

CBIMMS Invited Seminar

"Neutron and X-Ray Scattering Studies of Biomimetic Ultrathin Films: Cholera Toxin Assault on Model Lipid Membranes"

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ABSTRACT

The key information required to unravel the nature of complex interactions in soft matter is the structure-property relationship. In particular, since many biomaterials are inherently surface active and are thus confined to interfaces between aqueous and non-aqueous regions, the structure of these materials at the air/liquid or solid/liquid interface can be relevant to understanding their *in-vivo* function.

For example, in nature, membranes perform several functions of the living cell from selective transport and recognition, to simple sequestration. They are also primary targets of toxin assaults on living organisms. Despite of big progress in understanding the bio-chemical side of the process very little is known about the structural part of the toxins interactions with the lipid membranes. Using powerful new neutron and x-ray sources, the techniques of reflectivity and synchrotron grazing incidence diffraction permit us to obtain structural information on model lipid membrane in an aqueous environment and understand their interactions with toxins.

In particular, we will explore the structure due to interactions between lipid monolayers and cholera toxins at air/liquid interface. Cholera toxin is a hexameric AB_5 molecule. It binds to the membrane through the B_5 units and releases the A fragment which penetrates through the membrane and activates influx of sodium and water into the gut lumen. Using surface sensitive scattering methods we were able to follow the process of cholera toxin attack on a model single lipid membrane. In-plane and out-of-plane 2-D packing of B_5 and AB_5 cholera toxins molecules and the structure of the lipid layer were investigated. We believe that our structural studies will contribute to a better understanding of microbial toxins in general.