

Gavrilov S. A., Gerasimenko N. N., Rygalin B. N., Timoshenkov S. P. *Nanoengineering — Nanotechnology Realization in the Real Production* 3

The main problems of nanoengineering, which commonly implies a system of technical methods and tools for the nanosystem formation including nanomaterials, nanodevices and nanoelectromechanical systems, are discussed. The term nanoengineering is considered primarily on the examples in the field of nano-related electronic devices and systems.

Keywords: nanoengineering, nanomaterials, nanotechnology

Bulyarsky S. V., Basaev A. S. *Atoms and Molecules Adsorption on Carbon Nanotubes* 7

The formulas allowing a message calculations of isotherms and probabilities of adsorption taking into account action of external factors are received, to consider various types of interaction at adsorption. The developed mathematical model allows to find separately kinetic factors at desorption variously located molecules and reduces possible regular errors at the analysis of experimental results.

Theoretical models are approved on an example of physical and chemical adsorption of hydrogen, and physical adsorption of oxygen. The data on parameters atom with an adsorb, described in the scientific literature is cited.

Keywords: carbon nanotubes, adsorption, thermodynamic of adsorption, isothermal line of adsorption, kinetic of adsorption.

Basaev A. S., Saurov A. N., Labunov V. A., Kovalevsky A. A., Dobrego K. V., Reznev A. A. *About Burning of Micro- and Nanostructured Powders of Silicon* 22

The dynamics of burning of micro- and nanostructured silicon powders with solid oxidizers — perchlorate of potassium ($KClO_4$) and sulphur (S) is studied with the help of the high-speed videofilming. It is shown that the burning of such powders proceeds by some stages which are characterized by the flame temperature and by the characteristic period of time. It is shown that in both cases the process of burning is accompanied by the formation of specific spherical micro- particles — incandescent light-emitting microballs. The difference in the dynamics of micro- and nanostructured powders burning is brought out. The conditions under which an explosion of microstructural powders is initiated are being found. In case of burning of nanostructured powders a characteristic mushroom-shaped structure of scattering products of burning was detected. By the mass-spectrographic measurements the products of burning of both powders types, i.e. oxides of all components forming the composition of the initial powder mixture, are observed.

Keywords: micro- and nanostructured powders of silicon, dynamics of burning, microexplosion.

Labunov V. A., Shulitsku B. G., Prudnikova E. L., Novitsky A. N., Basaev A. S., Müller G., Priyatkin N. S. *Field Emission Cathodes on the Basis of Structured Meander-Shape Vertically Aligned Carbon Nanotubes* 30

The construction of field emission cathodes (FEC) which consists of Si/SiO₂/Ti substrate and active element of structured in the form of meander arrays of carbon nanotubes (CNTs) is developed and investigated. The structuring of the CNT arrays synthesized by the injection CVD method was ensured by means of their selective growth on the SiO₂/Ti surface. The developed FECs are characterized by the low threshold field strength, high integral field emission current, but possess insufficient emission homogeneity. The obtained results are used for further optimization of the FECs construction.

Keywords: field emission, carbon nanotubes, growth selectivity, field-emission cathode, CVD method.

Godovitsyn I. V., Saikin D. A., Fedorov R. A., Amelichev V. V., Maltsev P. P. *Characterization of SOI Wafer Based Experimental MEMS Accelerometer* 38

A technology for fabrication of MEMS-transducers on SOI-wafers is developed. A sample differential capacitive MEMS-accelerometer is designed with its parameters evaluated using analytical expressions and finite-element modeling. Using developed technology the designed MEMS-accelerometer is fabricated. Pull-in voltage and sensitivity of the MEMS-accelerometer are measured and good agreement with calculated values is demonstrated. Approaches for improving of parameters of the MEMS-accelerometer are proposed.

Keywords: MEMS, SOI-wafer, accelerometer.

Maximov E. M. *On the Sensitivity of the SOC-Type Magnetoresistive Magnetic Field Sensors* 45

The analysis of electronic aspects of the SOC-type magnetoresistive magnetic field sensors designing is presented. The analytical equations between parameters of thin-film magnetoresistive bridge both loading and noise parameters of an amplifying part of the integrated sensor are formulated. In this case the best sensitivity and a dynamic range of measurements of a magnetic field are reached at the given electric power consumption. It is shown that at realised technological parameters the sensitivity of the SOC-type magnetoresistive magnetic field sensors based on an anisotropic magnetoresistive effect at measurement of quasiconstant magnetic fields can achieve at power consumption 10–100 mW an order 10^{-4} – 10^{-5} Oe (at intensity of a magnetic field of saturation 10 Oe).

Keywords: magnetoresistive, magnetic field, sensor, sensitivity, electronics.

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