

# ADVANCED MATERIALS

## Supporting Information

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Flexible Photonic Cellulose Nanocrystal Films

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## **Electronic Supporting Information**

### **Flexible photonic cellulose nanocrystal films**

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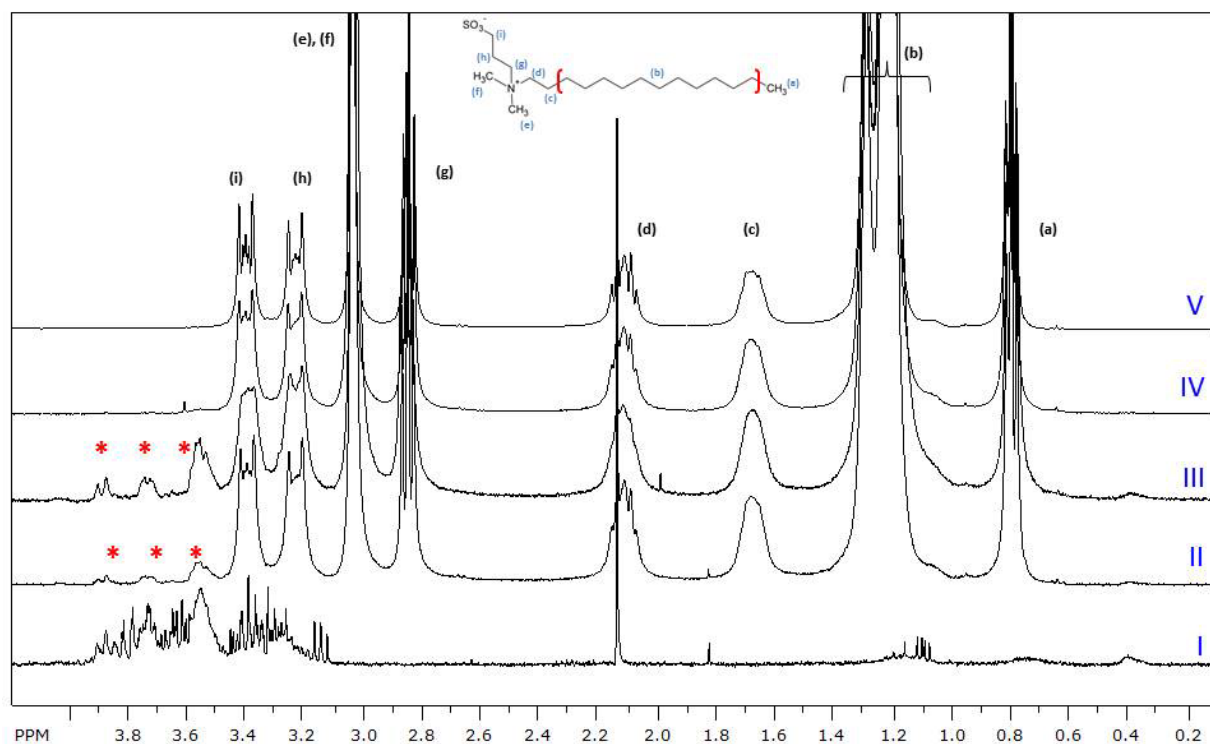
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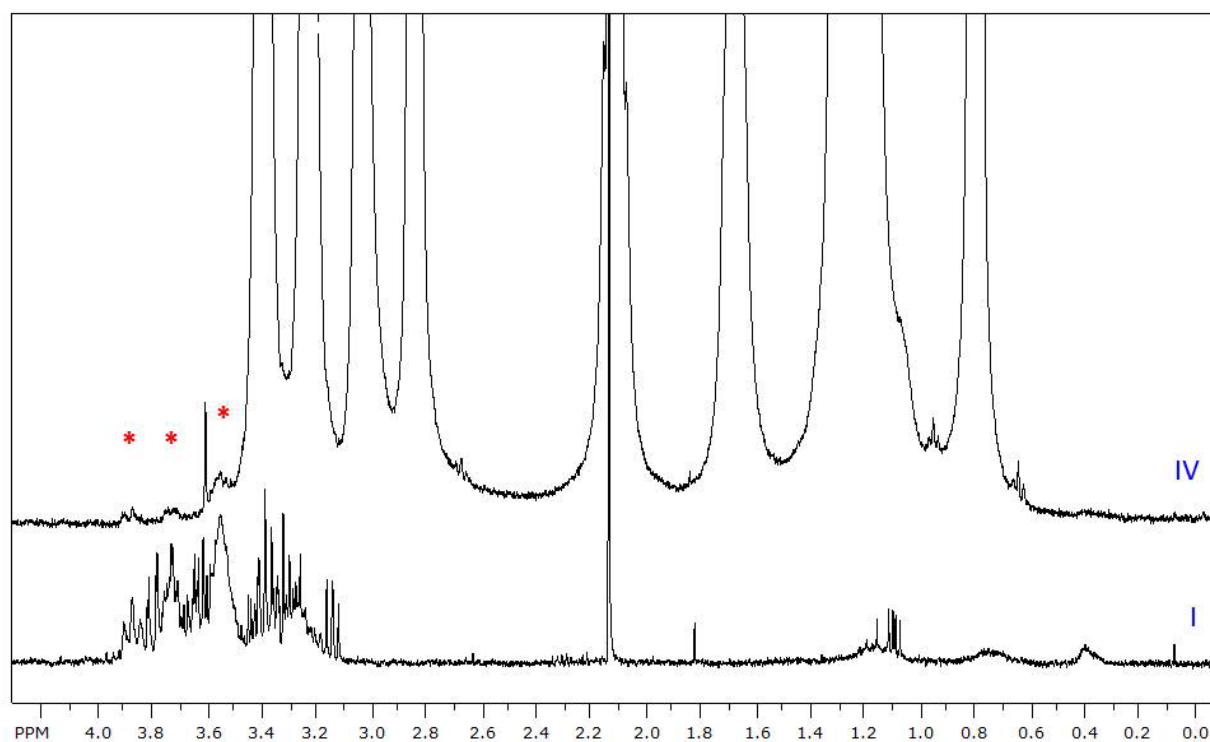
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Supplementary Figures

