Title: Nanoscaled Devices & Materials: Application in Label-Free Biosensors

Biography:

Khairuddin is an Associate Professor at the Faculty of Electronics Engineering Technology and also the Director, Centre for Graduate Studies, Universiti Malaysia Perlis (UniMAP). He received Doctor of Engineering Science from the Université Catholique de Louvain (UCL), Louvain-la-Neuve, Belgium in 2013. Prior to joining UniMAP in 2005, he had worked at Hewlett-Packard then Agilent Technologies (M) Sdn. Bhd, Penang, where he was the Product Engineer for the Motion Control Department, manufacturing various printers' sensors. Later, he joined ON Semiconductor (M) Sdn. Bhd, Senawang, Malaysia, where he was involved in the development of Under-Bump-Metallurgy (UBM) for Flip-Chip Packaging, After that, for his doctorate study, he was involved in the characterization of silicon-on-insulator (SOI) ultra-thin body and thin buried oxide (UTBB) for advanced low power mobile transistor application. His current research is related to Field-Effect device technology and biosensors. With his experience in semiconductor packaging, fabrication process, and device technology, gained at industry and academic, he has received various national and two Royal Society – Newton Ungku Omar mobility and PHC-Hibiscus grants. He is one of the founding members and currently Past-Chair/Advisor for IEEE Malaysia Section Sensors & Nanotechnology Joint Councils Chapter. He is also a Professional Engineer and serves as the Engineering Accreditation panel for the Board of Engineer Malaysia (BEM) and Malaysian Qualifications Agency (MQA).

Abstract

Field-Effect-Transistor (FET) is a leading technology for successful today's electronic gadgets since the birth of the first transistor more than 70 years ago. Today, the application of FET is more diversified, inclusive in biosensor applications i.e. the ability to convert biomolecules interaction into a measurable electrical signal. Compatible with existing silicon technologies, higher sensitivity, higher surface-to-volume (integration with 0D, 1D and 2D materials), label-free, ambipolar conduction, and ease of modification of its intrinsic properties are the exceptional characteristics of biosensors-based FET.. In this presentation, the chronological aspect of device scaling from the conventional scaling approach to the fully-depletion concept, which emerges from the beauty of thin-body silicon-on-insulator technology. Finally, the application of biosensors-based FET with advantages and strategies for enhancement, particularly integration with nano-scale materials and substrate-gated, which increase the surface-to-volume and better control of charge conduction is demonstrated.