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Phase Behavior of Amphiphilic Block Copolymers in Supercritical Carbon Dioxide WILLIAM EDMONDS, TIMOTHY LODGE, MARC HILLMYER, University of Minnesota — Condensed carbon dioxide represents a promising "green" solvent alternative, on the basis of its abundance and modest critical conditions. Amphiphilic block copolymers offer the potential of enhancing the versatility and usefulness of this solvent through the formation of micellar aggregates. Our goal is to understand and define the parameters that control aggregate shape and dimensions in compressible carbon dioxide; these parameters include copolymer volume fraction and solvent density. A series of low molecular weight block copolymers with varying compositions of 1,2-polybutadiene (PBD) and poly(hexafluoropropylene oxide) (PFPO) were synthesized. Using a custom-built apparatus, we characterized the phase behavior of these materials in supercritical carbon dioxide as a function of concentration, temperature, and pressure. The key result indicates that the most soluble amphiphile at a fixed molecular weight of PBD is the one with an intermediate molecular weight of PFPO. These results establish solubility conditions necessary for future experiments to characterize aggregate dimensions and solution viscosity.

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