

Neutron reflectometry of peripheral membrane proteins on biomimetic membranes: capabilities and examples

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Neutron scattering is a powerful, versatile tool for materials characterization. Neutrons are a particularly good probe for the light elements that compose biological materials, enabling detailed structural characterization over length scales from 1 to 1000 nm. Because neutrons interact with nuclei rather than the electronic structure of materials, neutron scattering is highly complementary to other structural techniques. Individual material components can often be distinguished using isotopic substitution, which can be as simple as exchanging heavy for light water. In this talk, I will give a broad overview of the biological neutron reflectometry capabilities and research activities at the NIST Center for Neutron Research. I will focus on the use of neutron reflectometry to characterize interactions of peripheral membrane proteins with, and their effects on, biomimetic lipid bilayers. I will chronicle recent progress in creating novel architectures for surface immobilization of membrane proteins and highlight the complementarity between neutron reflectometry and other biophysical methods. Finally, I will introduce the new CANDOR reflectometer at NCNR as a transformative development for high-speed neutron reflectometry of membrane proteins.