

MAR17-2017-020960

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

Bulk Interfacial Contributions to the Adhesion of Acrylic Emulsion-Based Pressure Sensitive Adhesives
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The performance of pressure sensitive adhesives (PSAs) depends strongly on the viscoelastic properties of the adhesive material itself and the surface that it is placed into contact with. In this work we use a multiple-oscillatory test with microindentation apparatus that is able to quantify the mechanical response of adhesive materials in the linear regime, and also in the highly strained regime where the adhesive layer has cavitated to form mechanically isolated brils. The experiments involved the use of hemispherical indenters made of glass or polyethylene, brought into contact with a thin adhesive layer and then retracted, with comprehensive displacement history. A set of model acrylic emulsion-based PSAs were used in the experiments which show a suprising degree of elastic character at high strain. The experiment result suggest that an adhesive failure criterion based on the stored elastic energy is appropriate for these systems. The primary effect of the substrate is to modify the maximum strain where adhesive detachment from the indenter occurs.