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Rheo-Optics of Thermotropic Cellulose-Based Liquid Crystals

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It is well known that cellulose derivatives can form thermotropic liquid crystalline phases at room temperature [1]. In this work, acetoxypropylcellulose (APC), propionate hydroxypropylcellulose (PPC) and butyrate hydroxypropylcellulose (BPC) esters [2, 3] were revisited to assess their rheo-optical properties, with the aim of elucidating how molecular-level modifications influence their physicochemical behavior. Preliminary studies show that BPC is the most promising cellulose derivative to generate liquid crystal elastomers due to its lower viscosity at room temperature and under the same shear rate compared to APC and PPC. Moreover, for APC, PPC and BPC with the same molecular weight and degree of substitution, the three regions of the Onogi and Asada curve were observed, as well as the development of band textures, which were followed during and after shearing. This work aims to unveil the potential use as precursors of these thermotropic systems for the development of polysaccharide-based liquid crystal elastomers.

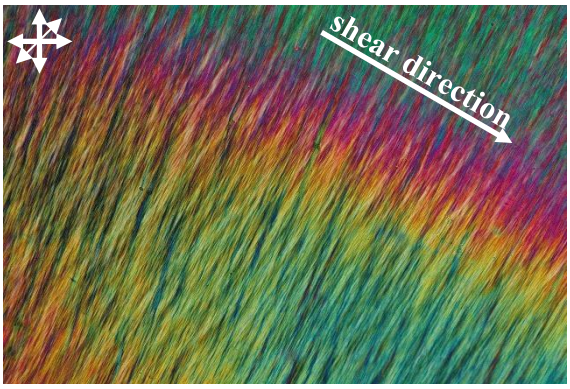

Figure 1. Example of a band texture developed after shearing obtained from butyrate hydroxypropylcellulose ester at room temperature.

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