Materials Seminar

Professor John Conboy

University of Utah
Department of Chemistry

"Nonlinear vibrational spectroscopy for the analysis of biological membranes (How scientific contributions from the past shape the present"

A central issue in molecular biology is the movement of lipids across the cellular membrane. The translocation of lipids is involved in cell apoptosis, the viral infection of living cells, the functioning of antibiotics, antiseptics and drugs, and the regulation and growth of cells. There have been a number of studies attempting to find the putative proteins responsive for lipid transbilayer movement in eukaryotic cells. This has led to a large number of theories about the mechanism of transbilayer movement of lipids in cellular systems. Several groups have conjectured that protein mediated process are the main mechanism by which transbilayer migration of lipid occurs. The possibility also exists that the translocation of glycerophospholipids lipids in membranes is not governed completely by active protein transport, but rather by membrane defects, or heterogeneities which can be induced by cholesterol, other lipids, fatty acids, and proteins which perturbed the otherwise uniform landscape of a pure lipid bilayer. Using methods of classical surface chemistry coupled with nonlinear optical methods, we have developed a novel analytical approach, using a sum-frequency vibrational spectroscopy (SFVS), to selectively probe lipid compositional asymmetry in a planar supported lipid bilayer. This new method allows for the detection of lipid flip-flop without the need for a fluorescent or spin-labeled lipid to observe the translocation of lipid species. We have successfully used planar supported lipid bilayers as models for studying the transbilayer movement of lipids and exploring the effect of lipid composition, headgroup and fatty acid chemical structure, on the rate and thermodynamics of lipid transbilayer migration.

Thursday
October 25

12:15 p.m.
1315 Chemistry

Coffee & cookies
at 12 p.m.

Host: Prof. Bob Hamers

DEPARTMENT OF
Chemistry
UNIVERSITY OF WISCONSIN-MADISON