CONTENTS

In the given work the basic problems modern nanoelectronics are resulted and ways of their decision are indicated. The basic concepts of nanomaterials and nanoelectronic devices are resulted. Keywords: nanoelectronics, nanomaterials, nanotransistor, CMOS, High-k.

It is shown fundamental a role of atom in becoming mechanosynthesis as leading direction nanotechnology. The new approach to a structure of theoretical bases nanotechnology is offered.

Keywords: atom, model, theory, project, nanosystems, structure, inter-atomic and inter-molecular interaction, nanotechnology.

Lougin A. N. Nano-Effects of Three-Dimensional Non-Uniformity of Current Distribution and Power Dissipation in Thin Film It was shown that nano-effects of three-dimensional non-uniformity of current distribution and power dissipation are watched in resistive layer on the contact boundary. The peak values of current and power dissipation exceed corresponding values of these parameters with their uniform distribution by 3-10 times at length of 0,01 µm away from the contact boundary. Keywords: resistor, thin film contact, resistance, current density, power dissipation, potential difference, distribution, non-uniformity, nano-effect.

Markelov A. S., Trushin V. N., Chuprunov E. V. Features of Formation of Contrast of X-Ray Images at Diffraction of

It is investigated features of formation of contrast of X-ray images at diffraction of X-rays from a surface of a crystal from the changed geometry of structure of its surface. Data of modelling of formation of X-ray images of the X-rays received at diffraction from a surface of a crystal having columned structure. It is shown, that at use columned structures resolution of X-ray images raises more than in 10 times that allows to form two-dimensional X-ray images.

Keywords: X-ray, X-ray image, columnet structure, resolution, temperature field, contrast.

On molecular-mechanical model rigidity Y-shaped carbon nanotube is investigated at stretching/compression deformation. It is established that deformation remains elastic only in limits from-3 % to 3 % of change of length of a Y-tube along a symmetry axis. The rigidity factor (on a solution corner) for a Y-tube of a tube (6,6) doubled from one edge with a corner of a solution 112,5°, is equal 12,26 nN/grad. Thus, Y-tubes can serve as a strengthening composite of polymeric materials, and also probes of high rigidity in nuclear power microscopes.

Keywords: Y-shaped carbon nanotube, established deformation, molecular-mechanical model.

Rinkevich A. B., Ustinov V. V., Samoilovich M. I., Klescheva S. M., Kuznetsov E. A. Magnetic Resonance in Opal Matrixes Interaction of electromagnetic waves with nanoheterostructures obtained by doping of opal matrixes with nickel-zinc and manganese-zinc ferrite has been studied. The opal matrixes contain of SiO₂ nanospheres with diameter about 250 nm with ferrite nanoparticles in the nanosphere voids. The measurements are carried out in frequency range from 26 to 38 GHz in magnetic fields up to 13 kOe. Variation in magnetic field of the transmission coefficient module of the TE₁₀ mode in rectangular waveguide containing a doped opal matrix is studied. The nanstructure sample is placed into the waveguide. Field dependencies of the transmission and reflection coefficients are analyzed. It has been shown that the magnitude and the field dependences of the coefficients are similar each other. Measurements of transmission coefficient module through a rectangular cavity with a doped opal matrix sample have been carried out. It was shown that magnetic resonance in the doped matrix is the main reason for microwave variations. Besides the resonances belonging to the acoustic branch of magnetic resonance spectrum, other resonances have been observed to appear which do not relevant to the acoustic branch. Transmittance of electromagnetic waves through nanocomposite sample has been analyzed and its magnetic field dependency. Keywords: microphotonics, opal matrices, ferrite nanoparticles, microwave measurements.

Work is considering deep anisotropic etching of SOI structures. Parameters of trench forming process in ion coupled plasma reactor with LF bias at substrate electrode are given. Breakdown voltage of formed structures is measured. Keywords: trench, anisotropical etching, plasma chemical etching.

Molecular-beam epitaxy (MBE) layers of silicon with 30–1000 nm thickness on sapphire were investigated by means of Lateral Force Microscopy (LFM) and Z-modulation mode of Atomic Force Microscopy (AFM). It was shown, that lateral force contrast between silicon and sapphire exists independently of deposited layer thickness, while the difference of elastic properties of silicon and sapphire appears only on thick films (more than 100 nm).

Keywords: silicon on sapphire (SOS), molecular-beam epitaxy (MBE), atomic force microscopy (AFM), lateral force microscopy (LFM), Z-modulation mode.

Keywords: logic element, CMOS, power saving, performance, hardware components.

Keywords: microvibrations of designs, energy output, laser Doppler vibrometer, vibrovelocity, vibrodisplacement.

Keywords: microelectromechanical systems, nanogyroscope accelerometer.

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://www.microsystems.ru

Адрес редакции журнала: 107076, Москва, Стромынский 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 Т. В. Пчелкина

Сдано в набор 18.11.2008. Подписано в печать 16.12.2008. Формат 60×88 1/8. Бумага офсетная. Печать офсетная. Усл. печ. л. 6,86 Уч.-изд. л. 8,59. Заказ 22. Цена договорная

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

- НАНО- И МИКРОСИСТЕМНАЯ ТЕХНИКА, № 1, 2009 -