

Stimulus-Responsive Liquid Marbles¹

Damien Dupin¹, Steven P. Armes¹ and Syuji Fujii²

(1) *Department of Chemistry, Dainton Building, University of Sheffield, Brook Hill, Sheffield, South Yorkshire, S3 7HF, UK*, (2) *Dept. of Applied Chem., Osaka Institute of Technology, 5-16-1, Ohmiya, Asahi-ku, Osaka, 535-8585, Japan.*

Millimeter-sized ‘liquid marbles’ are usually prepared using highly hydrophobic particles such as fluorosilane-treated lycopodium powder or alkylated silica sols. In the present work it is shown that ‘liquid marbles’ can be prepared using sterically-stabilized polystyrene latex; remarkably, such latex particles can be readily prepared by *aqueous emulsion* polymerization using a well-defined styrene-functionalized poly(2-(diethylamino)ethyl methacrylate) macromonomer as a reactive steric stabilizer. The macromonomer stabilizer chains are water-soluble when partially protonated below their pK_a of around 7.0, but become sufficiently hydrophobic in their deprotonated form to allow formation of robust ‘liquid marbles’ that remain stable when placed at the air/water interface. Moreover, the stabilizer chains confer pH-responsive behavior on the ‘liquid marbles’; addition of acid to the aqueous sub-phase causes immediate destruction of the ‘liquid marble’. Finally, a water-soluble dye is used to demonstrate payload release, which suggests potential encapsulation applications.

References:

1. Dupin, D.; Fujii, S.; Armes, S.P. *J. Am. Chem. Soc.* **2009**, *131*, 5386–5387