SEMINAIRE EXCEPTIONNEL

(de 13 h à 14 h, salle Belledonne, IMEP-LAHC, MINATEC,
ouvert à tous : enseignants, étudiants, chercheurs, administratifs, techniciens)

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"Mobility Spectrum Analysis of Carrier Transport at Insulator/Semiconductor Interfaces"

by Lorenzo Faraone,
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Abstract: Modern semiconductor MIS and hetero-structures can contain multiple populations of distinct carrier species which can be either intentional or unintentional. Accurate characterisation of electronic transport properties in such structures demands a more sophisticated methodology than the conventional analysis of Hall-effect measurements at a single value of magnetic field intensity. This difficulty can be overcome by undertaking variable magnetic field Hall measurements combined with mobility spectrum analysis (MSA), as originally proposed by Beck and Anderson in 1988. Over the last two decades, numerous research groups have developed sophisticated algorithms built upon the original MSA framework, among which can be found the comercially-available quantitative mobility spectrum analysis (QMSA), various implementations of maximum-entropy MSA, and the recently developed high-resolution MSA procedure (HR-MSA).

In this presentation, results will be presented of MSA based studies of electronic transport in various HEMT and MIS structures, including recent progress in the modelling of mobility distributions and carrier scattering in two-dimensional electron gases in AlGaN/GaN HEMTs. It is shown that the HR-MSA approach can provide unique information that enables optimisation of the epitaxial growth process, since it allows identification of parasitic conduction channels. Furthermore, since HR-MSA is able to provide information on mobility *distributions* for each individual carrier, it is capable of providing greater insight into the fundamental scattering mechanism and electronic transport phenomena in two-dimensional inversion and accumulation layers. The presentation will also include some preliminary HR-MSA results on carrier transport in SiC and InGaAs MOSFET devices.

Professor Faraone *has published more than 200 international journal papers on his research work and supervised more than 30 PhD student completions. He is currently Head of the Microelectronics Research Group (MRG) at The University of Western Australia (UWA) and Director of the WA Centre for Semiconductor Optoelectronics and Microsystems (WACSOM). Prior to joining UWA in 1987, he worked primarily in the area of CMOS-based microelectronics and non-volatile memory technology with RCA Labs in Princeton, NJ, USA. Since joining UWA he has worked on compound semiconductor materials and devices, including AlGaN/GaN HEMTs, HgCdTe-based infrared sensor technology and MBE growth, as well as MEMS technologies for infrared applications. Professor Faraone is a Member of the Order of Australia (AM), and a Fellow of both the Australian Academy of Science (FAA) and the Australian Academy of Technological Sciences and Engineering (FTSE).*

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