

# ABSTRACTS

## ELECTRONIC ENGINEERING MATERIALS

### Acceptor Centers Generation under Influence of Reductive-Oxidative Mediums on $\text{Cd}_x\text{Hg}_{1-x}\text{Te}$ Films Surface

*V.S.Varavin, G.Yu.Sidorov*

The influence of reductive-oxidative mediums on the acceptor centers generation in  $\text{Cd}_x\text{Hg}_{1-x}\text{Te}$  films, grown by the molecular beam epitaxy on GaAs (301) substrates, has been investigated. During the long-term stability testing the parameters of the untreated n-type films remain stable, while in the treated films the conductivity and the carrier mobility of the treated samples may decrease by up to two orders of magnitude. It has been shown that an acceptor source is formed on the epilayer surface during treatment. Probably, these acceptors are mercury vacancies.

## MICROELECTRONICS TECHNOLOGY

### Study on Technological Process of Removing Clear Defects on Photomask

*V.A.Ovchinnikov*

A relationship of the deposited material line width variation depending on the moving speed of the coordination stage and laser radiation energy has been determined. The technological conditions of removing clear defects have been established.

### Investigation and Simulation of Plastic RFID-Cards Thermo-Strength

*A.F.Vishnitsky, A.M.Grushevsky, N.M.Larionov, A.I.Pogalov, A.U.Reznik*

The main principles for simulation of the RFID-cards thermo-strength have been presented. The finite-element modes have been developed, the simulation results have been given and the influence of the constructive and technological factors on the stress-strain state has been investigated. The most significant factors of the identification cards thermo-strength have been determined.

## MICROELECTRONIC DEVICES AND SYSTEMS

### Photon Structures and Their Use

*D.A.Usanov, A.V.Skripal, A.V.Abramov, A.S.Bogolyubov, M.U.Kulikov*

The computer simulation and experimental investigation of the frequency dependencies of the reflectance and transmittance of photon crystals based on the microstrip lines in the 0 – 20 GHz frequency band have been performed. The investigations were conducted for the photon crystal with the irregularity, introduced as the changed geometry size of the stripline conductor or changed substrate permittivity of one of the sequence microstrip sections. A good agreement between the calculations and the experimental results has been obtained. The possibility for application of open microwave transmission lines for realizing the parameters measurement method of the material, which acts as irregularity in photon crystal, has been demonstrated.

## NANOTECHNOLOGY

### **Volumetric Albumin Composites Based on Nanotubes and Fabricated by Continuous Laser Radiation Action**

*S.A.Ageeva, I.I.Bobrinetskii, V.I.Konov, V.K.Nevolin, V.M.Podgaetsky, V.V.Savransky, S.V.Selishchev, M.M.Simunin*

The possibility of creating a volumetric nanostructure for recovery of the improper bones and tissues (or for treatment of the native defects of human evolution) has been considered. Four types of multi-layer and one-layer carbon nanotubes, manufactured by the methods of thermo-catalytic dissociation, disproportioning on Fe-clusters and thermal cathode dispersion in the inert gas, have been investigated. The possibility of applying the volumetric nanocompositions as a bio solder for laser welding of the cartilage tissue has been demonstrated. The tissue compatibility with the nanocomposition material introduced into the rabbit ear perichondrium has been examined.

## CIRCUIT ENGINEERING AND DESIGN

### **Methods of Logical-Timing Analysis of Custom VLSI Blocks**

*A.L.Stempkovsky, S.V.Gavrilov, E.R.Kagramanyan*

The modern problems of the logical and timing analyses, which occur during the characterization of the CMOS VLSI blocks, have been considered. To solve this problem, the generalized logical-timing model of the functional block has been proposed. Such model, using the SP-DAG structure, includes both the logical function and the hierarchical representation of the circuit given at the transistor level. The Gaussian elimination method for the block generalized model extraction from the circuit netlist has been proposed. The estimation of conductance and capacitance values, as well as the delay analysis has been performed on the basis of the proposed model. Also, the branch and bound algorithm, enabling designers to verify the delays for a big number of different input patterns without the need of electrical simulation, has been proposed.

