

## CONTENTS

**Rathkeen L. S.** *The Prospective of Development of World Nanotechnological Industry* . . . . . 2

The Third international nanotechnological forum took place in Moscow November 1—3, 2010. On the forum were discussed the prospective of development of world nanoindustry. Scientific & technological program consists of 8 main directions: nanoelectronics, nanotechnologies for energy, nanomaterials, nanobiotechnologies, nanophotonics, nanotechnologies in healthcare, nanodiagnosics and catalysis and chemical industry.

**Keywords:** nanoindustry, nanoelectronics, energy, nanomaterials, nanobiotechnologies, nanophotonics, healthcare, nanodiagnosics, catalysis, chemistry, information technologies

**Glukhova O. E., Kolesnikova A. S.** *Theoretical Investigation of the Peapod Bending Influence on the Polymerization Process* . . . . . 10

We have studied the process of bending of the empty carbon nanotube (10,10) and the tube filled by fullerenes  $C_{60}$ . We have shown that the empty nanotube is not break at the bending of 270 degrees, and the polymerization of fullerenes and the chemical interaction between the fullerenes and the tube wall is observed in the tube filled with fullerenes. The inside of the nanotubes is transformed into a wave-like. We used two methods: the empirical and the quantum — mechanical methods. We used the multi-dimensional approach. The simulation until the polymerization of fullerenes is carried out by the empirical method, and the polymerization process is modeled by the tight binding method.

**Keywords:** the polymerization process, the bending, peapod, the empty nanotubes

**Zaitsev N. A., Matyushkin I. V., Krasnikov A. G., Orlov S. N., Pastuhova Yu. M.** *The Significance of Interfaces in the Nanoscale MISFETs with Multilayer High-K Dielectrics* . . . . . 15

The paper deals with the thesis of the necessity to control the structure suboxide layer at the high-K dielectric/Si interface by forming an  $SiO_2$  ultrathin layer as well as the feasibility of using a buffer layer at the high-K dielectric/metal interface.

**Keywords:** interfaces, MIS-structure, high-K dielectrics

**Smolin V. K., Gerasimov V. A.** *Quality Evaluation Possibilities of Metallization Electromigration Tolerance* . . . 17

There are reviewed issues referred to evaluation methods of thin film metallization tolerance to electric loadings with high current density. There are shown the aspects of determined electrical impulses application at metallization operation control.

**Keywords:** metallization, electromigration, electrodiffusion, thin film structures, impulse action

**Chernov V. A., Miterev A. M., Prudnikov N. V., Sigeikin G. I., Leonova E. A.** *Optimization of Structure and the Sizes of Current Sources Based on Direct Nuclear-Electrical Energy Converting with Use of Secondary Electrons* . . . . . 21

Measurements of secondary electrons current in metall-isolator-metall structures (MIM-structures)  $W-Al_2O_3-Al$  as the elements of current sources based on direct nuclear-electrical energy converting with use of secondary electrons are executed. Calculations of fission fragments and alpha particles power losses in MIM-structures layers are executed. The made experiments and calculations have allowed to optimize the structure and the sizes of current sources based on direct nuclear-electrical energy converting with use of secondary electrons.

**Keywords:** direct nuclear-electrical energy conversion, secondary electrons, metal-isolator-metal structures, method of magnetron ionic-plasma dispersion, electronic beam dispersion method

**Voitsekhovskii A. V., Nesmelov S. N., Kulchitsky N. A., Melnikov A. A.** *Influence of Dislocations on the Internal Quantum Efficiency of Light-Emitting Structures Based on Quantum Wells InGaN/GaN* . . . . . 27

The different methods to determine the internal quantum efficiency of light-emitting structures based on quantum wells InGaN/GaN were analyzed. Recombination properties of structures based on quantum wells InGaN/GaN and the influence of dislocations on the internal quantum efficiency of light-emitting structures based on quantum wells InGaN/GaN were examined.

