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Phase Behavior and Structure of $C_8\beta G_1/C_8E_3$ Surfactant Solutions and their Role in Membrane Protein Crystallization. Gabriella M. Santonicola, Eric W. Kaler, Abraham M. Lenhoff, Center for Molecular & Engineering Thermodynamics, Dept. of Chemical Engineering, Univ. of Delaware, Newark, DE 19716.

A major limitation in the development of crystallization conditions for integral membrane proteins is the lack of knowledge of the role surfactant plays in the interactions of these proteins. Previous experimental observations have brought attention to the features of surfactant solutions near the liquid-liquid phase boundary in the search for a rational mechanism that would guide and thus accelerate the screening of crystallization conditions. Towards this goal, we have developed mixtures of nonionic surfactants β -octyl glucoside ($C_8\beta G_1$) and octyl triethylene glycol (C_8E_3) with tunable microstructure and studied their role in crystallization of bacteriorhodopsin. Small-angle neutron scattering was used to determine the micellar properties of several mixtures near the cloud point curve. Crystallization experiments were carried out in these solutions and the kinetics of growth of the protein-surfactant complexes were followed by light scattering. Results indicate that the rate of growth and morphology of the aggregates depend on the proximity of the solution conditions to the cloud point curve, which can be tuned by varying the ratio of the two surfactants.