

Copolymer Microgels: Structure, Preparation and Applications

M. J. Snowden and L. H. Gracia

*Medway Sciences, University of Greenwich, Chatham Maritime, Kent, ME4 3TB
m.j.snowden@gre.ac.uk, Tel No. 44 (0) 208 331 9981*

A range of co-polymer colloidal microgel particles have been prepared by a surfactant free emulsion polymerisation reaction.

Co-polymers of N-isopropylacrylamide and 4-vinyl pyridine were prepared having different compositions where the fraction of 4-vinyl pyridine in the gels varies from 0 to 100%. The fraction of 4-vinyl pyridine could be quantified in the resultant gel using the intensity of the Raman vibrational band at 997cm^{-1} . The technique offers promise as a means of quantitatively determining the monomer composition within a co-polymer microgel system.

Co-polymer microgels of N-isopropylacrylamide and butyl acrylate have also been prepared at different ratios and the distribution of the butyl acrylate component within the resultant microgels has been analysed by Small Angle Neutron Scattering (SANS). The butyl acrylate appears to be distributed according to a series of islands within the microgel structure. The result was somewhat unexpected as a more core-shell like structure was believed to have been the more likely outcome.

The absorption of a range of drugs into the co-polymer microgels of N-isopropylacrylamide and butyl acrylate has been studied. The absorption into both the random co-polymers, having the island like structure, and deliberately prepared core-shell type structures, has been measured. The results of the absorption for both types of structure are compared and contrast. The results provide clues as to possible optimal structural arrangements for the use of microgels as uptake and release agents.