

Flexible Chiral Nematic Cellulose Nanocrystals Film with Brilliant and Tunable Structural Color

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Cellulose nanocrystals (CNCs), which have also been named as cellulose nanowhiskers or nanocrystalline cellulose, are rod-like or whisker shaped particles with diameters of a few nanometers and a screw symmetry. The physical principles behind structural colors have inspired numerous efforts to generate photonic materials based on cellulose nanocrystals. In the colorful biological world, the animals that use camouflage such as *Paracheiroidon innesi*, *Charidotella egregia* can reversibly change their structural colors in response to external stimuli in the surrounding environment [1]. Inspired from these animals, we have developed flexible and chiral nematic CNC/polyethylene glycol (PEG) composite films that exhibit humidity-responsive structural color change (Figure 1).

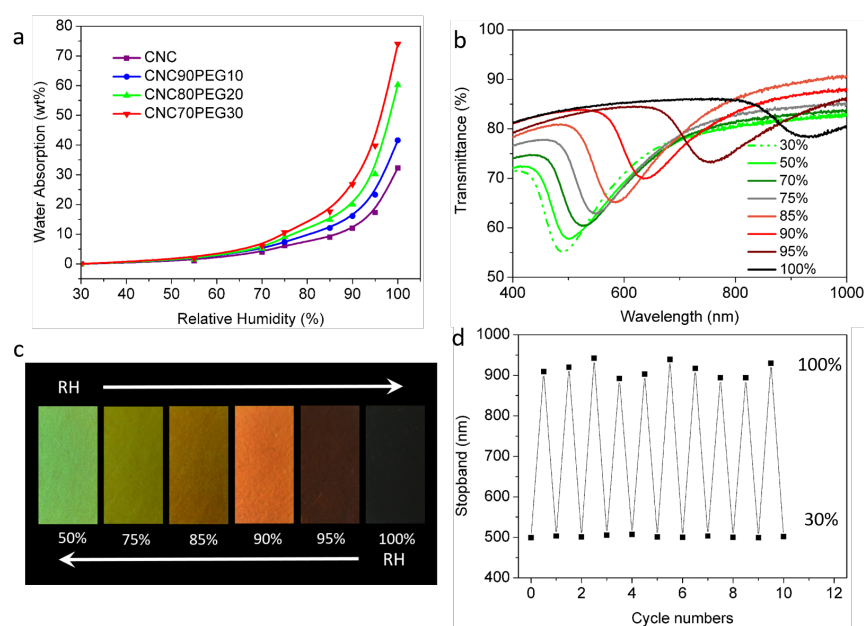


Figure 1. a) Water uptake of the CNC and CNC/PEG composite films. b) UV-Vis spectra of the CNC80PEG20 composite film at different relative humidity (RH). c) Photographs of the CNC80PEG20 composite film at different RH. d) Reversible conversion of the stopband position of the CNC80PEG20 composite film by exposing to increasing and decreasing RH conditions between 30% and 100%.

References

- [1] Y. Zhao, Z. Xie, H. Gu, C. Zhu, Z. Gu, Chem. Soc. Rev., 2012, 41, 3297-3317.