Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Correlation Between Interfacial Mositure Content and Adhesive Fracture Energy EMMETT O'BRIEN[1], BRYAN VOGT[2], CHRISTOPHER WHITE[3], NIST — The effect of surface chemistry and moisture on adhesion was investigated using neutron reflectivity and the shaft-loaded blister test. Four different surface treatments were examined: bare Al_2O_3, t-butylphosphonic acid, phenyl phosphonic acid, and n-octyltrichlorosilane. Measurements were taken in the dry condition and after samples were equilibrated in a 100% relative humidity. Previous neutron reflectivity work by Vogt (submitted to Macromolecules) on spincoated films of poly(4-tert-butoxycarbonyl-oxystyrene) has shown that the phenyl and octyl surface treatments reduced the amount of water at the interface, relative to the bare aluminum. The t-butyl treatment did not reduce the interfacial moisture content. These results were correlated to adhesive fracture energy measurement of spin coated PMMA films. The adhesion measurements match the expected trend. The phenyl surface had the largest adhesion strength and a low interfacial moisture content. The t-buty and bare Al_2O_3 surface had similar moisture contents and adhesion energy. The octyl treated surface had the worst adhesion but the lowest interfacial moisture content.

[1]Buildings and Fire Research Laboratory
[2]Polymers Division
[3]Bulidings and Fire Research Laboratory

Christopher White
NIST

Date submitted: 09 Nov 2004 Electronic form version 1.4