PHOTOPHYSICAL STUDIES OF WATERBORNE POLYMER COLLOIDS FOR COATING APPLICATIONS.

S. Wilkinson, I.Soutar and L.Swanson
School of Chemistry & Physics, Lancaster University, Lancaster, LA1 4YA

Polymer colloids which consist of a methyl methacrylate "core" and ethyl acrylate/methacrylic acid "shell" have been shown to exhibit interesting morphological properties in that progressive neutralisation of the latex results in significant particle swelling. We have studied the colloidal morphology and film formation properties of core-shell latices of this type, as a function of both pH and MAA content, utilising a variety of luminescence techniques. Copolymerising a fluorescent label (or labels) in the colloidal matrix, and subsequent interrogation of the luminescence characteristics, affords information as regards the swelling, phase separation and coalescence properties of the colloid.

Results are presented illustrating, in particular; diffusional quenching of the label fluorescence within the colloids, label rotation and energy migration effects, as obtained by Time Resolved Anisotropy Measurements (TRAMS), and studies of particle coalescence using direct non-radiative energy transfer experiments.

At pH >10 it is shown that the colloids become unstable, and that some of the latex polymer becomes solvated. Quenching and film formation studies imply that the colloid morphology is not actually strictly core-shell but more akin to an interpenetrating network.