



**Wolfson Department of Chemical Engineering Seminar
Lecture Hall 6, Wolfson Department of Chemical Engineering,
Wednesday, March 11th, 2020 at 13:30**

Advanced Electronic Sensing Platforms with Skin-Like Capabilities

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Over millions of years, the mammalian skin has been evolving in order to create the most durable and sensitive sensing platform. Big efforts have been invested in the development of artificial electronic materials/platforms with skin-like capabilities because of their potential application in soft robotics, human-machine interfaces, and healthcare. My PhD work started from the development of a biomimetic high-performance field-effect transistor (an essential element in most of the modern electronics) that combines multiple "natural" properties including softness, stretchability, and self-healing ability. The device was applicable in the form of an ultrathin skin tattoo for temperature and humidity monitoring. Afterwards, I focused on the development of advanced electronic skins. Many important features were integrated into the design including selective sensing, water insensitivity, and self-monitoring. Simultaneous and selective detection of multiple signals such as pressure, temperature, and chemical compounds was introduced. The water insensitivity was obtained by designing a new highly hydrophobic self-healing elastomer that has stable properties in many different aqueous conditions such as varying pH values, salt concentrations and more. Finally, we designed a new on-demand self-repair system which is inspired by wound healing in our body. This system consists of neuron-like components for damage detection/localization and repairing components for accelerated damage recovery in designated areas. The self-repair mechanism enables electronic systems to monitor their functionality/integrity and to intervene in case of any damage-related malfunction. My PhD work opens a new window of design strategies of smart skin-like wearable electronics and electronic skins for future robotics and prosthetics.

Refreshments will be served at 13:15