

Pickering-Emulsion Templates to Synthesize Highly Porous Polymer Foams

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Highly porous poly-Pickering foams with a closed-cell structure have been synthesized by the polymerization of Pickering-HIPEs with an internal phase volume fraction of up to 0.92. These concentrated emulsion templates were stabilized against coalescence and phase inversion using oleic acid modified silica particles. The resulting poly-Pickering-foams can be used as sandwich cores in applications where easy to prepare closed-cell polymer foams are required. Besides the use of Pickering-HIPEs as emulsion templates, these Pickering HIPEs offer exiting opportunities in the food, cosmetic or pharmaceutical industries. Here we report on Pickering HIPEs with up to 0.85 internal phase volume fraction stabilized by only 1 wt.-% functionalized silica particles. However, this maximum internal phase volume fraction above which the emulsion phase separates was increased by increasing the particle concentration used in stabilizing the emulsion. We study the effect of increasing the internal phase volume fraction of the emulsion template and particle concentration used in stabilizing the emulsion on the pore size, porosity, density and mechanical properties of the resulting poly-Pickering foams