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Water whitening of waterborne polymer films: Effect of the morphology of polymer latex.

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Waterborne latex films, obtained from the dispersion of latex particles are of particular interest due to the non-content of volatile organic compounds (VOC), often mandatory under environmental legislation. However, abrupt water penetration inside the films restricts their lifespan and deteriorates the shine of the coating. In order to prepare efficient and solvent-free coatings with the low glass-transition temperature (Tg < the drying temperature) but with higher mechanical strength, hydrophilic layers were integrated (Acrylic acid/ Poly(acrylamide)) around the hydrophobic cores (mixture of Methyl methacrylate and Butyl acrylate) in the latex film. In another morphology of polymer latex, particles with soft core and hard shell were synthesized with different core-to-shell ratios, using emulsion polymerization. The water whitening of polymer films derived from solution was studied by the use of UV–vis spectroscopy, in situ SANS, and ESEM. The combined study provides the formation of the FCC-like structure by the latex films, which become more organized by including the hydrophilic hairy layers. The formation of water domains in the latex films disrupts the ordering of the films without having the hydrophilic layers while remaining intact for hydrophilic hairy layer latex films, when exposed them to water. On the contrary, latex films with soft cores and hard shells showed excellent water resistance and did not alter their ordering while exposed to water for a long time.

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