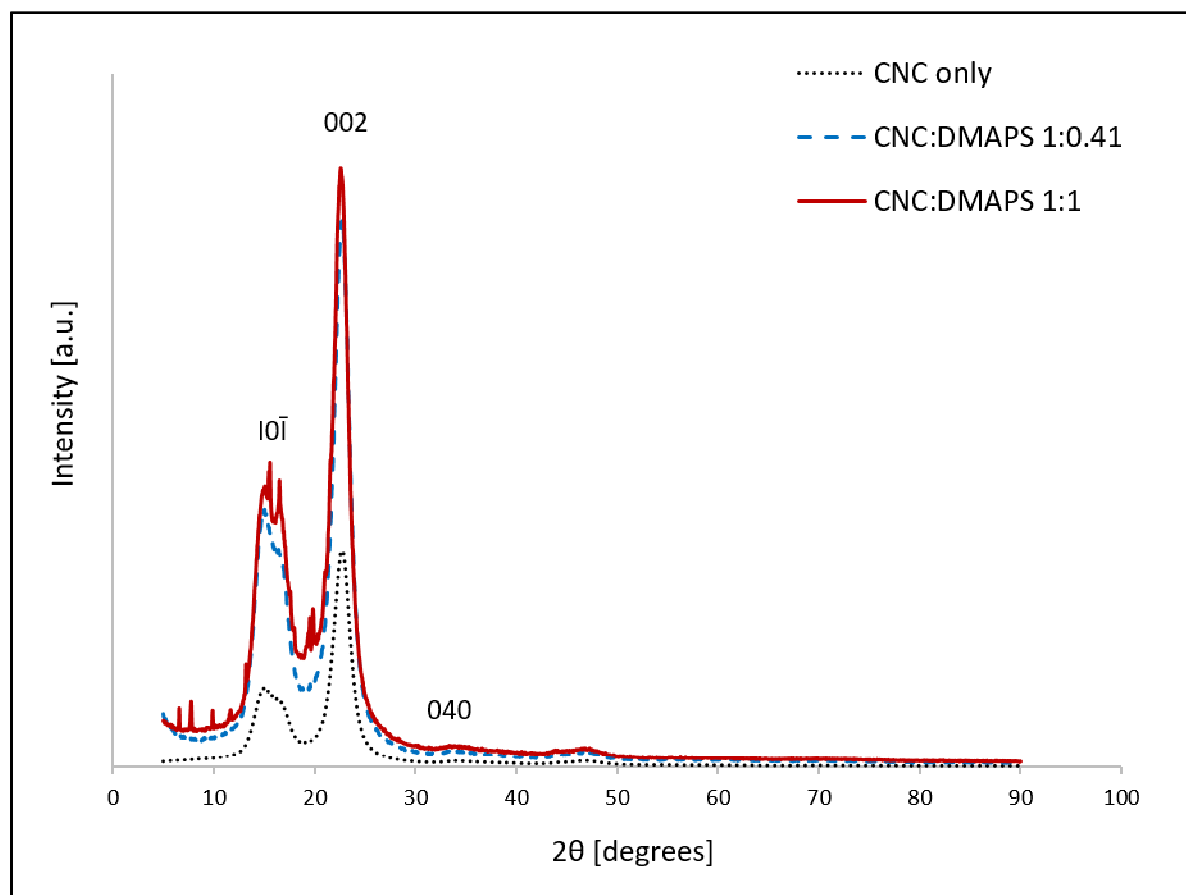
(a)



