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**Rheo-NMR measurements of shear alignment and banding in non-ionic wormlike micelles** LOUIS A. MADSEN, EDWARD T. SAMULSKI, University of North Carolina - Department of Chemistry, RALPH H. COLBY, Pennsylvania State University - Department of Materials Science and Engineering, BRADLEY S. DOUGLASS, PAUL T. CALLAGHAN, Victoria University of Wellington - Department of Physics — Orientational order produces myriad nonlinear effects in complex fluids such as polymer solutions, liquid crystals, and anisotropic colloids. Wormlike micelles (WLMs) exhibit especially fascinating rheological properties since the component molecules order relative to the tube axis, which itself acts as a supramolecular polymer backbone. Equilibria between wormlike and spherical micelles may be controlled using temperature, concentration, or additives to modulate properties (e. g., viscosity) over several orders of magnitude. We have investigated a new class of WLMs composed of non-ionic triblock copolymers (PEO-PPO-PEO) mixed with alcohol additives to stabilize the core. We have employed in-situ rheo-NMR spectroscopy and microscopy in a Couette shear cell to observe the first shear-induced alignment and banding in a non-ionic block-copolymer system. Deuterium-labeled additives exhibit gap-dependent spectral splittings, assessing the molecular alignment versus shear rate. Proton NMR microscopy probes shear banding across the Couette cell gap with resolutions down to 20 microns.

Louis A. Madsen
University of North Carolina - Department of Chemistry

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