MAR16-2015-007665

Abstract for an Invited Paper
for the MAR16 Meeting of
the American Physical Society

Pushing the lipid envelope: using bio-inspired nanocomposites to understand and exploit lipid membrane limitations

GABRIEL MONTANO, Los Alamos National Laboratory

Lipids serve as the organizing matrix material for biological membranes, the site of interaction of cells with the external environment. . As such, lipids play a critical role in structure/function relationships of an extraordinary number of critical biological processes. In this talk, we will look at bio-inspired membrane assemblies to better understand the roles of lipids in biological systems as well as attempt to generate materials that can mimic and potentially advance upon biological membrane processes. First, we will investigate the response of lipids to adverse conditions. In particular, I will present data that demonstrates the response of lipids to harsh conditions and how such responses can be exploited to generate nanocomposite rearrangements. I will also show the effect of adding the endotoxin lipopolysaccharide (LPS) to lipid bilayer assemblies and describe implications on our understanding of LPS organization in biological systems as well as describe induced lipid modifications that can be exploited to organize membrane composites with precise, two-dimensional geometric control. Lastly, I will describe the use of amphiphilic block copolymers to create membrane nanocomposites capable of mimicking biological systems. In particular, I will describe the use of our polymer-based membranes in creating artificial photosynthetic assemblies that rival biological systems in function in a more flexible, dynamic matrix.