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Nanoporous Conductive Films Derived from Polymeric Bicontinuous Microemulsions BRAD JONES, KAI-YUAN CHENG, RUSSELL HOLMES, Department of Chemical Engineering and Materials Science, University of Minnesota, TIMOTHY LODGE, Department of Chemistry and Department of Chemical Engineering and Materials Science, University of Minnesota — Ternary blends of two homopolymers and a diblock copolymer can self-assemble into interpenetrating, 3D-continuous networks with a characteristic length scale of 100 nm. These polymeric bicontinuous microemulsions (BμE) can be designed to serve as templates for the synthesis of nanoporous materials with 3D-continuous pore networks. We have investigated the behavior of BμE-forming blends of polyolefins as precursors to nanoporous polyethylene (PE) films. The effect of interfaces in these films can drastically disrupt the BμE structure, leading to a macro-phase separated morphology. Proper consideration of several factors, including substrate surface energy, film thickness, and annealing time, is necessary to retain a BμE structure in such films. Finally, we use the BμE-like, nanoporous PE films as templates in the synthesis of nanoporous films of the conducting polymer poly(3,4-ethylenedioxythiophene), having potential application in organic electronic devices.

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