

Block Copolymer/Water/Oil Mesophases

Reza Foudazi

*Department of Chemical and Materials Engineering, New Mexico State University, Las Cruces, NM
88003, USA*

Abstract

In the presence of selective solvents, amphiphilic block copolymers self-assemble and form different mesomorphic structures, known as mesophases, such as micellar cubic, lamellar, normal/reverse hexagonal, and bicontinuous cubic. Mesophases have been utilized in pharmaceutical and biomedical applications and as template for synthesis of mesoporous material for separation and adsorption processes. While polymeric surfactants are less studied than small-molecule surfactants for self-assembly, they offer some opportunities in terms of flexibility, diversity, and functionality. Using a monomeric phase as oil in mesophases, we propose a new technique for the preparation of ultrafiltration (UF) membranes without the need for organic solvent or post-modification. As-synthesized membranes are found to have pore sizes in the nanometer range and exhibit both excellent fouling resistance and high permeance of water, outperforming conventional UF membranes. The processability of such mesophases for large-scale production can be investigated through measuring their rheological properties.