***Dr. Buddini I. Karawdeniya** completed her undergraduate work from Institute of Chemistry Ceylon and University of Colombo in 2011. She was with the Institute of Chemistry Ceylon as a Teaching Assistant until 2012. Buddini earned her PhD in chemistry in 2018 from the University of Rhode Island. She joined School of Engineering in the Southern Methodist University, USA in 2018 as a Postdoctoral Fellow. Buddini joined the Research School of Physics of Australian National University, 'Our Health in Our Hands' (OHIOH) Grand Challenge as a Research Fellow in 2020 and currently leads the sensor developments efforts of OHIOH Physics and is the Program Coordinator who manages the collaborations of the OHIOH Sensors team. Her research interests include solid-state nanopore sensors, surface functionalization strategies, meta-optical systems and Raman spectroscopy.*

Theme Seminar

A nanoscale aperture with molecular-level fingerprinting prospects

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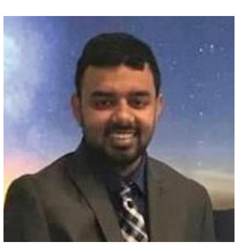
A nanopore is a nanoscale aperture in an otherwise impervious membrane (solid state or biological) that functions as the sole fluidic pathway between two electrolyte reservoirs. The application of a suitable voltage bias to one of the reservoirs drives the target analyte through the nanopore predominantly through electrophoresis, electroosmosis, or diffusion perturbing the ionic current flow and generating resistive (or conductive in some instances) pulses stamping analyte-specific information. Molecules/particles are probed one at a time—single molecule sensing—with added benefits such as low-cost overhead, ostensibly simple operation, high throughput, and real-time analytics. In this talk, a broad scope pertaining to nanopore sensing would be discussed including single molecule translocations, fabrication of pores (*e.g.* conventional and chemically-tuned controlled breakdown), modification of their interior (*e.g.* photo hydrosilylation), characterization of pores (*e.g.* noise) and nanoscale transport phenomena (*e.g.* electrophoresis vs electroosmosis). A host of biological, biomedical, and pharmaceutically relevant molecules and/or particles such as, DNA, proteins, glycans, viruses, and liposomes have been investigated using this sensor class. Applications such as sequencing (more relevant to biological nanopores), benchmarking, quality control (contaminated vs acceptable samples), payload and maturity estimation of viruses, and folding-unfolding characteristics of proteins under an electric field have gained substantial traction over the last two decades. Nanopipettes, fundamentally similar to planar nanopores, have also gained tremendous attention over the last decade and are fabricated by laser-pulling glass/quartz capillaries. This leads to a tapered nanopore that has 3D axial freedom in movement (not stationary like their planar counterparts) which is advantageous to probing biological systems. A host of applications such as sensing in ultra-low electrolyte conditions (*i.e.* 10 mM KCl), development of methods for high bandwidth sensing, and investigation of directional dependency on the transport characteristics would be discussed in addition to unique signatures arising with DNA translocating through nanopipettes.



***Dr Nuwan Bandara** stepped into the IChemC premises back in 2006, joining the 28th Batch as student. He graduated with a first class in 2011 upon completion of the GIC program at College of Chemical Sciences, Institute of Chemistry Ceylon. Simultaneously reading for a degree in the University of Colombo, he graduated with a Bachelors in Science in 2011. He served as a Teaching Assistant of College of Chemical Sciences, Institute of Chemistry Ceylon for a year, before gaining admission to the University of Rhode Island in 2012 to continue with his postgraduate studies. He obtained his PhD in chemistry from the University of Rhode Island in 2018. He has held two postdoctoral positions in the United States as a visiting scholar, and one postdoctoral position in Australia. His main interest in research is based on single molecule sensing. He is the author/co-author of 2 patents, 2 book chapters, 1 instrument chapter, 1 career article, and 30 peer-reviewed journal articles.*