

# Interdiffusion and phase separation studies of alkyd/acrylic hybrid films

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## Abstract

Our aim in this work is to use fluorescent confocal microscopy to determine the level of heterogeneity in hybrid films, as it is affected by the interdiffusion of miscible acrylic phases and the phase separation of immiscible alkyd and acrylic phases. A fluorescently-labelled acrylic monomer, which is not prone to photo-bleaching, was used in the miniemulsion polymerization of acrylic/alkyd nanoparticles. Confocal microscopy was used to determine the distribution of the fluorescent acrylic in films made with either a hydrophilic or a hydrophobic alkyd. Hybrid particles polymerised with the hydrophilic alkyd were found to create clusters when blended with acrylic particles to make films. On the other hand, hybrid particles containing the hydrophobic alkyd were much more homogeneously distributed in the films. Furthermore, in blends of alkyd emulsion droplets and fluorescent acrylic latex particles, there is evidence for flocculation of the alkyd phase and coalescence into droplets, some as large as 10  $\mu\text{m}$ . The alkyd phase could be inhibiting the drying rate and leading to water retention. In these blends, the hydrophilic alkyd is more finely and uniformly distributed in comparison to the hydrophobic alkyd. This result can be explained by greater stability of the hydrophilic alkyd in water.