



BiophysTO Lunchtime Seminar Series

Date

Thursday, May 18th 2023
12:00 – 1:00 pm

Michael P. Zwolak

National Institute of Standards and Technology
(NIST)

LOCATION:

Virtual (Zoom)

Host: Wilson Zeng

Beyond the permeation-selectivity trade-off: Simultaneous optimization of discordant processes to achieve biomolecular function

The permeation-selectivity trade-off is a long-standing barrier to optimizing membranes for filtration across many applications, such as desalination and gas separations. Biological channels, however, can have rapid permeation and high selectivity simultaneously. Here, we show, in both biological and synthetic pores in the context of ion transport, that this behavior can be understood by examining the landscape for permeation—a functional landscape—versus straightforward collect variables (e.g., pore radius, length, partial charge, among others). The optimization of discordant functions in this space can be generalized and distilled down to a single principle: The extremization of singular characteristics, e.g., permeation rates, occurs at distinct locations in phase space for different species. The polarization of the functional landscape gives rise to a “trade-off free” region, yielding both the direction for and scope of reconciliation. This simple principle will help make headway into understanding and classifying functional behavior within a range of synthetic and biological systems.

Zoom Link: <https://utoronto.zoom.us/j/86316195157>



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