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Studies on shear-thinning and recovery properties of beta-hairpin peptide hydrogel CONGQI YAN, RADHIKA NAGARKAR, JOEL SCHNEIDER, DARRIN POCHAN, University of Delaware — In solution, freely soluble, unfolded MAX1 peptide ($(VK)_4$-V^DPPT-$(VK)_4$-$CONH_2$) can undergo a conformation change into a foldedβ-hairpin by exposure to a folding stimulus, e.g. pH change, salt addition, or temperature rise. The consequent self-assembly leads to a stiff hydrogel stabilized by physical crosslinks between fibrillar nanostructures. When a proper shear stress is applied, the hydrogel shear-thins and flows. Moreover, as soon as the stress is ceased, the gel immediately reheals into a stiff solid and recovers its original mechanical strength quickly. This shear-thinning and rehealing property makes possible hydrogel delivery via syringe injection. In this work, Rheo-SANS was adopted to monitor the gel network morphology under shear flow. Also, rheological experiments were performed to measure the gel recovery after shear-thinning under various shear treatment conditions. Laser scanning confocal microscopy was used to observe the flow and velocity profile of the hydrogel through a channel. The results explain morphology changes of the gel network during shear-thinning and subsequent rehealing process. The fundamental gel shear-thinning and rehealing mechanisms will be discussed.

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