



BiophysTO Lunchtime Seminar Series

Date

Thursday, Feb 25, 2021
12:00 – 1:00 pm

Location

Virtual via zoom

Dr. Ruby Sullan

Department of Physical & Environmental Sciences,
University of Toronto Scarborough &
Department of Chemistry, University of Toronto

Breaking through the barriers: a multi-pronged strategy towards targeting bacteria

Engineering a new class of materials that inhibit bacterial fouling necessitates an understanding of the molecular mechanisms bacteria deploy to sense, respond and adhere to surfaces. The first part of my talk will focus on our recent exciting discovery that bacteria, akin to mammalian cells, continue to feel the surface long after initial attachment. Here, we show via atomic force microscopy (AFM)-based nanomechanical imaging, that *E. coli* cells adjust the mechanical stiffness of their outer membrane in response to substrate stiffness. The observed envelope stiffening persists independent of whether flagella or type 1 fimbriae were expressed, while these appendages play distinct roles in mediating stiffness-dependent attachment. Concurrent with our mechanistic approach in understanding bacteria-surface interaction, is nanomaterial-based therapeutic (nanotherapeutic) development targeted against bacterial pathogens and biofilms. By combining the intrinsic photothermal activity of a bioinspired nanoparticle, along with the bacterial targeting and membrane lytic action of an antimicrobial peptide, we have demonstrated that the resulting nanotherapeutic is more effective in killing a drug-resistant bacteria. With the recalcitrance of bacterial biofilms to common antimicrobials and host defenses, it is imperative to investigate alternative routes and strategies to mitigate biofilm-related problems. Lastly, I will highlight the quantitative platform we developed that can measure the nanomechanics of biofilms.

Zoom Link

<https://utoronto.zoom.us/j/82622130777>

Host: Dr. Walid A. Houry



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