Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Injectable solid peptide hydrogel: shear-thinning and instant recovery CONGQI YAN, Materials Science and Eng., U. of Delaware, JOEL SCHNEIDER, National Cancer Institute, NIH, DARRIN POCHAN, Materials Science and Eng., U. of Delaware — Peptides were designed to fold into β-hairpins once exposed to physiological conditions and consequently self-assemble into rigid hydrogel. The network consists of branched and entangled 3nm-wide fibrils. These physical gels shear thin and flow under a proper shear stress but immediately recover back into solids on removal of stress with further rigidity restoring over time. To elucidate mechanisms of these physical properties, gel behavior during and after flow was investigated. Gel stiffness recovered immediately after shear, as well as gel stiffening over time post-recovery, were found dependent on shear rate and shear duration. From scattering measurements during flow, the gel network structure was observed unchanged from the static state at all shear rates investigated. Thus, the peptide gel networks fracture into gel domains (>200nm as determined by scattering) during shear thinning/flow but can instantly percolate back into a solid hydrogel after cessation of shear, stiffening further as particle boundaries relax. As these gels are essentially the same solid material, before and after shear, they offer great potential as well-defined, injectable carriers of biomedical therapies where a desired encapsulated therapeutic payload is delivered to an *in vivo* site by simple syringe injection.

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Date submitted: 20 Dec 2010 Electronic form version 1.4