

## ABSTRACTS

### ELECTRONIC ENGINEERING MATERIALS

#### **Study on Electronic and Magnetic Properties of Semiconductor $\text{CuFeS}_2$ in 77–300 K Temperature Range**

*I.Kh.Khabibullin, E.V.Smidt, V.L.Matukhin*

The specific conductivity of photocrystalline samples of chalcopyrite  $\text{CuFeS}_2$  in the 77-300 K temperature range has been investigated. The distinction in behavior of electric conductivity in the low temperature areas of the investigated samples has been revealed. The detailed study on the spectrum of the Cu nuclear magnetic resonance in the  $\text{CuFeS}_2$  local field has been performed.

#### **Study on Mode of Ultra-High Metal-Insulator-Semiconductor Diode Stressed-Deformation Materials Hermetic Assembly Design**

*A.I.Pogalov, A.M.Grushevsky, Y.G.Dolgovykh, Y.V.Surin, T.V.Vigovskaya, V.S.Bychkova*

The mode of ultra-high metal-insulator-semiconductor diode stressed-deformation materials hermetic assembly design, implemented based on the bond silicon membrane with two gold beam-leads under the effect of temperature and an increased atmospheric pressure, has been investigated. The construction is protected by various sealing materials based on lacquers, enamels and compounds. The recommendations on minimization of the stressed-deformation mode of connection of various materials by optimization of the design and technology of the diode have been developed.

#### **Use of Scanning Probe Microscopy in Study of Electrodeposition On Platinum in Presence of Organic Additive**

*A.V.Rudnev, A.V.Khlynov*

The influence of acetic-nitrile adsorption on kinetics and the copper electric crystallization mechanism on high quality Pt(111) monocrystals in the sulfate aqueous solution has been investigated. The investigations have been performed using the electro-chemical scanning probe microscope.

### MICROELECTRONICS TECHNOLOGY

#### **Methods of Repairing Original Integrated Circuit Layout Defects on Photomasks**

*V.A.Bespalov, V.A.Ovchinnikov, D.V.Bazanov, S.M.Avakov*

The methods of repairing the integrated circuit layout defects on photomasks have been analyzed. The most effective methods for removal of the clear and opaque defects in manufacture of the photomasks for ICs with the standards of up to 90 nm nodes have been revealed.

#### **Reliability Analysis of Digital CMOS Circuits Taking into Account Degradation Effects of Transistors**

*S.V.Gavrilov, O.N.Gudkova, E.R.Kagramanyan*

The problems of the reliability analysis of the digital CMOS VLSI circuits have been considered, which arise when the scaling brings the transistor sizes down to the nanometer region. The modeling approaches of one of the major IC factors, namely the negative-bias temperature instability (MBTI), have been analyzed. The model of the PMOSFET threshold voltage degradation has been proposed taking into account the NBTI effect. The signal probability propagation algorithm has been proposed and developed in order to improve the degradation estimation accuracy. The estimation of the timing parameter variations of the digital standard cells has been performed on the basis of the proposed model. The static timing analysis flow has been developed taking into account the sensitivities of the timing parameters to the mentioned variations of the transistors threshold voltages.

## INFORMATION TECHNOLOGIES

### Heuristic and Quasi-Topological Algorithms of Image Contour Segmentation

*V.D.Koldaev*

The empiric algorithm of the segmentation task solution in the tech vision systems has been considered. The analysis of the heuristic and quasi-topological contour segmentation algorithms has been carried out and the preferable fields of their use have been shown. The hierarchical data organization for the image analysis and processing has been offered.

### Peculiarities of Associative Memory Functioning and Applications

*A.S.Parfenenko, A.V.Rybachek, E.S.Rybalko*

The algorithm of search with the associative memory application has been presented. The application features of the associative memory in computer networks and the implementation features of the associative memory blocks have been considered.