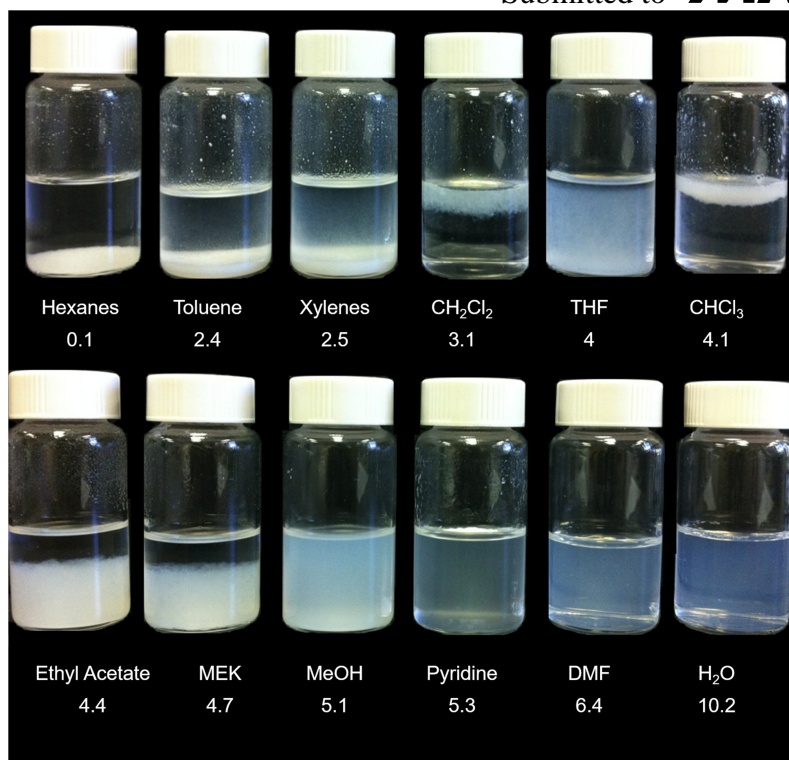
(b)



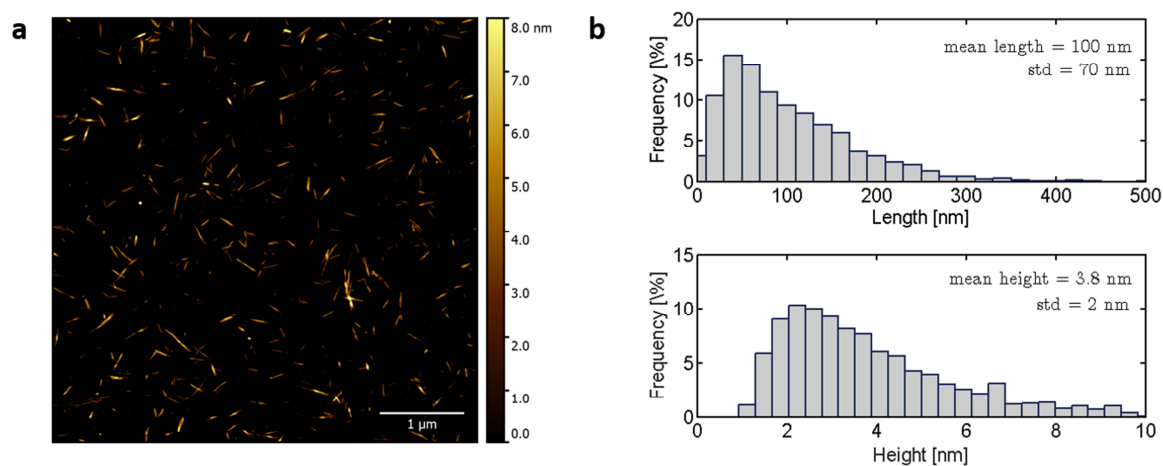
**Figure S1.** (a)  $^1\text{H-NMR}$  of Na-CNC (curve I) and CNC-DMAPS suspensions at mass ratio 1:0.41 prepared using H-CNC (pH~3) (curve II) and Na-CNC (pH~7) (curve III). The fourth curve (IV) represents CNC-DMAPS suspension at mass ratio 1:1 using Na-CNC (pH~7), while curve (V) represents the DMAPS solution. (\*) peaks are assigned to CNC protons. An increased scale for curve (IV) is given in (b). It is evident from the above that the CNC-DMAPS complex is present in the solutions at varying mass ratios and pH values, which confirms successful adsorption of the zwitterionic surfactant onto the CNC surfaces.



