

Abstract Submitted
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A quasi-elastic neutron scattering study of the stabilization of freeze-dried cholesterol-containing DPPC liposomes by trehalose V. GARCIA SAKAI, NIST Center for Neutron Research, M. DOXASTAKIS, A.S. REDDY, J. DE PABLO, Dept. Chem. Eng. University of Wisconsin, J.K. MARANAS, Dept. Chem. Eng., Penn State University — The disaccharide trehalose has been employed extensively as a dehydroprotectant for stabilizing phospholipidic membranes, as a result of its ability to lower the gel-to-fluid phase transition temperature [T_m] of phospholipids. Upon rehydration of the membrane in the presence of trehalose, the transition is prevented and cell leakage is avoided. We use quasi-elastic neutron scattering [QENS] on selective deuterated samples to probe the dynamics of both the heads and tails of freeze-dried liposomes in the presence and absence of trehalose. The dynamics of the lipid tails are responsible for the melting transition, which is significantly lowered in the presence of the sugar. The mobility of the head-group is directly associated with the mobility of the sugar. In the current work, we add cholesterol to the liposomes. Cholesterol, abundant in mammalian cell membranes and embedded in the bilayer structure due to its hydrophobic nature, is added to the liposomes. QENS measurements on the stabilization by trehalose on cholesterol-containing liposomes are presented. At temperatures lower than T_m the mobility of the tails is greatly reduced by cholesterol, but the addition of trehalose has little effect dynamics. At temperatures above the transition though, the mobility of the tails is only slightly reduced, but the addition of trehalose leads to a large decrease in dynamics.

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