GUEST EDITORIAL

SMEOS 2009 (SENSORS, MEMS AND ELECTRO-OPTIC SYSTEMS)

This special issue of the SAIEE Africa Research Journal is devoted to selected papers from the SMEOS 2009 (Sensors, MEMS and Electro-Optic Systems) Conference which was held in Skukuza, South Africa from 6 to 9 September 2009. The aim of SMEOS 2009 was to establish a forum for academia, research institutions and industry working in the field of sensors, MEMS and electro-optical systems, to share their relevant research and development ideas. Each paper presented at the conference was double-blind reviewed by at least two reviewers. Reviewers could recommend a reviewed paper to the technical chair for publication in this special issue, and a total of eight papers eventually passed this review process.

Four of the papers discuss the integration of additional functionality into existing CMOS processing. One paper addresses the issue of integrating MEMS devices onto a chip, and the other three investigate optical devices in the CMOS technology.

In the paper by Walton et al, "*Silicon$^+$ - Post processing CMOS wafers to create integrated sensors, MEMS and electro-optic systems*", the trend in recent years for many CMOS companies to diversify into new device types and associated novel application areas, is discussed. This paper examines many of the issues associated with integrating CMOS foundry and custom IC wafers with both new materials and technologies such as MEMS sensors and actuators.

The paper by Bogalecki and du Plessis, "*Design and manufacture of quantum-confined Si light sources*", investigates the characteristics of quantum confined nanometre-scale SOI light sources in silicon technology. The realisation of effective light sources in silicon has been described as the "holy grail" of the silicon technology, and some advances towards this goal are described. The paper by Ellinghaus et al, "*A fully CMOS optical transmission system based on light emitting avalanche diodes*", illustrates the practical feasibility of a fully CMOS optical link, where an array of CMOS avalanche light emitting diodes is modulated with frequencies of up to 100MHz. Venter and du Plessis in their paper "*Feasibility of optical clock distribution for future CMOS technology nodes*" discuss the limitations on future CMOS scaling, which lie in the development of adequate interconnects to support the increase in logic density. This work aims to take the International Technology Roadmap for Semiconductors (ITRS) requirements for future technology nodes, to investigate the feasibility of optical clock networks as CMOS device dimensions decrease.

Two papers investigate optical detector materials. Odendaal et al in "*Surface passivation applicable to InAsSb/GaSb photodiodes for infrared detection*" investigate the influence of various anodisation solutions on the surface passivation of InAsSb/GaSb photodiodes for infrared detection, while Talla et al in "*ZnO grown by Metal Organic Chemical Vapor Deposition: Effect of substrate on optical and structural properties*", compare the influence of various substrates on the optical, structural and morphological properties of MOCVD deposited ZnO thin films in the UV and visible spectral range.

Two papers describe MEMS applications. In the first, "*Characterisation of adaptive fluidic silicone-membrane lenses*", Schneider et al present an alternative novel low cost adaptive fluidic silicone-membrane lens with an integrated piezo-actuator to alleviate the problem of laborious and costly exact mechanical positioning in autofocus systems based on the distance variation in lens systems. The paper "*3D ultra-fast manufactured micro coils on polymer or metal cores*" by Wallrabe et al presents high aspect ratio 3D solenoidal microcoils manufactured in a serial but ultra-fast and fully MEMS compatible winding procedure, using an automatic wirebonder. The applications of these coils include semi-integrated inductors for electronics, energy harvesting purposes, sensors and actuators.

Prof. Monuko du Plessis
Guest Editor