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Self-Tailoring of Amphiphilic Block Copolymer Assemblies by Osmotic Pressure JINHYE BAE, RYAN HAYWARD, Polymer Science and Engineering Department at University of Massachusetts Amherst — Compartmentalization is a crucial architectural principle employed by eukaryotic cells, and correspondingly, pathways to assemble multi-compartmental polymeric assemblies are of considerable research interest. We report a study of the self-generation of water-in-oil-in-water (w/o/w) double emulsions with inner droplet sizes of ~ 2 -3 micrometers due to the osmotic pressure provided by salts initially dissolved in the organic phase. We show that this process can explain previously mysterious examples of spontaneous emulsion formation, due to the presence of initiator salt impurities within copolymer samples. Further, we harness it to tailor the structures of multiple emulsions, which upon solvent evaporation can yield multi-vesicular structures or hierarchically structured porous films. Such osmotically-driven polymer assemblies may have potential applications in therapeutic, pharmaceutical, cosmetic, and separation technologies.

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