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Trushin V. N., Markelov A. S., Zholudev A. A., Chuprunov E. V.	
Experimental Methods of the Thermo-Induced Control Parameters	
of X-Ray Diffraction Maximums of Crystals	

The research results of influence produced by the heating effect of the light beam on the shift of diffraction maximum of crystals are presented. Using X-ray diffraction maximum crystals CaCO₃, Si and KH₂PO₄ (KDP) as an example, the possibilities for correction of X-ray beams convergence through control of heating effect of the light beam on the surface of the crystal segments are disclosed. A possible mechanism for the formation of an X-ray image using a corresponding optical image as a template is considered.

The paper presents original results of the STM investigations of $Si-SiO_2$ and $Si-SiO_2$ -polymer structures on the air. Base principles of the structures surface modifications during the STM measurements were established. A model of the STM-contrast inducing on the $Si-SiO_2$ and $Si-SiO_2$ -polymer structures surface involving charge redistribution was suggested. Comparative study of macroscopic current-voltage characteristics and those measured by the STM was performed. Self-assembling phenomena of quantum dots are discovered.

The problem of X-ray Fresnel diffraction under grazing angles of incidence on concave surface of crystal in the presence of surface acoustic wave in noncoplanar symmetrical Laue geometry is considered. It is shown that the main peak of intensity and the diffracted satellites are focused at different distances from crystal. The influences of deviation from the Bragg orientation, of the width of spectral line, of the value of the amplitude of surface acoustic wave on the image are analyzed. The process of diffraction on the standing as well as on the running surface acoustic waves is studied.

The quality controlling model of the thermal radiation measurement includes the modeling processes of the noise arising in the sensitive HTSC-film $YBa_2Cu_3O_7$ and thermal metabolism in the initial transducer, linealing of the transducers exit characteristic in the secondary transducer, which allow to put the model parameters of the sensitive element into the memory of the secondary transducers digital circuit board, which allow also to simplify the calibre-process and guarantees the required measurements accurate.

Qraphanalitical model of structures with Schottky's barrier that approximate real dependence of equivalent capacitance and resistance of successive substitution scheme from frequency and take into account capacitance and resistance of contact and volume are worked out. Approximation curve represents a broken line.

Rembeza E. S., Rembeza S. I., Domashevskaya E. P.,

Grechkina M. V., Agapov B. L. Influence of the Atomic Composition of Oxide Nanocomposites on the Base of SnO_2 on Their Structure . 25 Influence of the composition of nanocomposites on the base of

Influence of the composition of nanocomposites on the base of tin dioxide (SnO₂:SiO₂, SnO₂:ZrO₂, SnO₂:MnO₂, SnO₂:Y₂O₃) on the grain size of polycrystals in film samples used as sensitive layers in gas sensors was studied. Atomic composition was determined with the help of X-ray microanalysis. Morphology of the film surface was investigated by method of atomic-force microscopy.

Smirnova I. V., Moshnikov V. A., Shilova O. A., Yaroslavtsev N. P., Il'in A. S. Research of the Glassy Borosilicate Sol-Gel-Derived Film Composition and Structure by Means of Internal Friction Method. . . 28

In the work the research results of the composition and structure of glassy borosilicate films of internal friction method are given. Such films successfully are used as diffusion sources in semiconductor materials. The films were formed from tetraethoxysilane-derived sols with addition of polyols of different topology and molecular weight by means of centrifuging. Changes of structure of the films in the temperature range from -100 up to + 500 °C are observed. The essential influence of initial components (simple spirits, polyols of different topology, boron acid) on composition of microphases formed in the films is revealed. The evolution of films phase composition during multiple heat treatments is shown.

It is described a pull-in effect in electostatic actuators of MEMS-and NEMS-devices. The methods of electrostatic pull-in suppression in different actuators are discussed. Proposed methods are used for some actuators parameters calculation. It is necessary to take the Casimir interaction into account because this effect limit the range of positional stability of microelectromechanical actuators too.

The article presents a new way of object detection and recognition based on residual magnetic fields analysis. We present general results of development of new methods of recognition, specifically built to work with data received from an array of magneto-resistance sensors. The principles of development of a recognition system, the basic limitations of the approach, and the future trends of the research are also described.

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

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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 04.05.2005. Подписано в печать 06.06.2005. Формат $60 \times 88~1/8$. Бумага офсетная. Печать офсетная. Усл. печ. л. 6,86. Уч.-изд. л. 7,87. Заказ 1042. Цена договорная

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