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Direct Observation of Early-Time Hydrogelation in β-Hairpin Peptide Self-Assembly TUNA YUCEL, Materials Science and Engineering, University of Delaware, Newark, DE 19716, JOEL SCHNEIDER, Chemistry and Biochemistry, University of Delaware, Newark, DE 19716, DARRIN POCHAN, Materials Science and Engineering, University of Delaware, Newark, DE 19716 — Triggered hydrogelation of MAX 1 peptide (NH_2-$(VK)_4$-V^DPPT-$(KV)_4$-$CONH_2$) proceeds through peptide intramolecular folding into β-hairpins and immediate self-assembly into branched clusters of well defined (uniform, 3 nm cross section), semi-flexible, β-sheet-rich nanofibrils. Cryogenic transmission electron microscopy indicates that dangling fibrils extend from one growing cluster to another and lead to early, intercluster communication in solution. At the apparent percolation threshold, the dynamic shear modulus measured by oscillatory rheology ($G'(\omega), G"(\omega) \propto \omega^n$) and the field-intensity autocorrelation function measured by dynamic light scattering ($g_1(\tau) \propto \tau^{-\beta'}$) show power-law behavior with comparable critical dynamic exponents ($n \approx 0.47$ and $\beta\prime \approx 0.45$). Finite interpenetration of percolating cluster with smaller clusters, along with permanent intercluster entanglements, increase the network rigidity. The self-assembly of MAX 1 peptide was compared and contrasted with the assembly of other biopolymeric networks in literature.

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