## INTEGRATED RADIOELECTRONIC DEVICES

### Study on Algorithm of Multiple Access with Space Division of Channels in System with Smart Antenna Array

*J.V.Chirkounova, K.S.Lyalin, V.I.Oreshkin*

The issues of applying the multipath smart antenna array for creation the systems of multiple access with space division of channels have been considered. The classification of the basic algorithms of signal space processing has been presented. The method of constructing the assigned form antenna pattern has been described. The results of the study on the algorithm of the multipath antenna pattern formation for the multiple access realization have been given.

### Problems of Composing Kalman Filter in Multi-Antenna GPS/GLONASS System

*V.E.Alekseev, Yu.V.Savchenko, A.N.Solovyev*

The most effective algorithm of the float solution determination using the Kalman filter in GPS/GLONASS systems has been considered. Special attention has been given to the problems of this algorithm implementation connected with the change of the visible satellite group. The methods of solving these problems have been offered, and the experimental estimation has been presented.

## MEASUREMENT METHODS AND TECHNOLOGY

### Local Measurement of Electric-Optical Parameters of Silicon Structures Based on Photorefractive Effect

*A.L.Filatov, A.V.Gerus, E.M.Korablev, A.V.Lugovskoi*

Based on the analysis of the photorefractive effect studies the new techniques of the pump light absorption coefficient and of the probe light refractive index dependence on the non-equilibrium carrier density have been proposed. The peculiarities of applying the proposed techniques have been theoretically and experimentally investigated.

## UNIVERSITY EDUCATION PROBLEMS

### **Automated Examination-Bulletins Processing Method of Full-Function Information-Operation System «Dean's Office»**

*V.K.Grigoriev, A.V.Grushin*

The problems of computer support in the educational process control have been considered on an example of the author's full-function information-control system «Dean's office MIREA». The process of output and input of the students' test-examination records has been distinguished. The model of the record structure has been proposed, and the mark recognition methods based on the bar-code identification has been considered. The results of the study on the recognition methods have been presented.

### **BRIEF REPORTS**

#### **Bandpass Filters on Dielectric Resonators with High Permittivity**

*A.G.Efimov, V.F.Panin*

The issues of application of dielectric resonators in the reception modules for work in the complicated electromagnetic conditions have been considered. The design of the bandpass filters based on the dielectric resonators has been described. The results of the experimental studies have been presented.

#### **Telemetric System for Data Collection and Registration of «Phoebes-Ground» Spacecraft Descending Apparatus (lander) Model for Experimental Range Tests**

*V.P.Betz, A.V.Kovtonjuk, A.V.Kantor, A.V.Nevzorov, A.E.Shirshakov*

The purpose, the structure principles and the basic peculiarities of implementing the telemetric system (TMS) of the data collection and registration of the spacecraft «Phoebes-Ground» descending apparatus (DA) model have been described. TMS consists of different purpose sensors (overload, angular speed, temperature and pressure), GPS – receiver for coordinates determination and the memory device. During the tests the descending apparatus model telemetric system (in the process of descending and impact with the ground surface) writes and saves the measurement values in the memory device.

#### **Program Complex for Systems of Diffractometrical Control and Measurement of Geometrical Parameters of IC's Units Topology**

*S.B.Benevolenskiy, N.L.Istomina, A.A.Smirnova, M.V.Spynu*

The program complex, which permits to decrease a methodical error of the diffractometrical method of measuring geometrical sizes of the topology units, introduced at the modeling analysis stage, has been described. The program complex includes the settlement module, the databank of parameters of virtual test structures, the auxiliary search system and the complex of procedures for visualization of the obtained results.

#### **Scanning Probe Microscopy Capacitance Technique in Air**

*I.I.Bobrinetskii, V.V.Losev*

It has been shown that the presence of adsorbate on the measured surfaces in air changes the conditions of the capacitance technique applicability in the scanning probe microscopy and increases its resolution. The technique realization examples have been presented.