

Poster 10

Lateral Distribution of Surfactants in Waterborne Pressure Sensitive Adhesive Films: Theory and Experiment

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Pressure-sensitive adhesives (PSAs) adhere instantly and firmly under the application of light pressure without covalent bonding or chemical activation. In recent years, a greater fraction of PSA manufacturing methods has used waterborne polymer colloids (*i.e.* latex). The presence and distribution of surfactants within waterborne PSAs can potentially have a profound impact on their optical clarity, failure mechanism and adhesive properties. In this work, the spatial distributions of surfactant (and other water-soluble components) in film cross-sections and laterally across the surface have been determined through a combination of atomic force microscopy (AFM) and time-of-flight SIMS analysis. Investigation of the effects of AFM tapping conditions has provided clear insight into the interpretation of images. “Islands” of surfactant are reproducibly observed at the film/air surface. Removal of the surfactant by rinsing with water reveals a permanent depression in the film surface, which is consistent with the predictions of film thinning driven by Marangoni flow. The size of these features is found to increase with increasing film thickness and with increasing surfactant concentration. These results are found to be in general agreement with the predictions of a linear stability analysis.