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Phase Transfer of Polystyrene-*b*-poly(ethylene oxide) Polymersomes from a Hydrophobic Ionic Liquid to Water SOONYONG SO, TIMOTHY LODGE, Univ of Minn - Minneapolis — The phase transfer of molecules and supramolecular assemblies from one phase to the other in a biphasic system is desirable for various applications such as catalysis, separation, and delivery. Herein, we describe the phase transfer of polystyrene-*b*-poly(ethylene oxide) (PS-PEO) polymersomes from a hydrophobic ionic liquid, 1-ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide ([EMIM][TFSI]), into water. The phase transfer behavior of PS-PEO polymersomes was studied systematically by varying the molecular weight of PS and the PEO volume fraction of the PS-PEO. We demonstrate a general boundary for the phase transfer in terms of a reduced tethering density for PEO, which is independent of the molecular weight of the hydrophobic PS. The tethering density can be increased by increasing the block length of PEO and the size of the polymersomes, and the increased tethering density induces the phase transfer. This phase transfer were also analyzed thermodynamically with the free energy difference of the polymersomes in [EMIM][TFSI] and water. Higher grafting density can reduce the interfacial tension between PS and water, and leads the polymersomes to transfer from [EMIM][TFSI] to water at room temperature.

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