

Nanotechnology-Enabled High Performance Coatings

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High performance paints and coatings are used to protect high value assets, including bridges, petrochemical structures, and building infrastructures, from the damaging effects of harsh environments and corrosion. While solventborne coatings generally meet the needs for such applications, environmental regulations and sustainability principles are encouraging the development of low volatile organic content, waterbased coatings having competitive performance. In the present work,

nanocomposite organic/inorganic latexes have been synthesized by Pickering emulsion polymerization to enable improved barrier properties of waterbased coatings. The Pickering latex particles are comprised of an acrylic copolymer core surrounded by a shell of ceria nanoparticles (10s of nm diameters). The Pickering latices, ranging from 0 to 7 wt% nanoceria, are film forming at ambient

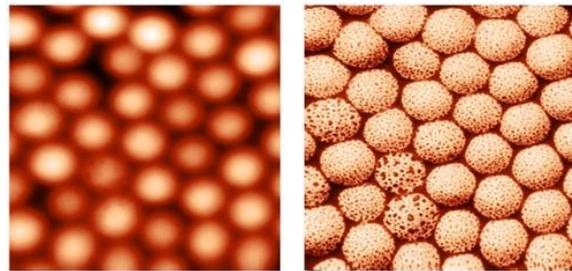


Figure 1. Height (left) and phase contrast (right) AFM images of film forming, nanoceria/polymer composites. Image sizes 2 μm x 2 μm .

temperature and demonstrate ordered particle packing, as revealed by atomic force microscopy. Upon film formation, the nanoceria shells of the particles create a honey-comb structure extending throughout the coating. The nanocomposites show strong absorption in the ultraviolet region, the absorption coefficient increasing linearly with nanoceria content.

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