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**Krasnikov G. Ya., Eremenko A. N., Zaitsev N. A., Sheshin E. P., Arilin R. A., Basina V. N., Matjushkin I. V., Ravirov M. F., Romanov I. M. *Element Base of the Control Circuits for Microsystem Devices* . . . . . 3**

The approach to control of microsystem devices and single-crystal control circuits fabricated in unified process flow is set up. The basis for the control circuits was served by field emission elements. The given element base provides activity of items in extreme conditions.

**Gallyamov M. O., Yaminsky I. V., Khokhlov A. R., Vinokur R. A., Nikitin L. N., Said-Galiyev E. E., Schaumburg K. *Deposition of Polymer Molecules and Thin Polymer Films From Supercritical Carbon Dioxide. Part 2. Results of AFM study* . . . . . 11**

We have shown that polymer solutions in supercritical carbon dioxide are convenient model systems to study the interactions of a macromolecule with a solvent. One important advantage of such systems is that the balance of macromolecule-macromolecule and macromolecule-solvent interactions depend strongly on the temperature and pressure of a supercritical medium, which can be easily varied during the experiment. Copolymer Teflon AF 2400 (material which is of much interest for technological application) was chosen as an object to be studied. The controlled decrease of a solvent quality (by controllable change of temperature or pressure) was applied to deposit on solid substrate surfaces both individual compacted macromolecules and thin-film coatings. Morphology of these structures was investigated by scanning probe microscopy.

**Verkhovskaya K. A., Vizdrik G. M., Kuznetsova N. I. *Ferroelectric Polymer Films* . . . . . 15**

The dielectric properties, phase transitions and switching process in multilayered ferroelectric films Langmuir-Blodgett, based on the copolymer vinylidene fluoride with trifluoroethylene P(VDF/TrFE) with different compositions (75/25, 70/30, 60/40, 55/45) have been investigated. All the tested films LB 5–15 nm thick display ferroelectric properties. The second harmonic generation (SHG) in copolymer P(VDF/TrFE), doped by dipole dye molecules has been studied. The special properties of SHG have been observed due to the ferroelectricity of polymer matrix.

**Galkin N. G., Konchenko A. V., Polyarnyi V. O., Maslov A. M., Dotsenko S. A., Galkin K. N., Zakharova E. S., Talanov A. O. *Optic and Photoelectric Properties of Nanostructures with Buried Semiconductor Silicide Clusters on Silicon in Visible and Near Infrared Range* . . . . . 21**

Self-assembled growth of nanosize islands of Cr, Fe and Mg silicides on Si(III) have been investigated. The sizes and density of is-

lands were determined. New interband transitions in the electronic structure of samples with buried nanosize silicide islands have been determined in the energy range 0.9–1.5 eV. The formation of two hole states (0.15 eV and 0.28 eV from the  $\beta$ -FeSi<sub>2</sub> valence band maximum), which can be connected with hole quantum confinement in the  $\beta$ -FeSi<sub>2</sub> islands, were observed in Si/ $\beta$ -FeSi<sub>2</sub>/Si system.

**Vostokov N. V., Gaponov S. V., Gribkov B. A., Masterov D. V., Mironov V. L. *Comparative AFM-STM Investigations of the Morphology Features of YBaCuO Thin Films of a Different Cation Composition* . . . . . 24**

The results of SPM investigations of the morphology features and local electric properties of the YBaCuO thin films, prepared by magnetron sputtering are presented. It is established that YBCO thin films with high superconductive properties ( $T_c \geq 88$  K,  $J_c(77K) > 4 \cdot 10^6$  A/cm<sup>2</sup>) and not containing CuO-particles can be obtained in the 90° off-axis magnetron sputtering system. It is shown that in comparison with AFM method, STM reveals more detail information about morphology and growth peculiarities of YBaCuO films.

**Blonsky I. V., Brodyn M. S., Vakhnin A. Yu., Zhugayevych A. Ya., Kadan V. M., Kadashchuk A. K., Pikus Yu. G. *Influence of Structure Inhomogeneity on Luminescence Properties of Silicon Nanocrystallites* . . . 28**

The results of studies of photo-, thermo-, and tunneling luminescence of nano-Si, which demonstrate the influence of quantum-dimensional effect and structural inhomogeneity on recombination processes, are reported. The quantum-dimensional effect results not only in spectral shift due to a wider band gap, but also in higher efficiency of an Auger process because its crosssection is inversely proportional to a nanocrystallite size. The model of "two-stroke charge pump" is proposed which bases on Auger processes ejecting carriers from a photoexcited nanocrystalline core to localized states in SiO<sub>2</sub> layer. The model explains in unified way all the experimental results obtained: nonmonotonic temperature dependence of PL integral intensity, saturation of lux-intensity characteristics of the main PL band, PL "fatigue" effect, peculiarities of TSL, presence of tunneling component of the luminescence, higher intensity of TSL and TL for samples with smaller nanocrystallites. The model is general and can be applied to other nanocrystalline semiconductors.

**Rekhviashvili S. Sh. *Concerning the Power Interactions in the Probe Micromechanical Systems* . . . . . 33**

The power interactions in the probe micromechanical systems are analyzed. The calculations of the interactions powers for the probes of the different forms in continual approximation and with regard to the discrete structure of the being investigated model are developed. It is shown that the calculations are coordinated satisfactorily with the experimental data. On the basis of the conducted analysis the definition method of the conjugate interatomic potential in noncontact mode of the atomic power microscope is suggested.

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