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WATERBORNE POLYURETHANE-ACRYLIC HYBRID NANOPARTICLES BY MINIEMULSION POLYMERIZATION: MECHANICAL PROPERTIES OF NANOSTRUCTURED FILMS

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This (and the accompanying) work reports on the results obtained in a EU 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. This second part is devoted to the study of the effect of the characteristics (particle morphology, MWD, gel content, network density, resin incorporation,...) of waterborne polyurethane-acrylics structured nanoparticles on film formation and adhesive properties.

Mechanical properties of such soft and sticky films were studied in small and large strain, with probe tack tests at the macroscopic scale and at the particle level with AFM force spectroscopy. Comparison of the performance of the nanostructured latexes with conventional ones is provided.

A connection between macroscopic properties of the film and particle structure and polymer architecture will be established. Combination of this information with that of the first part of this series opens the possibility of designing products for a given application.