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EXPLORING NEW ROUTES FOR CLAY ENCAPSULATION.

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For the polymer-clay composite latexes, control over morphology and clay platelet orientation can improve the exfoliation and platelet orientation in the final polymeric films. The objective of this research is to explore new routes for synthesizing anisotropic polymer clay composite articles with better control over morphology and platelet orientation. Two novel approaches are explored. First one is based on the use of bilayer forming cationic surfactants, like Dimethyldioctadecyl Ammonium Bromide. These bilayers can be adsorbed on the surface of oppositely charge clay where they can be loaded with suitable monomers and polymerize to form a shell. Results obtained with Laponite RD show that the encapsulation with this route is feasible. However single clay platelet encapsulation per particle is not achieved and the platelet orientation control is poor.

Second approach requires the synthesis of amphipathic random macro-RAFT copolymers comprising of hydrophobic and hydrophilic/charged units. These living copolymer chains can be adsorbed on to the surface of oppositely charge clay where they can grow further to a polymeric shell with the fresh supply monomer[1]. Using the RAFT agent Dibenzyl Trithiocarbonate, we synthesize a series of RAFT based copolymers with different combination of Acrylic acid and Butyl acrylate units and utilized them to encapsulate the cationic clay ***Gibbsite***. CryoTEM micrographs of the resulting composite latexes demonstrate the formation anisotropic composite latex particles with mostly one platelet per particle. Good control over platelet orientation and high encapsulation efficiency is achieved via this route.

References:

[1] Hawkett, B. S.; Such, C. H.; Nguyen, D. N.; Farrugia, J. M.; MacKinnon, O. M. **WO/2006/037161**