

Guest Editorial

IMAPS Electronic Devices and Systems International Conference, 2010

Dear reader,

It is a pleasure to introduce this special issue of the Radioengineering journal dedicated to IMAPS Electronic Devices and Systems International Conference (EDS) 2010. The conference covers many topics starting from physics and semiconductor devices, through sensors, MEMS, packaging and interconnection, design of integrated circuits and optoelectronics, power applications and reliability at the end. The EDS conference is organized by IMAPS CZ&SK Chapter Society in cooperation with the Department of Microelectronics and the Department of Physics, Faculty of Electrical Engineering and Communication, Brno University of Technology.

The conference with almost 20 years history passed through successive evolution from a small regional conference with 5 basic topics to the international symposium with 13 topics and about 100 participants per year. In 2008 the conference joined together with the revised online Electroscopie journal to provide the opportunity for authors of the best conference papers to present their research results in more details. In 2010 the conference best papers are presented in the Radioengineering journal. Hopefully this is the beginning of the new tradition of the conference which is also focused to be established in ISI Web of Science database.

This special issue of the Radioengineering journal presents the best conference papers such as invited papers or articles presented during special oral sessions. The papers were selected by the conference program committee and they are focused on various electro technical and technology problems.

The very first article is the conference invited paper by *A. Dziedzic et al.* presenting modern materials and technology process for fabrication of RFID tags. The test structures especially antennas on cheap flexible substrates and the test results are presented as well.

The next four papers have a common topic regarding material properties for electro technical industry. *J. Pavelka et al.* depict problem of activation energy of RTS noise. The paper is focused on small area devices (especially MOSFETs), which significantly suffer from the RTS noise influence. The temperature dependence of transport and noise characteristics of various silicon MOSFETs is examined and activation energy of drain current and RTS noise time constants discussed. Another noise problem is presented by *P. Sedlak et al.* However it is noise in ceramics. The main sources of voltage or current fluctuation

in piezoelectric ceramics are thermal noise, polarization noise and low frequency $1/f$ noise. Authors validate the Nyquist relation for piezoelectric ceramics in various temperatures. The electrical impedance and noise spectral density were measured and compared as well. The work by *E. Prociow et al.* is focused on structural, optical and electrical behavior of vanadium based oxide thin films prepared by magnetron sputtering under different conditions. The refractive index and the width of optical band gap have been calculated. The D.C. resistivity values at room temperature and thermal activation energy have been obtained from electrical investigation point of view. *S. Cichon et al.* were focused on preparation of Ni silicide contacts and their properties observations. The Ni silicide contacts are expected to be advantageous contact materials on SiC. The Schottky behavior was observed by means of I-V characteristics measurements at lower annealing temperatures. Raman spectroscopy measurements confirmed formation of single Ni silicide.

Two articles were selected from chapter Packaging and interconnections. The first by *I. Szendiuch* was also the invited conference paper and it presents actual development, research achievements utilizing both organic and inorganic substrates and the roadmap of modern 3D package solutions. The second paper by *L. Brančík* elaborates techniques for the time-domain analysis of multiconductor transmission lines (MTL) on a basis of the implicit Wendroff method. All computations have been performed in the MATLAB language while utilizing sparse matrix notations.

The following papers are focused on integrated circuits design. *D. Biolek et al.* presents very interesting topic on SPICE model of memcapacitor development. The model is related to the charge-controlled memcapacitor, the capacitance of which is controlled by the amount of electric charge conveyed through it. The results of transient analysis clearly show basic fingerprints of the memcapacitor. The next paper depicts design problems and MATLAB modeling of pipelined analog-to-digital converter by *V. Kledrowetz*. The MATLAB-Simulink model includes some nonideal factors such as random capacitor mismatch, comparator offset and finite operational amplifier gain. All these problems are discussed and solution is presented too. *T. Urban et al.* elaborates a thorough analysis and design of a low-voltage low-power voltage reference circuit with sub-bandgap output voltage. The outcome of the analysis and the resulting design rules are universal and it is supposed to be general and suitable for similar topologies with just minor modifications. *J. Bajer et al.*

presents a pair of current-mode sine-wave oscillator circuits. Both these circuits are implemented using positive second-generation current conveyors (CCII+). The modified circuit version was manufactured by means of so-called diamond transistors, which stand for CCII+ active building blocks. The paper by *Z. Kolka et al.* deals with a procedure for approximate symbolic analysis of linear circuits based on simplifying the circuit model. The influence of each modification of the circuit model is ranked numerically. A fast method based on the use of cofactors is presented as well.

The last, but not least article also depicts very modern topic related to solar systems. *J. Bauer et al.* shows the design and simulation of the low power inverter that acts as an output part of the whole converter in solar power stations. The design of the control algorithm of the inverter for both types of inverter application – for islanding mode

and for operation on the supply grid, is discussed in the paper. Attention is also paid to the design of the output filter that should reduce negative side effects of the converter on the supply network.

Hopefully this special issue will provide you new inspiration for your future research activities.



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