Seminar "Organic Semiconductor Optoelectronics: Emerging Applications in Medicine and Communications", Prof. I.D.W. Samuel

Date: Friday, March 10, 2023 - 14:00 to 15:00
Location: Seminar Room L4F01, Lab 4

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Talk title: Organic Semiconductor Optoelectronics: Emerging Applications in Medicine and Communications

Abstract:
Organic semiconductors are a remarkable class of materials because they combine novel semiconducting optoelectronic properties with simple fabrication and the scope for tuning properties by changing their chemical structure. Their properties are very different from, and complementary to, their inorganic counterparts. For example they can be deposited from solution to make working electronic and optoelectronic devices. Advances in materials have enabled a wide range of advances in devices, and in the domain of optoelectronics, organic light-emitting diodes (OLEDs), solar cells and (optically pumped) lasers have been demonstrated. These advances, in turn, open exciting new directions for applications going beyond displays, lighting and photovoltaics.

In this talk I will present two emerging fields of application. One is in medicine where wearable light sources can be used for the treatment of many skin cancers. This occurs by photodynamic therapy in which the combination of light, a drug and oxygen leads to the generation of reactive oxygen species. I will also present recent results showing that OLED PDT can be effective in killing bacteria. The other emerging field of application I will describe is visible light communication in which optical communication is used to

supplement Wi-Fi – sometimes called “Li-Fi”. Organic semiconductors have many potential uses in both transmitters and receivers. In particular, we have explored how fast an OLED can be for data transmission.