PhD Seminar Departmental Seminar

Title: Employing Self-Assembled Monolayers and Electrochemical Transducers Towards Biosensor Development

Abstract:

Portable analytical methods have attracted a lot of attention as they can be applied easily on-site, such as the iconic at home pregnancy tests commercially available at most pharmacies. From a healthcare perspective the SARS-CoV-2 pandemic has highlighted how critical it is for rapid and accessible testing to help mitigate the spread of a contagious and potentially deadly virus. On the ecology side, portable analysis is also needed for environmental applications, such as monitoring harmful contaminants in water sources. Electrochemical sensors have gained lots of interest partly due to the success of glucose sensors. However, adapting electrochemical sensors to biological detections has many challenges and the development has many technical requirements, such as sensitivity, selectivity and stability of the sensors.

A biosensor contains three key parts, a biorecognition element (BRE), a sensor chip, and a linker molecule which connects the first two parts. While sensitivity of the detection is important, it is also essential to accommodate additional requirements such as selectivity and robustness of designs.

The work presented will focus on the design of biosensors utilizing gold sensor chips. Different mechanisms for adhesion of the linking molecule to the gold sensor chip in addition to different linking molecules bound to toll-like receptor BREs are employed for broad spectrum whole-cell pathogen detection. Sensor storage methodologies are employed extending the sensor shelf life. [1, 2] The results demonstrate versatility in chip and linker molecule design for the successful detection of whole cell bacteria.

1. McLeod, J.; Park, C.; Cunningham, A.; O'Donnell, L.; Brown, R. S.; Kelly, F.; She, Z., *Analyst* **2020,** *145* (18), 6024-6031.

2. Singh, I.; Lee, D. S.; Huang, S.; Bhattacharjee, H.; Xu, W.; McLeod, J. F.; Crudden, C. M.; She, Z., *Chem Commun* **2021,** *57* (68), 8421-8424.