### **CONTENTS**

### Dedkov G. V., Kyasov A. A., Dedkova E. G. On the Sliding

Friction and Heat Exchange Between Nanostructures. . . . . . . . . .

Several problems related with the noncontact friction forces and heat transfer in dynamic contacts between a probe of atomic force microscope and the sample surface are considered theoretically, when the probe is in oscillating motion in normal to the surface direction. It is shown that at such motion the van der Waals friction forces are twice greater than at lateral motion, while the corresponding heat transfer mediated by evanescent electromagnetic fields has an oscillating (velocity proportional) contribution, being weakly dependent on temperature. Also, we analyze role of the adsorbing films on friction and heat transfer. It is shown that the film presence may increase/decrease the friction and heat flux by several orders of magnitude at certain conditions. Finally, using a model of semiinfinite homogenious rod we have calculated the temperature distribution along the height of the rod being in dynamic contact with the heated sample surface. The needed time for the equilibrium to be settled is determined.

# Valakh M. Ya., Dzhagan V. N., Krasilnik Z. F., Lytvyn O. S., Lobanov D. N., Novikov A. V., Yukhymchuk V. A. The Peculiarities of the Growth of Self-Induced SiGe Islands on SiGe Buffer . . . . . . . 8

A study of self-induced SiGe nanoislands, grown by molecular beam epitaxy on Si and  $\mathrm{Si_{0.9}Ge_{0.1}}$  buffer layers, is performed by using atomic force microscopy and Raman spectroscopy. The influence of  $\mathrm{Si_{0.9}Ge_{0.1}}$  buffer layer on the morphology and structural parameters of the islands shown. The values of composition, strain and degree of relaxation of the islands due to their three-dimensionality are determined for the islands grown on both Si and  $\mathrm{Si_{0.9}Ge_{0.1}}$  buffers.

### 

The advantages of the combined usage of complementary methods like X-ray and neutron spectroscopes for the physical studies of rare-earth-based systems with strong electron correlation are discussed. Some recent experimental data are presented along with physical models for a typical representatives of this class of material.

## **Bystrov S. G.** Peculiarities of Local Chemical Surface Structure of Block Copolymer PS39PEO61 Studied by Means of AFM and XPS . . . . . . 19

In the paper presented given are the results of the investigation of the local chemical surface structure of the block copolymer PS39PEO61, both initial and thermo-treated by XPS and AFM (P-47 NT-MDT apparatus). The surface morphology changes in the block copolymer after the annealing are described. Computational structural models for the polymers under investigation are presented. The distributional maps delimitating the areas with different chemical nature scattered along the surfaces of the investigated materials are also been given.

## **Kozlov A. G.** Modelling of Temperature Distribution in a Thermal Microaccelerometer with Inertial Mass....

An analytical method is presented that allows one to determine the steady-state temperature distribution in a thermal microaccelerometer with inertial mass. In the thermal microaccelerometer, the active domain in which basic thermal processes take place is marked out. This domain is substituted by the equivalent domain which is divided into some rectangular regions with homogeneous parameters. The temperature distribution in the regions is obtained with the Fourier method. The parameters characterising thermal conduction processes between adjacent regions are found using adjoint boundary conditions. Based on the presented method the temperature distribution in the concrete thermal microaccelerometer and the dependence of the temperature in the site where the hot junctions of thermocouples are located on the gap between the moving element and the thermally isolated structure are determined.

# Dryakhlushin V. F., Gaikovich K. P., Levichev V. V., Mishkin V. P. Fine Analysis of Emission Spatial Structure of Two-Color Semiconductor Laser in Near-Field Zone.

In work the spatial distribution of radiation modes of two-color semiconductor laser in near-field zone is studied. The attractive property of this laser is possibility of generation of terahertz oscillation with help of mixing of two different modes of laser radiation. The mapping of laser radiation using near-field optical microscopy is obtained. The probe transfer function was used to improve the resolution of images from the solution of corresponding 2D convolution equation obtained by employing the Tikhonov's method of generalized discrepancy.

#### Podurets K. M., Pogorely D. K., Manushkin A. A., Nedorezov V. G., Somenkov V. A., Schetinkin S. A. Refraction Imaging for Medicine and Materials Science at the Kurchatov Synchrotron Radiation Source . . . . 35

Experiments on the refraction imaging which were carried out at the Kurchatov Synchrotron Radiation Source are described. The results demonstrate the possibilities of the method for nondestructive testing and medical diagnostics. Experiments on the refraction imaging of the accreditation mammographic phantom were carried out. It is shown that the use of the refraction imaging method will enhance significantly the sensitivity of mammographic examination.

#### 

The new photosensitive bipolar silicon N-shaped devices with guided I-V characteristics are discussed in this paper. The modulation of infrared radiation causes the increasing or decreasing to null of the max current in the output I-V characteristics. The results of modeling correspond to experimental data.

### For foreign subscribers:

Joint-stock company MK-Periodica. E-mail: info@periodicals.ru Tel.: +7(095) 684-5008. Fax: +7(095) 681-3798

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(095) 269-5510.

E-mail: it@novtex.ru; http://www.microsystems.ru

Адрес редакции журнала: 107076, Москва, Стромынский пер., 4/1. Телефон редакции журнала (095) 269-5510. E-mail: it@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 И.С. Павлова. Корректор Е. В. Комиссарова

Сдано в набор 31.03.2005. Подписано в печать 04.05.2005. Формат  $60 \times 88$  1/8. Бумага офсетная. Печать офсетная. Усл. печ. л. 6,86. Уч.-изд. л. 8,37. Заказ 894. Цена договорная

Отпечатано в Подольской типографии — филиал ОАО "ЧПК", 142110, г. Подольск, ул. Кирова, 15