## CONTENTS

To method electron-probe the analysis concentration heterogenety is investigated in a solid solution of structure Si<sub>0.68</sub>Ge<sub>0.32</sub> depending on a way of its preparation (crystallization from liquid, pressing of a powder of an alloy, zone melting, mechanical alloying). It is astablished, that in alloys grains with two primary concentration of the basic components of an alloy are formed. Laws and parameters of distribution of concentration of components (a dispersion, asymmetry, an excess, expected value) are determined depending on a way of preparation. The highest homogeneity the alloys received by zone melting and mechanical alloying.

Sheglov D. V., Rodyakina E. E., Latyshev A. V. and Aseev A. L. New Scope of AFM-Tip-Induced Nanolithography

The advanced AFM-tip-induced nanoelectro-mechanical modification technology (TINE&MEMO) is developed to realize the principle new scale of modification depth, up to 100 nm, for manufacturing electronic and mechanic nanodevices. The novel method of AFM-tip-induced modification under simultaneously stress and voltage applying with nanometer scale resolution are demonstrated for nanostructures fabrication on silicon, titanium and gallium arsenide substrates. Peculiarities of local anodic oxidation kinetics and mechanic scratching are under consideration. The fabrication processes are analyzed in details to minimize the spatial resolution and to increase the depth of modified films.

**Dedkov G. V., Kyasov A. A.** New Aspects of Fluctuation Electromagnetic Interactions of Nanoprobes Moving Near a Surface

The retardation effect of heating rate and tangential fluctuation dissipative force on a particle moving with velocity V parallel to a flat surface is considered. The numerical estimations performed for metal particle and metal surface. Relation between the heating (cooling) rate and rate of dissipation of mechanical energy of an oscillating nanoprobe is studied. The calculations show that retardation effects become important only in the range of the tip —surface separations of about several microns. Both the heating rate and energy dissipation power of the tip near a surface are monotonously decreasing functions of the distance in the range of 1 nm to 1 mm. A comparison of the heating rate and rate of the tip mechanical energy dissipation in dynamic regime (without contact forces and hysteresis) demonstrates that the first one is much greater (by many orders of magnitude) even at small temperature difference between the tip and sample surface. This can activate new mechanisms of energy dissipation in the tip sample system.

Shashkin V. I., Vopilkin E. A., Vostokov N. V., Klimov A. Yu., Rogov V. V., Gusev S. A., Shuleshova I. Yu. Fabrication and Controlled Bending of Microconsoles.

The  $Ta_2O_5$  microconsole with dimensions  $12 \times 2 \times 0.2$  µm and the GaAs microconsole with dimensions  $36 \times 1.5 \times 1.3$  µm are fab-

ricated. The gap between the console and the basis is less than 1  $\mu m$ . The static stiffness and resonant frequency of the consoles are measured by the AFM. The possibility of controlled bending of consoles is shown. By the successive sputtering of various metals the bending was reversed.

Sechneov D. A., Ageev O. A., Svetlichnui A. M., Klovo A. G. Influence of Rapid Thermal Processing Modes on the Thermal Fields in the Metal/Silicon Carbide Heterohen Structures.............. 26

In this paper we have investigated the influence of the optical properties differences and irradiation conditions on thermal fields of the metal/SiC heterohen structures under rapid thermal annealing by infra red radiation. Modes and conditions of the heating with minimum thermal gradients was defined.

Problems of modelling of complicated functional microelectromechanical systems (CF MEMS) were considered. Joint analysis of functioning of micromechanical and electronical parts is required in such systems. General principles of creation of SPICE models realizing piezoresistive and capacitive sensors of physical magnitudes are elaborated. Possibilities of analysis of piezoresistive sensor characteristics are demonstrated for the pressure sensor inclusive instrumental amplifier and capacitive accelerometer which has sensitive element representing differential micromechanical condenser with active middle plate.

Combined two-band model of heterostructure with one tunnel junction and expanded near contact regions taking into account intervalley scattering is proposed. The model based on self-consistent solving of Schrödinger and Poisson's equations. The model is characterized by high efficiency. On the basis of the model a program was developed. The program was included in the nanoelectronic device simulation system NANODEV and volt-ampere characteristics of GaAs/AlAs device were calculated using the program. It was made a comparison of volt-ampere characteristics obtained by single-band and tmo-band models. Our work shows as applied biases increased there are considerable quantitative as well as qualitative differences of volt-ampere characteristics.

One of the ways to adapt a spatial pattern of the sensors of the molecular electronic transducers (MET) for making these sensors using standard lithographic technologies is being discussed in this work. The frequency response of a MET transducer with gauze electrodes. The calculation is compared with experiment.

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