based on field-emission under action of electrons emitted from nano-structured cathode.  
**Keywords:** field-emission, field-emission cathode, phosphor, spectral characteristics, photonic crystal, ultraviolet radiation
- Belozubov E. M.** *Thin-Film Capacitive Microelectromechanical Systems with the Monolithic Dielectric* . . . . 48  
Thin-film capacitive microelectromechanical systems (TCMEMS) with the monolithic dielectric are considered. The strength and weakness of such systems are indicated.  
**Keywords:** thin-film capacitive microelectromechanical systems (TCMEMS), the monolithic dielectric

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