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Large-amplitude oscillatory shear of methylcellulose solutions through the sol-gel transition JOHN W. MCALLISTER, JOSEPH R. LOTT, FRANK S. BATES, TIM P. LODGE, University of Minnesota — Methylcellulose (MC) is a chemically modified polysaccharide that is partially substituted by methoxy groups. Aqueous MC solutions undergo gelation and phase separation (LCST) upon heating, which is attributed to the assembly of molecules into fibrillar structures noted by cryo TEM images and small angle neutron scattering. The transition from a strain-softening solution to a strain hardening gel upon heating has been probed using large-amplitude oscillatory shear (LAOS). In addition to strain hardening, MC solutions exhibit positive normal stresses (pressing the plates of the rheometer apart) while MC gels exhibit negative normal stresses (contracting the plates together) at stresses larger than 10 Pa. Nonlinear rheological responses are a useful probe to monitor structure-property relationships as MC transitions from a solution to a gel.

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