

Synthesis of Monodisperse Emulsion-Templated Beads

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Monodisperse emulsion-templated polymer beads with diameters about 2 μm have been prepared using oil-in-water-in-oil (O/W/O) sedimentation polymerization.¹ These polymer beads show highly interconnected, open porous structures and exhibit high intrusion volumes (up to 9 cm^3/g). This method has been extended to prepare polymer-silica composite beads. Uniform silica beads have been obtained after calcining the polymer phase.² The silica beads show hierarchically porous structures (macropores interconnected with mesopores), high surface areas ($>400 \text{ m}^2/\text{g}$), and high intrusion volumes ($\sim 8 \text{ cm}^3/\text{g}$). Recently, we have used emulsion-templated polymer beads as templates to prepare a range of inorganic beads (*e.g.*, silica, titania, alumina, zirconia). All of the inorganic beads exhibit hierarchical porosity with highly interconnected pores and high surface areas. Moreover, the nature of the porosity can be adjusted by varying the preparation conditions.

1. H. Zhang and A. I. Cooper, *Chem. Mater.*, **2002** *14*, 4017.
2. H. Zhang, G. Hardy, M. J. Rosseinsky and A. I. Cooper, *Adv. Mater.*, **2003** *15*, 78.