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Interaction of Ionic Liquids with Lipid Biomembrane: Implication from Supramolecular Assembly to Cytotoxicity BENXIN JING, NAN LAN, Y. ELAINE ZHU, Department of Chemical and Biomolecular Engineering, University of Notre Dame, Notre Dame, Indiana 46556, United States — An explosion in the research activities using ionic liquids (ILs) as new “green” chemicals in several chemical and biomedical processes has resulted in the urgent need to understand their impact in term of their transport and toxicity towards aquatic organisms. Though a few experimental toxicology studies have reported that some ionic liquids are toxic with increased hydrophobicity of ILs while others are not, our understanding of the molecular level mechanism of IL toxicity remains poorly understood. In this talk, we will discuss our recent study of the interaction of ionic liquids with model cell membranes. We have found that the ILs could induce morphological change of lipid bilayers when a critical concentration is exceeded, leading to the swelling and tube-like formation of lipid bilayers. The critical concentration shows a strong dependence on the length of hydrocarbon tails and hydrophobic counterions. By SAXS, Langmuir-Blodgett (LB) and fluorescence microscopic measurement, we have confirmed that tube-like lipid complexes result from the insertion of ILs with long hydrocarbon chains to minimize the hydrophobic interaction with aqueous media. This finding could give insight to the modification and adoption of ILs for the engineering of micro-organisms.

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