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The function of microelectronic transducers in the modem technological systems, in the techniques and in mode of life and also the perspective directions of their development is considered. The decomposition of sensory elements and structures is reduced. The questions of the development, estimate and choice of the constructive — technological decisions contributing the increase of the transducers stability are elucidated.

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They are reduced the analytical research results of the mathematical model of micromechanical mirror work with two degrees of freedom suspended in Cardano suspension above electrodes surface. The calculation of the operational characteristics of micromirror, snapdown-effect under the different geometric system parameters is fulfilled. It's found the upper bound of the distance angle of micromirror for its design which is technologically realizable.

# Timoshenkov S. P., Kalugin V. V., Prokop'ev E. P. Research of Clearing Technology of Surface of Silicon Wafers During Processing of SOI Stuctures and Microelectron Devices.

The different methods of a research of a surface Si of wafers and their methods of monitoring are considered. For exact definition of a state and properties of a surface of substructures usage of a combination of several methods of monitoring of a surface of semiconductor wafers is optimal. In case of usage of semiconductor wafers during processing of integrated circuits with  $B_{\rm min} < 1$  micron, obtaining of SOI structures by a method of bonding of wafers and other situations, when the maximum smooth surface is required, is necessary conservation of a required level of a surface roughness at holding processes of a chemical treatment, express selection of silicon wafers and chemical reagents.

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Thermowave spectroscopy of porous silicon (por-Si) in the systems  $\text{LiNbO}_3$  — por-Si — Si-substrate and por-Si — Si-substrate by

photopyrielectric and photothermoacoustic studies has been performed.

The main thermophysical parameters of por-Si (the volume heart capacity, thermal conductivity, thermal diffusivity and effusivity) and thermophysical characteristics of por-Si — Si boundary (thermal contrast factor, coefficients of thermal wave reflection and transmission) have been evaluated.

Efficiency of thermal characterization of micro- and nano-porous materials and the boundaries in functional systems material porous Si by thermowave probing has been shown.

Efficiency of using por-Si layer as buffer and damper layers of pyroelectric and other thermal detectors has been proved.

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Optical responses of the noble metal nanoparticles significantly increase with their aggregation into clusters because of a strong collective integraction between the particles inside a light wave. It was experimentally found that cubic susceptibilities of silver clusters at 10-ns pulsed excitation is considerably (1—2 orders of magnitude) larger than for 2+50-ps pulses. This fact is to be connected with the response time of the optical nonlinearity and the possible inertial mechanisms are discussed.

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We have considered the state-of-the-art methods of thin polymer films and polymer structures deposition on hard substrates as well as results of probe microscopy studies of these objects. Special attention has been paid to polymer structures formation methods related with the usage of supercritical solvents.

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The trends of the mechatronics development and the creation perspectives of microminiature machines and mechanisms on the base of microsystem technology are considered.

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