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Keywords: nanosafety, nanoindustry, nanotechnology, nanotechnology development programme, environment protection, human health protection, ecology, influence of nanotechnology on human health, certification of nanomaterials.

Potapov A. A. *The Strategy of Development of Nanotechnology* 4

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Keywords: atom, model, theory, nanotechnology, electronic structure.

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Keywords: magnetic-force microscopy, MFM tips, MFM phase contrast, ferromagnetic nanoparticles.

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Two models of establishment of a phase condition of ferroelectrics, based on the thermodynamic theory are offered. The technique of definition of phase transition temperature by results of processing experimental dependences is described. The technique of probabilities evaluation of erroneous classifications of ferroelectrics phase conditions is stated, allowing to carry out researches with the guaranteed reliability.

Keywords: ferroelectric, phase condition, phase transition temperature, probability, error of measurement.

Topolov V. Yu., Glushanin S. V., Panich A. E. *A correlation between Hydrostatic Parameters of 2—2 Composite Based on Single-Domain $0.67\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3 - 0.33\text{PbTiO}_3$ Crystal* 20

Analysing the orientation and volume-fraction dependences of effective properties of a novel 2—2 single-domain $0.67\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3 - 0.33\text{PbTiO}_3$ crystal/polymer composite, we have stated an essential correlation between its hydrostatic parameters being electromechanical coupling factor k_h^* and the piezoelectric coefficient d_h^* . Orientations of the spontaneous polarisation vector and an optimal volume fraction of this crystal have been

determined at which the parameters $|k_h^*| \approx 0.7...0.8$ and $|d_h^*| \approx 400$ pC/N are considerably more than those related to the composites based on poled ferroelectric ceramics.

Keywords: piezo-active 2—2 composite, hydrostatic piezoelectric coefficient, hydrostatic electromechanical coupling factor, relaxor-ferroelectric single crystal, electromechanical properties.

Barulina M. A., Dzhashitov V. E., Pankratov V. M. *The Miniature Pressure Sensor for Monitoring and Diagnostics of Rocket-Space Engineering in Conditions of Mechanical and Thermal Effects* 26

The connected mathematical models of non-stationary thermal processes, of the thermoelastic strained-deformed condition and strength of the miniature pressure sensor applied to monitoring and diagnostics of a condition of space-rocket engineering and functioning in conditions mechanical and thermal impacts are constructed. Are solved problems of calculation and the analysis of non-stationary temperature fields of the sensor and its thermoelastic is strained-deformed condition. Estimations of strength of the sensor are received at mechanical and thermal effects. The computer experiments verifying adequacy and functionality mathematical, algorithmic and the software are conducted, quantitative estimations are received and recommendations on maintenance of effective functioning the miniature pressure sensor are developed.

Keywords: miniature pressure sensor, temperature fields, strained-deformed condition, finite-element mathematical model, mechanical and thermal effects.

Grebennikov E. P., Samoylovich M. I., Orlovski Yu. V. *Bacteriorhodopsin into Opal Matrices* 30

The subject of this review is an investigation of optical properties of nanocomposite materials based on photochromic protein "bacteriorhodopsin" and cubic packings of SiO₂ nanospheres named "opal matrices". The influences of any substrates included strong piezoelectrics (barium strontium niobate and lithium niobate) on luminescence and Raman spectra of nanocomposite bacteriorhodopsin-opal matrix films are studied. The perspectives of creation of optical neuronet processing systems based on bacteriorhodopsin-containing opal nanocomposites are considered.

Keywords: bacteriorhodopsin, opal matrix, luminescence.

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