

Seminar title:

**Microchip Technology enabling Rapid Diagnostics for Infectious Diseases -  
From AMR to COVID-19**

Seminar abstract:

In the last decade, we have seen a convergence of microelectronics into the world of healthcare providing novel solutions for early detection, diagnosis and therapy of disease. This has been made possible due to the emergence of CMOS technology, allowing fabrication of advanced systems with complete integration of sensors, instrumentation and processing, enabling design of miniaturised medical devices which operate with low-power. This has been specifically beneficial for the application areas of DNA based diagnostics and full genome sequencing, where the implementation of chemical sensors known as Ion-Sensitive Field Effect Transistors (ISFETs) directly in CMOS has enabled the design of large-scale arrays of millions of sensors that can conduct in-parallel detection of nucleic acids. Furthermore, the scaling of CMOS with Moore's law and the integration capability with microfluidics has enabled the creation of hand-held and portable rapid diagnostic systems for infectious diseases.

In this talk, I present how my lab is advancing the areas of DNA and RNA detection for rapid diagnostics of infectious diseases and Antimicrobial Resistance (AMR) through the design of CMOS based Lab-on-Chip systems using ISFETs. I will showcase Lacewing, our latest handheld diagnostic system which is able to rapidly identify bacterial and viral infections in under 30 minutes, communicating results in real-time to the cloud for epidemiological surveillance. Results from our latest trials for detection of Malaria and bacterial resistant infections will be shown in addition to our most recent efforts in tackling the COVID-19 outbreak.