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Effect of Beta-Hairpin Peptide Strand Length on the Dynamics of Semiflexible Networks BULENT OZBAS, DARRIN POCHAN, Materials Science and Engineering Department, University of Delaware, KARTHIKAN RAJAGOPAL, JOEL SCHNEIDER, Chemistry and Biochemistry Department, University of Delaware — Semiflexible behavior of fibrillar networks formed by the intramolecular folding and consequent self-assembly of beta hairpin peptides was characterized using rheological, electron microscopy, and neutron scattering measurements. The peptide molecules used are locally amphiphilic with two linear strands of alternating hydrophobic valine and hydrophilic lysine amino acids flanking a central turn sequence. The effect of number of amino acid residues of the beta-hairpin molecules (24, 20, 16, 12) on the folding, beta-sheet and self-assembly were studied by CD and FTIR spectroscopy. The network properties of the hydrogels and the nanostructure of the fibrillar assemblies were studied by TEM and SANS. The results show that local nanostructure of the fibrils is similar. The cross-sectional diameter of the fibrils, and thus, the bending modulus of the chains vary with the number of amino acids of strands of the molecules. Dynamic oscillatory and transient rheological measurements were employed to probe the differences in the dynamics of the fibrillar network structure. Rheological results reveal that rigidity of the hydrogels differ with strand length of the molecules. An increase in the relaxation times of the network was observed with decreasing cross-section diameter of the fibrils.

Bulent Ozbas

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