

Koleshko V. M., Dejnak D. A., Chashinsky A. S., Hmurovich N. V. *Designing of the Electronic Nose on the Basis of Nanotubes and DNA* 2

In article the opportunity of creation of electronic nose with a sensitive element in the form of nanotubes, molecules of DNA or their combination for definition of explosive, narcotic and psychotropic substances is considered. The optimum structure of a sensitive element is determined. Its sensitivity for investigated substances is calculated. Selective selectivity nanotubes concerning definition of the basis of DNA is considered.

Keywords: electronic nose, surface-acoustic-wave structure, sensitive element, nanotube, DNA, adsorption, explosive, narcotic and psychotropic substances.

Polyakov V. V. *Stray Capacitance Compensation Technique in Scanning Capacitance Microscopy* 6

Specially designed probe and novel stray capacitance compensation technique for 2D dopant profiles characterization of semiconductor structures by scanning capacitance microscopy (SCM) have been advanced. Corresponding unit for SCM realization has been engineered. Advantages of using compensation technique and high (10–20 nm) spatial resolution of SCM are demonstrated on samples with dopant concentration in the range $10^{15}–10^{20} \text{ cm}^{-3}$.

Keywords: SCM, capacitance microscopy, SPM, AFM, probe microscopy, dopant profile.

Egorov V. V. *Scattering Waves on the Boundary* 11

It is pointed that the vector diffraction boundary problem for two mediums it is possible to lead to scalar diffraction boundary system of equations with special boundary field components represent.

Keywords: equations of Maxwell, boundary problem, integral equation, decomposition of boundary problem.

Obizhaev D. Yu., Zhukova S. A., Babayevsky P. G., Chetverov Yu. S. *Properties and Structure of Nano-Thin Silicon Nitride Films Formed on Polyimide Surface by Low-Temperature Plasma Deposition* 14

Silicon nitride films of 2–300 nm thickness deposited on polyimide coatings and films were investigated. Films were formed by low-temperature ECR chemical vapor deposition. It was shown that the ratio of precursor gases has an influence on chemical structure, morphology and surface energetic properties of the films and does not have an influence on Young's modulus.

Keywords: silicon nitride, plasma deposition, deposition of a gas phase, microelectromechanical converters, superficial microprocessing, a sacrificial layer, an elektron-cyclotron resonance.

Chebanova E. V., Kabirov Yu. V., Kuprina Yu. A., Kupriyanov M. F. *Heterogeneity Effects of Structural States in BaTiO₃ and PbTiO₃* 20

Principles of perovskite tetragonal phases formation at BaTiO₃ and PbTiO₃ syntheses and structural changes after mechanical stress on these structures are investigated experimentally. It is shown that temperature synthesis yields cubic perovskite phase of BaTiO₃ and a large quantity of similar tetragonal PbTiO₃ phases with different room temperature spontaneous strain in single crystallites. Mechanical stress on the stabilized structures of BaTiO₃ and PbTiO₃ result in heterogeneous structural states.

Keywords: ferroelectrics, perovskite, heterogeneous structural states.

Astachov M. V., Rodin A. O., Seleznev V. V., Piguzov M. Yu. *Properties of Deformed Powders Nonorganic Scintillators* 26

The scintillation characteristics of new scintillation materials based on deformed powders alkali metal halides were studied. Reduce decay times of deformed powders was observed in deformed powders scintillators as compared with the single crystal.

Keywords: scintillator, decay time, intensive plastic deformation.

Aleksandrov P. A., Demakov K. D., Shemardov S. G., Kuznetsov Yu. Yu. *Improvement of Silicon-on-Sapphire Structures by Hydrogen Implantation and Subsequent Annealing.* 30
Silicon films on sapphire with a low defect concentration have been produced using hydrogen implantation and subsequent thermal treatment. The method of X-ray rocking curves indicated that the full-width-at-half-maximum (FWHM) decreased by 40 %.

Keywords: implantation, silicon on sapphire, high-temperature annealing.

Alexenko A. G. *Micro- and Nanosystems Wireless Electronics.* 33
Wireless nanosystems which built — in and integrated with alive and lifeless objects promise to become as same symbols of our century as in the past "information" century transistors and the Internet were. Proceeding from the understanding of nano- and IT technologies ability to convergence of sciences, technologies and manufactures, the creation "The world of clever things" forecast is presented as the basis for radical changes of the industry, social and interpersonal attitudes in XXI century.

Keywords: system-on-Chip (SoC), convergence, above branches of science, nano- and IT-technology, wireless nanosystems, personal teraflop supercomputer, paradoxes, century challenge.

Belkin M. E. *Research of Semiconductor Laser Productivity for Super-High Speed Digital Signal Transmission.* 36
Experimental investigation principles and specialties of the semiconductor laser characteristic in microwave band and super-high speed digital signals transmission quality with the help of such a source are highlighted. A simple oscilloscopic method for the digital signals transmission quality examination enable to account BER based on the transmitted digital signal's eye diagram geometrics measuring result is suggested. PRBS signal's form-factor, eye diagram and BER investigation procedure and results are presented that confirm the productivity of the designed laser with power-to-bandwidth product of more than 300 mW · GHz for digital signal transmission with the bit rate of 10 Gbit/s.

Keywords: semiconductor laser, super-high speed digital signal transmission characteristics, fiber optic systems.

Erofeev A. S., Yaminsky I. V. *Biochemical Cantilever Analyzers* 45
It is very important to determine extra small quantity of substance in time during the early registration toxic chemical substances in the public places, during determination the rate of the pollution of water by the chemicals. Biochemical analyzers based on micromechanical cantilever systems can determine extra small concentrations of substances and gave opportunity to register the joined mass with the accuracy less then one attogram (10^{-18} g).

Keywords: atomic force microscopy, biochemical analyzer, cantilever, surface tension.

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