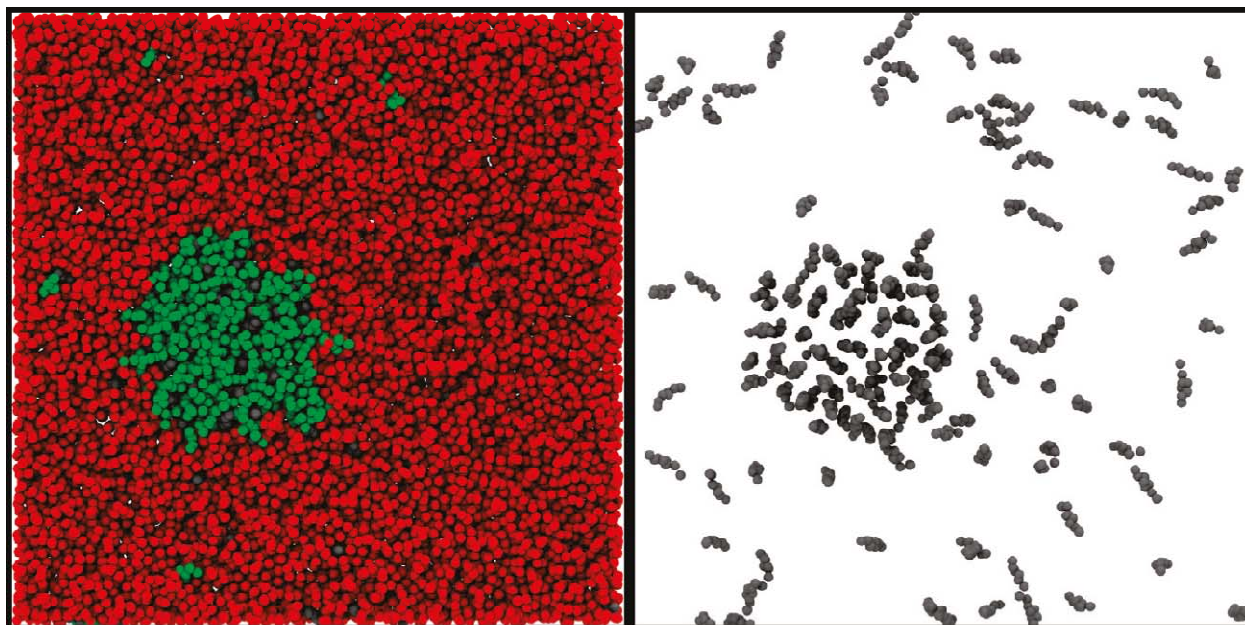


The newly established Neutron Based Biomembranes Initiative (NBBI) at Oak Ridge National Laboratory (ORNL) will be comprised of three major thrusts, namely: 1) the elucidation of the structure and function of biological membranes through the use of biologically relevant membrane systems (e.g. model and real), and the unique capabilities offered by thermal and cold neutrons (e.g. contrast variation); 2) the development and fabrication of systems with utility to the pharmaceutical and medical industries (e.g. liposomal based targeted drug delivery and imaging); 3) the development of novel neutron scattering techniques (e.g. neutron holography, refinement of lipid areas), samples and sample environments, especially those that will exploit the capabilities of the Spallation Neutron Source (SNS). The seminar will provide an overview of the proposed projects within each of the three major thrusts.



Snapshots (top view) of an MD simulation of a DAPC bilayer doped with 10 mol% DMPC and 10 mol% cholesterol (the simulation system is comprised of 1520 lipid and cholesterol molecules in total). DAPC molecules are shown in red, DMPC in green, and cholesterol in gray; water molecules are not shown. Left: A DMPC-rich domain (green) in a DAPC bilayer (red). Right: Cholesterol molecules only. It is evident that a considerable amount of cholesterol resides outside the DMPC-rich domain. Importantly, cholesterol molecules in the PUFA-rich domain are laying flat in the bilayer center, whereas those in the DMPC-rich domain adopt, almost exclusively, the upright orientation. In neither orientation is distinct clustering (i.e., dimers or trimers) of cholesterol molecules observed [Kučerka et al., *Biochemistry* **49**, 7485 - 7493 (2010)].