

Biomimetic photonic cellulose films

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Cellulose nanocrystals are nanoparticles obtained by hydrolyzing natural cellulose fibers. This nanomaterial is promising due to an exceptional mechanical stiffness and interesting photonic light-matter interactions following the self-assembly of these rods into helices. Jointly at CERMAV (Grenoble) and in the “Bio-inspired photonics” group of S. Vignolini (Cambridge U.), we develop the latter application by dispersing cellulose nanocrystals in organic solvents, that allow helices to interact with light in the visible range.

The JEPO-2018 talk will deal with the optimization of the iridescence of cellulose nanocrystal helices in organic solvents using magnetic and electric fields. We will see that they are a very powerful tool to finely tune the orientation as well as the iridescence response of the cellulose nanocrystal helices. The last part of the talk will be dedicated to making an advanced material by photopolymerizing oriented suspensions. Key aspects like retaining cholesteric organization and orientation during polymerization will be discussed.