

Waterborne Polyurethane-Acrylic Nanoparticles by Miniemulsion Polymerization: Mechanical Properties of Nanostructured Films

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Abstract

We report on the results obtained in a EU integrated project (Napoleon) to develop a technology platform for the production of films with controlled nanostructure and without the emission of organic solvents or residual monomer. Waterborne nanocomposite nanoparticles with carefully controlled structure are used as building blocks for the films.

Our work is devoted to

- a) the study of the effect of the characteristics (e.g. particle morphology, MWD, gel content, network density, resin incorporation) of waterborne polyurethane-acrylics structured nanoparticles on the adhesive properties and
- b) the establishment of a connection between macroscopic properties of the film and particle structure / polymer architecture.

Mechanical properties of such soft and sticky films were therefore studied in small and large strain, with probe tack tests at the macroscopic scale and at the particle level with atomic force microscopy techniques.