Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Contributions to the Adhesion of Glassy Polymers from Radical Recombination and Segmental Interpenetration at Elevated Temperatures MURAT GUVENDIREN, MICHELLE LEFEBVRE, CHRISTINE DETTMER, SONBINH NGUYEN, KENNETH SHULL, Northwestern University — We study two examples of adhesive interactions between glassy polymers that occur when the polymers are heated to elevated temperatures. First set is the adhesion between thin films of poly(phenylene oxide) (PPO). The samples are brought into contact at an elevated temperature and cooled to room temperature prior to measuring the fracture energy by using the contact mechanics approach based on JKR (Johnson, Kendall and Roberts) theory. Very little adhesion is observed at temperatures below about 130C, which enables us to perform a second set of experiments, where adhesion is due to radical recombination across the interface. Polystyrene (PS) is synthesized by anionic polymerization, and terminated by an end-capped nitroxide radical group. Nitroxide mediated polymerization is used to attach a poly (*tert*-butyl acrylate) (tBA) block to the PS chains. These block copolymers are added to the PPO films that are brought into contact with one another. Nitroxide radicals become uncapped at elevated temperatures, with subsequent radical recombination providing another potential mechanism for the formation of bonds across the interface.

Murat Guvendiren
Northwestern University

Date submitted: 03 Dec 2005 Electronic form version 1.4