Poster 2

Preparation of Core-Shell Latexes with Highly-Hydrophobic Cores

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Structured latexes comprise at least two phases of controlled composition and location within the latex particles, most commonly with a core-shell morphology, and are widely exploited in commercial coatings, particularly paints and adhesives. Traditionally, structured latexes have been prepared by sequential emulsion polymerisation processes in which seed particles are formed and then grown successively with polymers that have different chemical and/or physical characteristics [1,2]. However, this route has limitations in terms of the range of polymer types that can be incorporated. A particular issue is that pre-formed oligomers/polymers and highly hydrophobic monomers cannot be used because of the need for transport of reactants through the aqueous phase to supply the growing particles during the reaction. Miniemulsion polymerisation [3-6] is different in that all reactants can be contained within the pre-formed miniemulsion droplets which are then directly converted to particles, thereby eliminating issues of reactant transport. Use of miniemulsion polymerisation for the preparation of structured particles is restricted, however, because thermodynamics largely control the particle morphology; by comparison, in emulsion polymerisation, kinetic control can be used to overcome thermodynamic factors and achieve preferred particle morphologies [1,2].

The objective of the present project is to study control of core-shell particle morphology using a combination of miniemulsion and emulsion polymerisation processes. This paper will present results from initial work on miniemulsion polymerisations of highly-hydrophobic monomers such as lauryl acrylate and isodecyl acrylate. By varying the miniemulsification process and the levels of initiator, surfactant and costabiliser, conditions have been developed that allow reproducible control of particle diameter. The latexes produced are being used as *core* particles for subsequent reactions employing conventional emulsion polymerisation methods to form *shells* with the ultimate aim of making the shell both functional and hydrophilic. The reactions have been monitored by measurement of conversion and particle diameter with time. All final latexes have been characterised using several particle size characterisation techniques and the polymers have been characterised by gel permeation chromatography and thermal analysis.

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