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Injectable Solid Peptide Hydrogel as Cell Carrier: Effects of Shear Flow on Hydrogel and Cell Payload[1] DARRIN POCHAN, University of Delaware — Peptides were designed to intramolecularly fold into β-hairpins once they are exposed to physiological conditions and then consequently self-assemble into a rigid hydrogel with a network structure of branched and entangled, 3nm-wide fibrils. These physical hydrogels can be injected as preformed solids, because they can shear-thin and consequently flow under an appropriate shear stress but immediately recover back into solids on removal of the stress with gel stiffness restoring over time. In this work, mechanisms of gel shear-thinning and immediate recovery were elucidated by investigating gel behavior during and after flow via mechanical and structural characterizations. Importantly, hydrogel flow behavior was studied in a capillary geometry that mimicked the actual situation of syringe injection. Hydrogel flow profiles were obtained via fluorescent particle tracking and the profile shape was found dependent on flow rate and gel stiffness. Hydrogel nanostructure was probed with small angle neutron and x-ray scattering. The results demonstrate that these hydrogels can be excellent candidates for tissue regeneration substrates and injectable therapeutic delivery vehicles.

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