**Keywords:** internal quantum efficiency, group III nitrides, quantum wells, light-emitting structures, dislocation

**Gavasheli D. Sh., Rekhviashvili S. Sh.** *Thermal Destruction of Fractal Nanostructures under Pulsed Laser Radiation* . . . . . 36

We performed a simulation of the destruction of fractal nanostructures by laser radiation of finite duration, based on nonlinear partial differential equations. Fractality is taken into account when calculating the thermal conductivity coefficient, isochoric heat capacity and intensity of thermal radiation of the substance. The dependence of the critical laser intensity of the pulse duration is construct. Demonstrated a qualitative agreement of simulation results with experimental results.

**Keywords:** fractal nanostructure, thermal properties, laser destruction of nanomaterials

**Mustafaev Ab. G., Mustafaev G. A., Mustafaev Ar. G.** *Silicon on Sapphire Heteroepitaxy Study for Creation Transistor Structures* . . . . . 41

In work investigated mechanism of silicon on sapphire heteroepitaxy, for the subsequent creation low defect level transistor structures. By RBS method were studied epitaxial silicon layers on sapphire substrate. In these layers defects increase in those areas of a spectrum is appreciable which correspond to intermediate area between a layer and substrate and give the maximal contribution in channeling. Auger analysis determines structure and depth of a transitive layer. The way of creation of the semi-conductor device with the improved parameters is developed.

**Keywords:** silicon on sapphire, silicon on insulator, Rutherford back scattering

**Adamov Yu. F., Bratov A. V., Bratov V. A., Grunshpan A. A., Gorshkova N. M., Sibagatullin A. G.** *Universal Differential Signal Receiver for Programable ICs* . . . . . 44

The article content description of differential signal receiver with high range common mode displacement. Receiver based on the BiCMOS technology with heterostructure SiGe bipolar transistors.

**Keywords:** receiver of differential signal, FPGA, CPLD, serial interface, heterostructure bipolar transistor

**Mukhurov N. I., Efremov G. I., Zhvavyi S. P.** *Effect of Preliminary Deformation of Elastic Elements of Electrostatic Microrelays. Part 1. The Deformed Anchor* . . . . . 47

The effect of creation of internal mechanical stresses in electrostatic microrelays is considered due to deformation of elastic mobile elements. Variants are investigated with elastically deformed anchor in the bulk and planar design. The basic mathematical equations and examples of designs are resulted.

**Keywords:** electrostatic microrelay, planar and volumetric structure, active electrostatic and reactive mechanical forces, elastic deformation of the elements

**For foreign subscribers:**

*Journal of "NANO and MICROSYSTEM TECHNIQUE" (Nano- i mikrosistemnaya tekhnika, ISSN 1813-8586)*

*The journal bought since november 1999.*

*Editor-in-Chief Ph. D. Petr P. Maltsev*

**ISSN 1813-8586.**

**Address is: 4, Stromynsky Lane, Moscow, 107076, Russia. Tel./Fax: +7(499) 269-5510.**

**E-mail: nmst@novtex.ru; http://novtex.ru/nmst**

Адрес редакции журнала: 107076, Москва, Стромьинский пер., 4. Телефон редакции журнала (499) 269-5510. E-mail: nmst@novtex.ru

Журнал зарегистрирован в Федеральной службе по надзору за соблюдением законодательства в сфере массовых коммуникаций и охране культурного наследия.

Свидетельство о регистрации ПИ № 77-18289 от 06.09.04.

Дизайнер Т. Н. Погорелова. Технический редактор Е. М. Патрушева. Корректор Е. В. Комиссарова

Сдано в набор 17.06.2011. Подписано в печать 20.07.2011. Формат 60×88 1/8. Бумага офсетная. Печать офсетная.

Усл. печ. л. 6,86. Уч.-изд. л. 8,01. Заказ 548. Цена договорная

Отпечатано в ООО "Подольская Периодика", 142110, Московская обл., г. Подольск, ул. Кирова, 15