

Guest editorial

The present Special Issue on Electronics is the 4th one in the series “Engineering” of the Proceedings of the Estonian Academy of Sciences. The previous special issues on electronics were published in 1977, 2000 and 2001. Traditionally, the published papers are related to presentations at the biennial Baltic Electronics Conferences, held in Tallinn already for 15 years. These conferences have become important scientific forums in the Baltic Sea region and wider area (with special guests even from the USA and Asia) in the field of electronics, microtechnology, control and communications. This time the contents of published papers will be presented orally at the 9th Baltic Electronics Conference BEC 2004, which will be held at Tallinn University of Technology on 3–6 October 2004.

As an exception, this issue contains only the papers of Estonian authors from the Department of Electronics of Tallinn University of Technology. The papers reflect recent research results in two internationally recognized lines: 1) study of semiconductors with an accent on new wide band-gap materials, and 2) signal processing and measurement with applications in biomedicine.

The first research line is presented by three papers. The first paper by E. Velmre and A. Udal estimates the strength of photon recycling effect in the new wide band-gap semiconductor 2H-GaN. Comparison with the same effect in the more traditional semiconductor GaAs is given as a reference for estimation. The next two papers in the same line are written by T. Rang and his colleagues. These papers analyse the temperature dependence of the dynamic behaviour of complementary 4H-SiC and 6H-SiC Schottky structures (considering mostly the turn-off time). Also, some other physical parameters and imperfections of SiC Schottky interfaces, manufactured by diffusion welding technology, are investigated using computer simulations.

The second line is reflected in three papers. The paper by T. Parve and R. Land analyses errors of the introduced novel analogue signal processing method, intended for application in the correlation-type bioimpedance measurement unit, which is designed for implantable medical devices like cardiac monitors and pacemakers. The paper by T. Paavle gives theoretical conceptions for designing the undersampling synchronous demodulators of bioimodulated impedance signals from living tissues and organs. The concepts are verified by computer simulations. The last paper by A. Ronk and Ü. Voolaine is devoted to the study of transient processes in adaptive digital Fourier analysers. Improvement of the speed of frequency convergence is the main goal of the study. It is

shown that robust algorithms with reasonably chosen parameters can drastically reduce the convergence time.

Summing up, the present issue characterizes theoretical research at the Department of Electronics today. I appreciate the contribution of the authors and I would like to thank many other people, who's consistent work made the Special Issue available in this form. Also, I wish a success to the Baltic Electronics Conference BEC 2004.

Mart Min
Co-Chairman of the BEC 2004