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### Scaling-up of nanotechnology-based sensors

The point-of-care diagnostics market is expected to reach US\$37 billion by 2021 globally. This has led to much research interest and effort in the development of nano biosensors as point-of-care diagnostics for the detection and monitoring of diseases. Nanobiosensors offer many advantages, such as ultra-high sensitivity, excellent specificity, rapid response time and they require minimal volume of sample for detection, due to the use of nanoscale electronic materials as their sensing elements. However, the commercialisation of nanobiosensors has been impeded by its high production cost as many of these devices are fabricated using expensive facilities and complex processes. Therefore, the ability to scale-up the production of nano biosensors at very low-cost is commercially attractive as it would bring the technology to the mass-market.

In this talk, the novel use of flexographic printing technique in the fabrication of nanobiosensors will be presented. The technique enables high-speed direct-patterning of nano materials onto a surface and is ideal for volume production of nanobiosensors at very low cost due to the roll-to-roll printing technique.<sup>1</sup> Furthermore, the technique allows the use of organic substrates, which would significantly reduce the cost of these devices. We have demonstrated the fabrication of ZnO nanowire chemiresistive gas sensor and Au nanoparticle electrochemical biosensor using the printing technique.<sup>2-4</sup> More recently, we have demonstrated the production of nano biosensors, consisting of intricate nano textured surface on flexographic printed ZnO thin films, which is ideal for large scale screening of diseases at very low cost with excellent sensitivity.

### Biography

Dr Kar Seng (Vincent) Teng is an Associate Professor and leads the Nanoelectronics Research Group in the College of Engineering at Swansea University (United Kingdom). He received his PhD in Electrical and Electronic Engineering from Swansea University, and has extensive research experiences in the study of nanoscale electronic materials and devices. This involves the application of nanotechnology in electronics, which has major impact in healthcare, computer, photonic and energy technologies. His group has the expertise in the fabrication and characterisation of nanoscale electronic materials and devices, as well as controlling their properties through surface engineering for novel applications. His funded research includes the investigation of low-dimensional electronic materials, such as graphene, metal-oxide and nitride nanostructures etc., for the development of ultra-sensitive nanobiosensors for the early detection of diseases using printing technology. He serves as an Associate Editor for RSC Advances

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