

**Gerasimenko N. N., Smirnov D. I.** *Radiation Hardness of Nanostructures* . . . . . 2

The main problems of radiation hardness of nanostructures, nanostructured materials and devices incorporating these materials are reviewed. Radiation hardness of the carbon systems (nanotubes, graphene, nanofibres), semiconductor nanostructures  $A^{III}B^V$ , and also nanocrystalline and porous materials used as electronic and optical components in nanoelectronics is discussed. The model of enhanced structural radiation hardness of nanocrystalline materials is promoted and discussed.

**Keywords:** radiation hardness, nanostructures, nanostructured materials, ion irradiation, structural and parametric degradation.

**Basayev A. S., Danilyuk A. L., Andreyenko A. V., Labunov V. A., Prudnikava A. L., Tagachenkov A. M., Yanushkevich K. I.** *Magnetic Structure Simulation of Cementite Nanoparticles En-capsulated in Carbon Nanotubes. Part 2* . . . . . 12

The magnetic structure of the cylindrical cementite nanoparticles encapsulated into the carbon nanotubes has been studied in the absence of magnetic field depending on its size in the temperature range of 300—470 K using continuous approximation. The distribution of the magnetization in the cementite nanocylinders has been calculated considering the uniaxial crystallographic anisotropy. The vortex magnetization has been simulated using the rational fractional functions which ensure the required accuracy of the calculations and allow determining the vortex size correctly.

It has been shown that the geometrical parameters of the nanoparticles and the temperature are the main factors influencing the transitions between the vortex and homogeneous states.

The temperature dependence of the transition between the vortex state and the homogeneous  $z$ -state in the temperature range of 300—470 K has been calculated. It has been revealed that the rise in the temperature leads to the vortex size enlarging and promotes the transition from the vortex to either homogeneous or planar states, depending on the size of nanocylinder. The reverse transfers are banned, since the single-domain length increases as the temperature rises.

As a result, the diagrams of the magnetic transitions between the vortex state and the homogeneous magnetic states (planar and perpendicular  $z$ -states) for individual cylindrical nanoparticles of common view, as well as for cementite in particular, have been build.

**Keywords:** carbon nanotube, cementite, nanomaterials, magnetism, vortex magnetic structure, single-domain length.

**Doroshevich V. K.** *Recommendations to Construction and the Maintenance of the Normative Documentation of the Enterprises under the Statistical Control and Regulation of Technological Processes of Microcircuits* . . . . . 21

In article ecommendations are resulted to construction and the maintenance normative, documentation of the enterprises on to the statistical control and regulation technological processes of microcircuits.

**Keywords:** the normative documentation, the statistical control and regulation, technological process, microcircuit, technological operation.

**Belkin M. E., Vasil'ev M. G.** *Semiconductor Lasers with High Average Power — Modulation Bandwidth Product* . . . . . 23

R & D results related with two types of laser heterostructures: burried-crescent (BC) and burried multiple quantum wells (MQW) developments for promising telecom and radar applications are discribed. The major technology features of heterostructures fabrucation are highlighted. The procedure and crucial results of TCAD simulation and experimantal verification are listed. Possibility of the optical power more than 40 mW with modulation bandwidth of 10 GHz providing is shown.

**Keywords:** lasing heterostructure, semiconductor laser, epitaxy, semiinsulator-burried procedure, power-current and direct modulation characteristics.

**Belozubov E. M., Belozubova N. E., Kozlova Yu. A.** *Thin-Film Capacitive MEMS Structures for Pressure Transducers with the Temperature Dependence Minimization*. . . . . 33

Design and producibility problems as concerns thin-film capacitive MEMS structures with minimization of the temperature dependence by means of temperature-compensating capacitors, are submitted. Practical realization is presented, terms of the temperature dependence minimization are formulated. Such minimization makes it possible to increase the temperature stability of MEMS structures within the wide temperature range.

**Keywords:** thin-film capacitive MEMS structures, temperature, vibration, lead, electrode, temperature-compensating capacitor.

**Obraztsov R. M., Yunyaev A. R., Novikov A. V.** *Concerning Selection of the Most Effective Size of the Beam-Type Bimorph Piezoelectric Sensing Element for the Small-Size Vibrating Gyroscope* . . . . .37

The finite-element models of piezoelectric bimorph beam were created by authors and modeling of oscillatory processes has performed. Its results have allowed to receive selection algorithm of maximum effective geometrical parameters and to determine required tolerances of geometrical parameters of beam piezoelectric bimorph as a sensitive element for a small-sized vibrating gyroscope.

**Keywords:** gyroscope, sensing element, piezoelectric ceramics, bimorph.

**Efremov G. I., Mukhurov N. I.** *Parameters Three-Electrode Electrostatic Microactuators* . . . . .40

Features of interaction of electromechanical forces in three-electrode systems are analyzed. Formulas of key parameters are received. The sphere of application three-electrode microactuators is appraise.

**Mustafaev Ar. G., Mustafaev Ab. G.** *Influence of Total Ionizing Dose on Mosfets Fabricated by SOS Technology* . . . . .44

MOSFETs are irradiated with a Co-60 gamma source up to 900 Gr(Si). An increase of leakage current is founded after irradiation in nMOS only at low total dose and in pMOS only at high dose. The increase in leakage current is appropriate to the trapped charge polarity change with the increase of total dose.

**Keywords:** silicon on sapphire; solid-phase epitaxy; radiation hardness; defects density.

**Zaitzev N. A., Alimuhamedov M. R.** *Use Superficial Integrated Accelerometer for Work in Structure of a Complex of Parachute-Jet System* . . . . .47

In clause, use superficial integrated accelerometer for work in structure of a complex of parachute-jet system, some questions and offers on immediate and operative deliveries of cargoes in remote places are considered. Decisions of these questions existing now have been analyzed. For a basis for the further development the way of delivery air way with use of the plane and parachute system for descent and a landing has been chosen. In clause the provisional structure of a complex is given. The basic components for development are chosen and the provisional structure superficial integrated accelerometer as basic component of parachute-jet system, the principle receiving information is resulted is given.

**Keywords:** accelerometer, gauges of acceleration, gauges of speed, parachute-jet system, piezoelectric accelerometer, superficial integrated accelerometer.

**Shtennikov V. N.** *We Discuss Recommendations of International Standards IPC* . . . . .50

Experts UEMP share the experience in the field of research of thermal processes of soldering of electronic products.

**Keywords:** the soldering, a component, heating, solder, a flux, the printed-circuit-board, a soldering iron, a conclusion.

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