Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Formation and properties of silicon elastomer-based responsive surfaces JULIE CROWE, KIRILL EFIMENKO, JAN GENZER, North Carolina State University, DWIGHT SCHWARK, Sealed Air, Cryovac Food Packaging Division — Responsive surfaces facilitate prompt response to an external stimulus, such as electrical, chemical, or mechanical; the ultimate responsive surface is one that instantaneously responds to its environment with a measurable property change. We report on forming responsive surfaces from model silicon elastomer (SE) networks containing vinyl functionalities, which can be chemically or physically modified to attach various functional groups. Rapid responsiveness of such SE surfaces stems from the cooperative effects due to high flexibility of the siloxane backbone and the enthalpic interactions of the SE functionalized surface with the outside medium. We present several examples of responsive SE materials, including those in which the vinyl bond conversion has been achieved by chemical grafting of alkane chains and carboxylic acids. The responsiveness of such materials is tested with respect to the nature of the contact medium (hydrophilic vs. hydrophobic) and the temperature. We also discuss the reversibility of these phenomena.

Julie Crowe
North Carolina State University

Date submitted: 01 Dec 2004 Electronic form version 1.4