Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Sorting Category: 04.1.10 (E)

Growth Mechanism of Lipid-Based Nanodiscs – a Model Membrane for Studying Kinetics of Particle Coalescence[1] ANDREW HU, University of Connecticut, Mechanical Engineering , MU-PING NIEH, University of Connecticut, Institute of Materials Science, Chemical Materials & Biomolecular Engineering, ANTHONY DIZON, University of Connecticut, Chemical Materials & Biomolecular Engineering, MING LI, University of Connecticut, Institute of Materials Science, TAI-HSI FAN, University of Connecticut, Mechanical Engineering — Lipid-based nanodiscs composed of long- and short- chain lipids [namely, dimyristoyl phosphatidylcholine (DMPC), dimyristoyl phosphatidylglycerol (DMPG) and dihexanoyl phosphatidylcholine (DHPC)] constantly form at high lipid concentrations and at low temperatures (i.e., below the melting transition temperature of DMPC, T_M). The initial size of these nanodiscs (at high total lipid concentration, $C_L > 20$ wt.%) is relatively uniform and of similar dimension (according to dynamic light scattering and small angle neutron scattering experiments), seemingly independent of thermal history. Upon dilution, the nanodiscs slowly coalesce and grow in size with time irreversibly. Our preliminary result shows that the growth rate strongly depends on several parameters such as charge density, C_L and temperature. We have also found that the nanodisc coalescence is a reaction limit instead of diffusion limit process through a time-resolved study.

[1]Funding supported by NSF CMMI - 1131587.

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Date submitted: 14 Feb 2012 Electronic form version 1.4