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Location: Atrium AT101



Optical Nanosensors and Machine Learning for Biosensing and Diagnostics

Abstract:

Surface-enhanced Raman scattering (SERS)-based plasmonic sensors and machine learning models have emerged as potential analytical tools for sensing and diagnostics. Our group develops demand-driven plasmonic substrates spanning colloidal, 2D, and 3D SERS nanosensors that can harvest light-matter interactions in the form of localised surface plasmon resonance (LSPR) hotspots and cavity modes. Tuning the surface chemistry of the sensor opens up avenues for label-based and label-free sensing of biomolecules and cell physiology with high sensitivity and selectivity. This has implications in clinical medicine, especially for disease diagnostics and antimicrobial resistance profiling. In this seminar, we will discuss our efforts to exploit low-cost colloidal nanoparticles and surface chemistry to develop SERS immunoassays and advanced curved biosensors. We will also highlight the utility of such sensors along with machine learning to probe immune response following viral infections and biomolecules related to bacterial response to stress and biofilm infections.

Bio:

Dr. Malama Chisanga is an Assistant Professor and group leader for the Nanoplasmonics and Analytical Measurements Lab (NAML) in the Department of Chemistry at Dalhousie University. Dr. Chisanga completed a 1st class MSc (2014) and a PhD (2020) in Analytical Chemistry with Prof. Roy Goodacre at the University of Manchester (UK). Before joining Dalhousie University, he worked as an honorary research associate at the University of Liverpool (UK), followed by a postdoctoral fellowship with Prof. Jean-Francois Masson at the University of Montreal. Research in Dr. Chisanga's group is interdisciplinary, combining plasmonics, spectroscopy, surface chemistry, and machine learning, aimed at addressing challenges in sensing, disease diagnostics, therapeutic monitoring, and environmental monitoring. His research has been recognised with awards, including the Commonwealth Scholar fellowship award (UK), the Society for Applied Spectroscopy Early-career travel awards, and the Royal Society of Chemistry's Analytical Trust fund for early investigators. His research has been profiled in the Analyst Editor's choice for the most exciting research (2020), and he was invited to present his work to the British Commissioners and Parliamentarians at the Royal Society (UK).