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Morphological study on a phospholipid mixture and their Dependence of Temperature, Concentration and Chemical Composition YING LIU, University of Connecticut Chemical Engineering, YONGKUN YANG, University of Connecticut Polymer Program, MU-PING NIEH, University of Connecticut Chemical Engineering/IMS — A variety of morphologies, such as nanodiscs (bicelles), bilayered ribbons, unilamellar vesicles (ULVs), multi-lamellar vesicles (MLVs) and perforated lamellae exist in phospholipid mixtures composed of a long chain phospatidylcholine (PC), its charged counterpart (i.e., phosphatidylglycerol, PG with the same hydrophobic chain length) and a short-chain PC. Here, we present a comprehensive the structural characterization of such mixtures with various combinations of long-chain (e.g., di-14, di-16, di-18 PC) and short-chain (e.g., di-06, di-07 PC) lipids at a constant charged density using small angle neutron scattering (SANS), dynamic light scattering (DLS) and transmission electron microscopy (TEM). A time-resolved DLS study is also carried out to understand the kinetics of the structural transformation as a function of temperature, lipid concentration and composition. The preliminary data indicate that uniform nanodiscs and/or bilayer ribbons generally exist at low temperature, while at high temperature ULVs or MLVs are obtained. Moreover, the nanodiscs coalesce with each other over a period of time. The fundamental understanding of the structural formation mechanism and kinetics can lead to potential application of this system to bionanotechnology, such as drug carrying and therapeutic imaging.

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