**Title:** Water-Based Cellulose Liquid Crystal System Investigated by Rheo-NMR

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**Abstract:** Water-based cellulose cholesteric liquid crystalline phases at rest can undergo structural changes induced by shear flow. This reflects on the deuterium spectra recorded when the system is investigated by rheo-nuclear magnetic resonance (rheo-NMR) techniques. In this work, the model system hydroxypropylcellulose (HPC)+water is revisited using rheo-NMR to clarify unsettled points regarding its behavior under shear and in relaxation. The NMR spectra allow the identification of five different stable ordering states, within shear and relaxation, which are well integrated in a mesoscopic picture of the system's structural evolution under shear and relaxation. This picture emerging from the large body of studies available for this system by other experimental techniques, accounts well for the NMR data and is in good agreement with the three distinct regions of steady shear flow recognized for some lyotropic LC polymers. Shear rates in between 0.1 and 1.0 s(-1) where investigated using a Taylor-Couette flow and deuterated water was used as solvent for the deuterium NMR (DNMR) analysis.

**Keywords Plus:** Nuclear-Magnetic-Resonance; Hydroxypropylcellulose Solutions; Molecular-Orientation; Aqueous-Solutions; Polymer; (Hydroxypropyl)Cellulose; Films; Temperature; Flow

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