

Pickering stabilizers in (mini)emulsion polymerization and design of Janus supracolloidal structures

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We synthesize a variety of polymeric molecules and particles and investigate their use as building blocks for the design of more complex colloidal structures.

We reported the use of nano-sized solid particles, *i.e.* Laponite clay discotic particles ($h = 1$ nm, $d = 25-35$ nm), as Pickering stabilizer in the miniemulsion polymerization of styrene.¹⁻³ Herein, we further explore the use of nano-sized Pickering stabilizers in (mini)emulsion polymerizations.

We studied the Pickering miniemulsion polymerization of vinyl ester monomers using Laponite clay discs ($h=1$ nm, $d=25-35$ nm) as stabilizer. The high pH imposed by the dispersed clay discotic particles restricts the use of monomers to those that do not undergo substantial hydrolysis. We report the miniemulsion polymerization of vinyl laurate stabilized by Laponite clay discs. We propose a simple semi-empirical model that correlates the average particle size with the amounts of clay and monomer used. We demonstrate via series of miniemulsion polymerizations that we are able to control and predict the average particle size. Furthermore, we investigated the importance of potential aqueous phase events during the radical polymerization by addition of the water soluble radical scavenger, sodium nitrite.

Next, we demonstrate the use of nano-sized colloidal silica as potential (Pickering) stabilizers in heterogeneous polymerization reactions of various monomers. Armes *et al.*⁴⁻⁶ previously showed that these silica sols could be used successfully to stabilize dispersion polymerization.

References

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