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Fibril Formation and Phase Separation in Aqueous Cellulose Ethers AMANDA MAXWELL, University of Minnesota, Department of Chemistry, PETER SCHMIDT, University of Minnesota, Department of Chemistry and Materials Science, JOHN MCALLISTER, JOSEPH LOTT, University of Minnesota, Department of Chemistry, FRANK BATES, University of Minnesota, Department of Chemistry and Materials Science, TIMOTHY LODGE, University of Minnesota, Department of Chemistry — Aqueous solutions of many cellulose ethers are known to undergo thermoreversible gelation and phase separation upon heating to form turbid hydrogels, but the mechanism and resulting structures have not been well understood. Turbidity, light scattering and small-angle neutron scattering (SANS) are used to show that hydroxypropyl methylcellulose (HPMC) chains are dissolved in water below 50 °C and undergo phase separation at higher temperatures. At 70 °C, at sufficiently high concentrations in water, HPMC orders into fibrillar structures with a well-defined radius of 18 ± 2 nm, as characterized by cryogenic transmission electron microscopy and SANS. The HPMC fibril structure is independent of concentration and heating rate. However, HPMC fibrils do not form a percolating network as readily as is seen in methylcellulose, resulting in a lower hot-gel modulus, as demonstrated by rheology.

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