Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Viscoelastic and not Viscous Glue Drops Produced by Orb-Weaving Spiders SAHNI VASAV, TODD BLACKLEDGE, ALI DHINOJWALA — Spiders use highly extensible and adhesive silk threads (capture silk) to capture prey. The capture silk, in addition to sticking to rough surfaces like insect setae, also adheres to smooth surfaces like glass. Here, we have studied the capture silk of modern orb weaving spiders that use viscous glue drops to capture prey. To understand the adhesion mechanism of this viscous glue has been challenging because the adhesive forces measured at pull-off depends on the mechanics of highly extensible axial silk and the adhesive glue drops. Here, we have developed an energy model to separate the adhesion energy required to peel the viscous glue droplets from the mechanics of the axial silk thread. Using this model and single glue drop experiments, we find that the glue is highly *viscoelastic* and is strongly affected by humidity and the rate of peeling. Knowledge of the adhesion and the mechanics of the glue will aid in developing bioinspired adhesives in the future.

Ali Dhinojwala
University of Akron

Date submitted: 19 Nov 2009 Electronic form version 1.4