Options for integrating MEMS based technologies with CMOS integrated circuits

Scottish Microelectronics Centre
Institute for Integrated Systems (ERPem)

Institute for Integrated Micro and Nano Systems
School of Engineering, The King's Buildings
University of Edinburgh, Edinburgh
EH9 3JF

Silicon based integrated circuit technology has shown astonishing progress scaling to ever smaller geometries as the industry follows Moore's predictions. However, to stay at the leading edge of silicon IC technology requires very significant investments which all but the largest companies are struggling to afford. As a consequence many have decided to go "fabless" and use foundry technology. The fabless option also provides the opportunity for technology based companies to use their cleanrooms to add extra functionality to products by post-processing extra layers/new materials to create innovative products and address new application areas.

All of these diverse post-processing technologies have one particular feature in common, namely they all use silicon (usually CMOS) as a platform for system integration with the added value being the innovation associated with post-processing and/or technology integration, which in many cases is realised on standard foundry technology. The talk will discuss the issues associated with integrating foundry and custom foundry IC wafers with both new materials and technologies such as MEMS based sensors and actuators. In particular this presentation examines the practical aspects that need to be considered when integrating CMOS and MEMS type technologies. Finally, examples of successful applications of this approach in both photonics and other application areas will be presented.

Prof Anthony J. Walton

Anthony J. Walton is professor of Microelectronic Manufacturing in the School of Engineering at the University of Edinburgh. Over the past 25 years he has been actively involved with the semiconductor industry in a number of areas associated with silicon processing which includes both IC technology and micro-systems. In particular he has been intimately involved with the development of technologies and their integration with CMOS. He played a key role in setting up the Scottish Microelectronics Centre (SMC) which is a purpose built facility for R&D and commercialisation.

He has published over 300 papers and has won the best paper awards for the IEEE Transactions on Semiconductor Manufacturing, Proc ISHM, IEEE ICMTS 2004) as well as an IET Nanobiotechnology 2007 IET Premium Paper Award. He has served as the chairman for a number of conferences which include the European Solid-State Devices Research Conference (ESSDERC/CIRC 1994 and 2008) and the IEEE International Conference on Microelectronic Test Structures (ICMTS 1989 and 2008). He also serves on numerous technical committees and is an associate editor of the IEEE Transactions on Semiconductor Manufacturing and the Journal of Nanoengineering and Nanosystems.