Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Nanosphere Embedment into Polymer Surfaces: A Viscoelastic Contact Mechanics Analysis[1] STEPHEN HUTCHESON, GREGORY MCKENNA, Texas Tech University — Teichroeb and Forrest (*Phys. Rev. Lett.*, **91**, 1, 016104-1(2003)) image gold nanosphere embedment into a polystyrene surface and imply the existence of a liquid surface layer. We use a viscoelastic contact mechanics model of their results to give a contrary interpretation. The surface interactions between gold and polystyrene and the indentation depth determine the loads on the nanospheres. Using bulk properties, quantitative agreement between the model and the data is obtained, implying little or no, depression in the glass temperature or existence of a liquid layer at the polystyrene surface. An important aspect of the present analysis is that it is the first to solve the problem for the time dependent Poisson's ratio. The fact that this varies from 0.33 to 0.5 upon traversing the glass transition (time) flattens the nanosphere embedment profile with increasing time.

[1]Financial Support from the NSF grant number DMR-0304640 is greatly appreciated.

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Date submitted: 01 Dec 2004 Electronic form version 1.4