Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Hybrid films with phase-separated domains: A new class of functional materials[1] MINJEE KANG, CECILIA LEAL, Univ of Illinois - Urbana — The cell membrane is highly compartmentalized over micro-and nano scale. The compartmentalized domains play an important role in regulating the diffusion and distribution of species within and across the membrane. In this work, we introduced nanoscale heterogeneities into lipid films for the purpose of developing nature-mimicking phase-separated materials. The mixtures of phospholipids and amphiphilic block copolymers self-assemble into supported 1D multi-bilayers. We observed that in each lamella, mixtures of lipid and polymer phase-separate into domains that differ in their composition akin to sub-phases in cholesterol-containing lipid bilayers. Interestingly, we found evidence that like-domains are in registry across multilayers, making phase separation three-dimensional. To exploit such distinctive domain structure for surface-mediated drug delivery, we incorporated pharmaceutical molecules into the films. The drug release study revealed that the presence of domains in hybrid films modifies the diffusion pathways of drugs that become confined within phase-separated domains. A comprehensive domain structure coupled with drug diffusion pathways in films will be presented, offering new perspectives in designing a thin-film matrix system for controlled drug delivery.

[1]This work was supported by the National Science Foundation under grant no. DMR-1554435.

Minjee Kang
Univ of Illinois - Urbana

Date submitted: 10 Nov 2016 Electronic form version 1.4