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NEW WATERBORNE POLYMER DISPERSIONS FOR IMPROVING ADHESION TO LOW ENERGY SURFACES

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Polyolefin films are extensively used in packaging. Due to their low surface energy, adhesion on these films is challenging. Surface treatment of the polyolefin film (corona, plasma, flame…); the use of primers, adhesion promoters and tackifiers; and the incorporation of hydrophobic monomers into the polymer backbone are used to improve performance. The current technology remains mainly based on solvent borne polymers.

This work explores the use of environmentally friendly waterborne dispersed polymers. A pressure sensitive adhesive (PSA) was chosen as case study. Wetting of the polyolefin by the waterborne polymer dispersion and interaction between the adhesive and the polyolefin are the key factors affecting the performance of the waterborne PSAs. Both aspects were addressed in this work.

Wetting of the polyolefin film was improved by reducing the surface tension of the dispersion using wetting agents. The competing adsorption on the polymer particles of these agents and the emulsifiers was studied. To maximize the amount of wetting agent in the aqueous phase, which leads to a minimum surface tension, i.e., to a maximum wetting. Current technology to improve tack on polyolefins involves the use of tackifiers, but it has a deleterious effect on shear resistance. The interaction between PSA and polyolefins depends on the composition and architecture (gel content, density of crosslinking, sol MWD) of the adhesive. Widely different PSAs were synthesized by miniemulsion polymerization to incorpore hydrophobic components into the polymer backbone. The relation between polymer micro-structure and adhesive performance (tack, shear and peel resistances) was investigated to obtain PSA with balanced adhesive properties, i.e., improving both tack and shear resistance. The performance of these PSAs was compared with that of the systems using tackifiers.