

Synthesis and Characterisation of Submicrometer-sized Polypyrrole-coated Polystyrene Particles

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Near-monodisperse, submicrometer-sized methoxy poly(ethylene glycol) methacrylate (PEGMA₂₀₀₀)-stabilised polystyrene latexes have been coated with polypyrrole by *in situ* deposition of the conducting polymer from aqueous solution. If the conducting polymer overlayer is sufficiently thin, it lies inside the steric stabiliser layer and the coated latexes retain reasonable colloid stability. The polypyrrole loading on the latex particles was varied over a wide range and the particles were extensively characterised using a host of techniques. The colloid stability of the coated particles appears to be related to the surface absorbed concentration of PEGMA₂₀₀₀ stabiliser (as determined by ¹H NMR). Pressed pellet conductivity measurements on the dried composites suggest that conductivity is a function of the polypyrrole overlayer thickness. X-ray photoelectron spectroscopy studies indicate that increasing the polypyrrole mass loading (4.2 to 28.1 wt. %) leads to an increase in the proportion of polypyrrole at the particle surface. Also the doping level (calculated from the N/N⁺ ratio) was seen to reduce for the lowest polypyrrole overlayer thicknesses. Further evidence for this was provided by FT - Raman spectroscopy studies where at very thin polypyrrole overlayer thicknesses the doping level was reduced.