### **Analog Test Bus Commutation Cell for Measurement of Internal Signals in Integrated Circuits**

*D.S.Latnikov, M.S.Miropolskiy*

The analog cell for the test bus commutation has been described. The proposed solution has the following advantages: small and constant capacitance, a wide range of input voltages, wide bandwidth and small layout size. These advantages give the possibility to investigate the internal analog signals of integrated circuits, including the sensitive points of the operational amplifiers, while testing.

## INFORMATION TECHNOLOGIES

### **Identification of Parameters of Complex Technical Systems Functioning**

*A.I.Terentev*

The statement and the methods of solving the problem of identifying the parameters of complex technical systems functioning have been considered. The criteria used in the problem solving process have been developed, and their advantages compared to the widely known integral criteria have been pointed out.

### **Error Probability Estimates for Symbol-by-Symbol Decoding Procedure of Orthogonal and Simplex Signals**

*L.E.Nazarov, I.V.Golovkin*

The problem of estimate of the probability characteristics for symbol-by-symbol decoding of signals has been considered. The obtained analytical expressions for the error probability per data bit, corresponding to application of this decoding method for orthogonal and simplex signals, have been presented.

## **Wavelet Based Video Compression Algorithm with Three-Layered Motion Vector Coding**

*A.A.Alexandrov, E.A.Koplovich, S.V.Umnyashkin*

A video compression algorithm, based on hierarchical wavelet coefficients coding and overlapped motion compensation, has been proposed. Within this algorithm framework, a three-layer coding scheme of the motion vectors has been implemented to provide the embedded bit stream generation and the flexible bit budget allocation between the motion and residual image coding.

## **MEASUREMENT METHODS AND TECHNOLOGY**

### **Dew Point Measurement Technique Based on Fiber Cut Reflection Coefficient Range**

*S.M.Kostritskii, A.A.Dikevich, Yu.N.Korkishko, V.A.Fedorov*

The fiber optical dew point hygrometer based on the fiber cut reflection coefficient change has been developed and examined. The model of the condensation detector functioning principle has been proposed and experimentally verified. The experimental ice point measurements for the air with different ice points have been performed.

### **Investigation of Optical Radiation Propagation through Multi-Layer Scattering Media in Approximation of «Straight Back Scattering»**

*S.A.Tereshchenko, D.A.Potapov, I.S.Skorinkin*

The propagation of laser pulses through the high scattering medium (HSM) consisting of several homogeneous layers, has been theoretically and experimentally investigated. The analytical solution of the radiation transport equation in the «straight back scattering» approximation for multi-layer HSM has been obtained. The experiments with two-layer HSM have been carried out and their correspondence to the theoretical description has been shown. The obtained results may be used for designing of the bio-medical optical tomographs.

## **BRIEF REPORTS**

### **Production of Boron Nitride Films by HF Magnetron Dusting Method**

*E.B.Sokolov, L.P.Batyunya*

The technology of producing BN films by the magnetron dusting method has been considered. The electrophysical properties and the structure of the films have been investigated. The possibility of producing the optically transparent BN films, having the mechanically strong diamond-like structure, has been determined. The produced BN films can be recommended as the protective coatings for various designs, including, also, the multi-layer film structures used in electron devices as well as in technology of production of electronic products.

### **Computer Modeling of Non-Isothermal Current Distributions in Symmetric Bipolar Transistor Structures with Defects**

*V.A.Sergeev, O.A.Dulov, A.A.Kulikov*

It has been analytically demonstrated that in the symmetric bipolar transistor structures with small defects with the preset full emitter current the difference between the currents, that flow through the symmetrical parts of the structure, is proportional to the value of the defect, and as a result of the structure self-heating, practically is linearly increasing with the collector voltage increase. The results of the theoretical analysis have been confirmed by computer modeling based on the program package «Workbench», supplemented by the block of computation of the structure parts temperatures.