Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Fundamental studies on shear-thinning and self-healing peptide hydrogels CONGQI YAN, AYSEGUL ALTUNBAS, Materials Science and Engineering, University of Delaware, RADHIKA NAGARKAR, Chemistry and Biochemistry, University of Delaware, BASAVARAJA MADIVALA, NORMAN WAGNER, Chemical Engineering, University of Delaware, JOEL SCHNEIDER, Chemistry and Biochemistry, University of Delaware, DARRIN POCHAN, Materials Science and Engineering, University of Delaware — Peptides have been designed to fold into beta-hairpins once exposed to physiological conditions, and then subsequently self-assemble into stiff hydrogels stabilized by physical cross-links. These physical gels shear-thin and flow like a solution under a proper shear stress. However, as soon as the stress is removed, the shear-thinned gel solutions immediately self-heal into solid gels with gel rigidity restoring over time which suggests the possibility of delivering the hydrogel construct with a desired therapeutic payload encapsulated toward an in vivo site by syringe injection. Current rheometric results indicate that gel restoration kinetics is the same whether the shear stress is applied by the rheometer or via syringe injection. Under steady shear flow, the gel network morphology was studied by flow-SANS and the motion of gel was visually monitored by rheo-microscopy. Confocal microscopy was used to track the flow of the hydrogels through a channel. The results explain how the gel network morphology evolves during shear-thinning and subsequent rehealing process.

Congqi Yan
Materials Science and Engineering, University of Delaware

Date submitted: 27 Nov 2009 Electronic form version 1.4