

# SL 20

## **WATERBORNE POLYURETHANE-ACRYLIC HYBRID NANOPARTICLES BY MINIEMULSION POLYMERIZATION: DESIGN AND PRODUCTION OF NANOCOMPOSITE MATERIALS**

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The development of many industrial sectors - i.e., coatings, adhesives, cosmetics, and additives for paper and textiles- is limited by the inability of existing technology to produce nanostructured polymer films via a sustainable technology. This (and the accompanying) work reports on the results obtained in a EC integrated project (NAPOLEON) to develop a technology platform for the production of films with controlled nanostructure without the emission of organic solvents or residual monomer, using waterborne nanocomposite nanoparticles with carefully controlled structure as building blocks for the films.

In this first part, the synthesis of polyurethane-acrylics structured nanoparticles by miniemulsion polymerization is presented. This technique allows the incorporation of water-insoluble pre-formed polymers into the nanoparticles. The effect of different polymerization strategies on colloidal characteristics (particle size, and particle size distribution), polymer architecture (MWD, gel content, network density, resin incorporation...) and particle morphology is reported. The critical steps in the control of the nanoparticles characteristics are identified and ways to overcome them discussed.