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Multicomponent effects in diffusion within microemulsions WYATT MUSNICKI, STEPHANIE DUNGAN, RONALD PHILLIPS, University of California Davis, CHEMICAL ENGINEERING AND MATERIAL SCIENCE DEPARTMENT TEAM — Holographic interferometry was used to monitor transport of hydrophobic solutes in systems containing nanometer-scale microemulsion droplets. In this technique, variations in the refractive index between a reference time and a later time are monitored via interference fringes that are formed with the help of a holographic plate. The refractive index change is driven by imposed concentration differences of either the solute (at constant surfactant concentration), or of the surfactant (at constant solute concentration). We find that, especially for hydrophobic solutes, the transport kinetics cannot be interpreted by using a pseudobinary approximation. Multicomponent interaction effects must be taken into account even at micelle concentrations as low as 6%. By performing multiple experiments with different initial concentration gradients, and extending earlier analyses of the experimental interference fringes, the multicomponent effects can be resolved, yielding results for all the relevant diffusion coefficients.

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