

Messiah College
Department of Chemistry and Biochemistry
Seminar

**Speaker: Dr Shelli Frey, Assistant Professor of Chemistry at
Gettysburg College**

Friday, October 9 ~ 4:30 PM
Refreshments at 4:15
Parmer Cinema

“Structure and Dynamics in Model Cell Membranes”

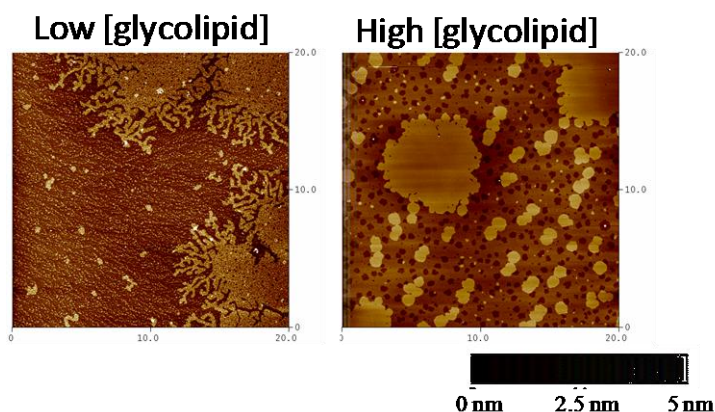


Professor Frey will talk about research she and her students have done on models of cell membranes and on the use of nanoparticles to carry therapeutic agents. You are invited to attend this seminar in this important area of research.

Abstract

The cell membrane is a selectively permeable structure that separates a cell's interior from its surroundings. This structure serves many purposes; functioning as a filter to control the flow of material into and out of the cell, acting as a barrier to pathogens, and serving as a site of recognition by containing transmembrane proteins that trigger biochemical events within cells. The membrane is composed of a phospholipid bilayer embedded with proteins which can function as receptors or channels across the membrane. There is growing evidence that the cell membrane is not uniform, but instead has regions of closely packed material termed lipid "rafts" which are enriched in sphingolipids, glycolipids, and cholesterol. These ordered domains have been implicated in numerous biological processes including signal transduction and sequestration of proteins. Research in my lab focuses on lipid monolayers as a model of the outer leaflet of the cell membrane. Monolayers can be used to study basic intermolecular physical and chemical interactions between the phospholipids contained in the layer, as well as the effects of relevant biomolecules introduced to the aqueous subphase.

Work done with phospholipid:glycolipid mixtures suggests that the two molecules, both fluid on their own, condense each other upon mixing through the formation of a condensed geometrically packed complex. To expand on these results, geometry of phospholipids and glycolipids has been explored as a potential molecular factor that drives certain lipid molecules to cooperate and coalesce into biologically active rafts. Another project focuses on biological nanoscale carrier systems, such as nanoparticles with different surface functionalization, that are potential means for targeted delivery of therapeutic material in the human body. Effects of exposure to nanoparticles on membrane structure and stability have been examined to correlate nanocarrier characteristics with their specific biomembrane interactions.



Atomic force microscopy topographic images of a mixed lipid:glycolipid monolayer deposited on a mica substrate.