

471i Smart Polymeric Surfaces—Responsiveness and Reconstruction

Julie A. Crowe and Jan Genzer

The ultimate responsive surface is one that instantaneously responds to its environment with a measurable property change. In our research we utilize model poly(vinylmethyl)siloxane elastomer (SE) networks modified with thiol alkanes to provide hydrophobic or hydrophilic surface properties. The cooperative effects of polymer mobility, arising from the high flexibility of the siloxane backbone, and the enthalpic interactions between the outside medium and the SE functionalized surface control the degree of responsiveness as measured by dynamic and static contact angle. The initial parameters screened were alkane chain length, medium temperature, and end-group functionality. Real-time wetting force measurements have been obtained with dynamic contact angle, where the surface reconstruction is measured continuously providing a means to determine the kinetics of reconstruction and reversibility. Our examples show that not only are SE networks excellent stimuli-responsive substrates, but that the magnitude of change and repeated reversibility are unparalleled to most polymeric surfaces.