

Abstract Submitted
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Surface Softening in Polymers and Their Nanocomposites Determined by Surface Mechanical Properties through Spontaneous Particle Embedment TASKIN KARIM, GREGORY MCKENNA, Texas Tech University

— In the present work, we have used the particle embedment technique with sub-micron particles to estimate the surface modulus of epoxy/POSS composites at a temperature far below the glass transition temperature. The embedment of the particle is determined from atomic force microscope measurements and the modulus was determined using the elastic analysis of Johnson, Kendall and Roberts (JKR) with surface energy estimates of the work of adhesion as the driving force for embedment. The surface modulus values were found much smaller than the macroscopic modulus values. The maximum embedment depth obtained for all surfaces was low enough so that it did not cause plastic deformation on the surface. The maximum stress values on all surfaces induced by the particle embedment were estimated to verify the expected response in close to the linear regime.

- [1] K. L. Johnson, K. Kendall and A. D. Roberts, *P. Royal Society of London A*, **324**, 301-313 (1971).
- [2] J. H. Teichroeb and J. A. Forrest, *Physical Review Letter*, **91**, 016104 (2003).

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