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Structure of block copolymer micelles in the presence of co-solvents MEGAN ROBERTSON, SHU WANG, KIM MAI LE, University of Houston, RACHELE PIEMONTE, LOUIS MADSEN, Virginia Tech — Amphiphilic block copolymer micelles in water are under broad exploration for drug delivery applications due to their high loading capacity and targeted drug delivery. We aim to understand the kinetic and thermodynamic processes that underlie the self-assembly of diblock copolymer micelle systems. The present work focuses on diblock copolymers containing poly(ethylene oxide) (a hydrophilic polymer) and polycaprolactone (a hydrophobic polymer), which spontaneously self-assemble into spherical micelles in water. Addition of a common good solvent (a co-solvent) for both of the constituting blocks, such as tetrahydrofuran (THF), reduces the interfacial tension at the core-corona interface. We are currently investigating the effect of this phenomenon on the micelle structural properties, using scattering experiments and nuclear magnetic resonance. We have characterized the hydrodynamic radius, core radius, corona thickness, aggregation number, degree of swelling of the micelle core with the co-solvent, and unimer (free chain) concentration, as a function of the co-solvent concentration. Fundamental knowledge from these studies will inform design of drug delivery systems by allowing us to tailor micelle properties for optimal cargo loading.

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