

**Bobrinetskiy I. I., Nevolin V. K., Simunin M. M., Komarov I. A. *Role of Thin Film Catalysts Surface for Nanotube Growth in Tasks of Electronics and Sensing Technology* . . . . . 2**

In our work we have investigated some aspects of carbon nanotube growth on thin film catalysts for integrated nanoelectronics. We have analyzed how ultrathin film dispersion influence nanotube diameter when system is heated up to 650 °C. We have found out the dependence between thin film roughness and nanotube diameter. Also methods of planar nanotube synthesis on multilayer catalysts Cr—Ni—Cr were developed.

**Keywords:** nanotubes, catalyst, chemical deposition, thin films

**Samoylovich M. I., Tcherniega N. V., Kudryavtseva A. D., Belyanin A. F., Klescheva S. M. *Opal Matrices as Metamaterial: Optic Acoustic Effects in Lattice Packings* . . . . . 5**

Experimental results of the investigations of the photon-phonon interaction in orderly packed silica dioxide (opal matrices) and nanocomposites on their base are presented. Effective conversion of laser light into acoustic vibrations of nanospheres, composing matrix, is shown to exist in such structures. Frequency shifts of the scattered light components are shown to correspond to the nanospheres vibrations eigenvalues. Stimulated scatterings of light generation in opal matrices dependence on the band-gap position is investigated.

**Keywords:** opal matrices, nanocomposites, acoustic effects

**Boginskaya I. A., Gusev A. V. Mailian K. A., Meshkov A. S., Pebalk A. V., Ryzhikov I. A., Chvalun S. N. *Polymer Films on Based Poly-p-Ksylylene in Micro- and Optoelectronics*. . . . . 17**

Technology of creation of polymer coating on based poly-p-ksylylene and chlorine modified poly-p-ksylylene on uneven substrate surface is developed. Coating with thickness 50 nm — 50 μm is obtained by vapor deposition polymerisation (VDP) method. Poly-p-ksylylene coating possess by humidity resistance, optical transparent, mechanical and electric strength, chemically inertness for most solvents, acids, and other outstanding properties. In thin poly-p-ksylylene film is obtained temperature resistance dependence with violently nonlinear character; hence, it can be used as thermo sensor. Film of poly-p-ksylylene can well be used as humidity resistance coating for optical and electronic devices.

**Keywords:** polymer films, poly-p-ksylylene, protective coating, temperature resistance dependence, thermo sensor

**Dzhangurazov B. Zh., Kozlov G. V., Mikitaev A. K. *The Physical Significance of Organoclay "Effective Particle" in Polymer Nanocomposites*. . . . . 22**

The simple and physically clear "effective particle" model in nanocomposites polymer/organoclay was proposed. Although the indicated model gives the same characteristics as and elaborated earlier treatments, but it takes into consideration interfacial adhesion polymer-organoclay level and not uses old-fashioned micro-mechanical models.

**Keywords:** nanocomposite, organoclay, polyethylene, "effective particle", interfacial adhesion

**Afonin S. M. *Absolute Stability of Automatic Control System for Deformation Electroelastictransducer for Nano- and Microdisplacements* . . . . . 25**

Problems of using criteria absolute stability of automatic control systems for Deformation electroelastictransducer for nano- and microdisplacements are discussed. Main features and principles of absolute stability of these systems are given.

**Keywords:** electroelastictransducer, control systems for deformation, nano- and microdisplacements, absolute stability

**Nepochatenko V. A., Rozumnyuk V. T., Nepochatenko I. A. *Limit Phase Boundary in Structural Second-Order Phase Transition*. . . . . 32**

The model of limit phase boundary is offered as structural second-order phase transition, which corresponds to the border of section of phases with the infinitesimal changes of parameters of crystalline grate. On the example of ferroelastic BiVO<sub>4</sub> we obtained the equalizations of limit phases boundaries forming four orientation states are got.

**Keywords:** equalization of phase boundary, seconf-order phase transition, BiVO<sub>4</sub>

**Ivannikov D. I.** *Theoretical Substantiation of the Images Recognition Theory Application at Chemical Membranes Designing* . . . . . 35

The theoretical substantiation of basic applicability of the images recognition theory is resulted at designing of chemical membranes for models with spatial and geometrical restrictions. It is shown construction methods of the distinguishing operator and a solving rule for investigated models.

**Keywords:** a membrane, the recognition theory, classification

**Spirin V. G.** *Mathematical Models of Thin-Film Resistor Impedance* . . . . . 38

The main kinds of errors and their effect on the thin-film resistor impedance are discussed. The model of the resistor nominal impedance includes additionally the systematic errors of its length and width as well as the impedance of the electrodes. The application of the above models makes it possible to design thin-film resistors with the size of 50  $\mu\text{m}$  and less without any change of the manufacturing process.

**Keywords:** mathematical models, thin-film resistor

**Masalsky N. V.** *Design of Logic Gate Characteristics for Double Gate sub-25 nm SOI CMOS Transistors for Lower Power Applications*. . . . . 41

Criteria of a choice of technological parameters for sub-25 nm double gate transistors with structure silicon on isolator for low-power applications are considered. Characteristics of one-cascade logic gates on the chosen type of transistors with length of the channel 22 nm are numerically investigated at a supply voltage of less than 1 V. The opportunity for creation of low-power circuitry in 100 GHz a range is shown.

**Keywords:** double gate SOI nanotransistor, logic gate, low power

**Dzhashitov V. E., Pankratov V. M., Barulina M. A.** *The Theoretical Bases of Development and Creation of the Superminiature Micromechanical Multifunction Sensor of the Inertial Information*. . . . . 46

The possibility of creation superminiature (volume  $< 1 \text{ mm}^3$ ) micromechanical multifunction (gyroscope + accelerometer) the sensor of the inertial information is considered and proved. The equations of motion of the sensor on any way moving basis in view of temperature disturbances and technology factors are injected and analyzed. Possible baseline designs elastic suspension of sensor are offered. Estimations of strained-deformed state of the sensor at mechanical and thermal effects are received, by means of the constructed finite-element models. The estimation of efficiency of functioning of the sensor in view of temperature and technological errors is received.

**Keywords:** superminiature micromechanical multifunction the sensor of the inertial information, equations of motion, finite-element models, strained-deformed state, temperature and technological errors

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