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First experimental determination of permanent and induced electric dipolar moments of colloidal cellulose nanocrystals dispersed in apolar solvents[1] BRUNO FRKA-PETESIC, BRUNO JEAN, LAURENT HEUX, CERMAV-CNRS — Scientists and industrialists show a growing interest for cellulose nanocrystals (CNCs) since these rod-like nanoparticles display excellent mechanical properties that make them perfect candidates for the design of high performance biobased composites. Furthermore, CNCs can be obtained as colloidal suspensions in apolar solvents that form chiral nematic (cholesteric) liquid crystals. Our aim is to obtain homogeneous unidimensionnal structures to enhance the optical and/or mechanical properties of CNCs-based architectures at a macroscopic scale. Using electric fields, CNCs suspensions from either cotton or tunicate were succesfully oriented in the direction of an electric field, in both AC and DC configurations. To probe the electric field induced orientation of the CNCs, a birefringence experimental set-up has been developped. While applying short electric DC field pulses, static and transient birefringence has been measured in diluted isotropic suspensions. From these measurements, we determined both the permanent and induced electric dipolar moments of the CNCs, whose effects appeared to be of the same order of magnitude. The results are discussed regarding to the CNC type and the apolar solvent used.

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Bruno Frka-Petesic
CERMAV-CNRS

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