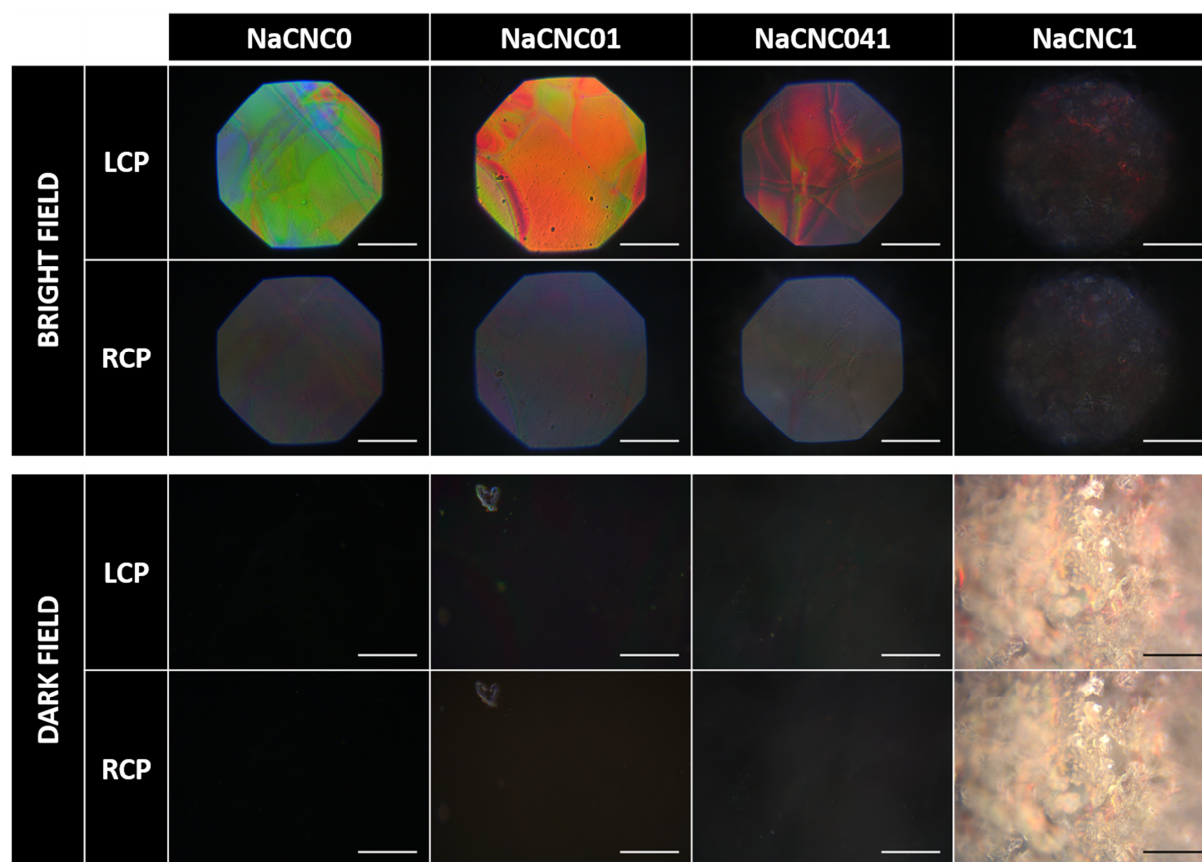
**Figure S2.** PXRD patterns of evaporation-induced self-assembled (EISA) CNC-DMAPS films shows well defined peaks assigned to the (002) plane at  $2\theta \approx 22.7^\circ$  and the (101) and (10 $\bar{1}$ ) planes at  $2\theta \approx 14-17^\circ$ , as well as a contribution from the (040) plane at  $2\theta \approx 34.3^\circ$ . Shown are patterns for CNC:DMAPS mass ratio 1:0.41 (blue) and 1:1 (red) vs. neat CNC (black) confirming CNC structural integrity within complex. Neat CNC intensity curve is scaled.



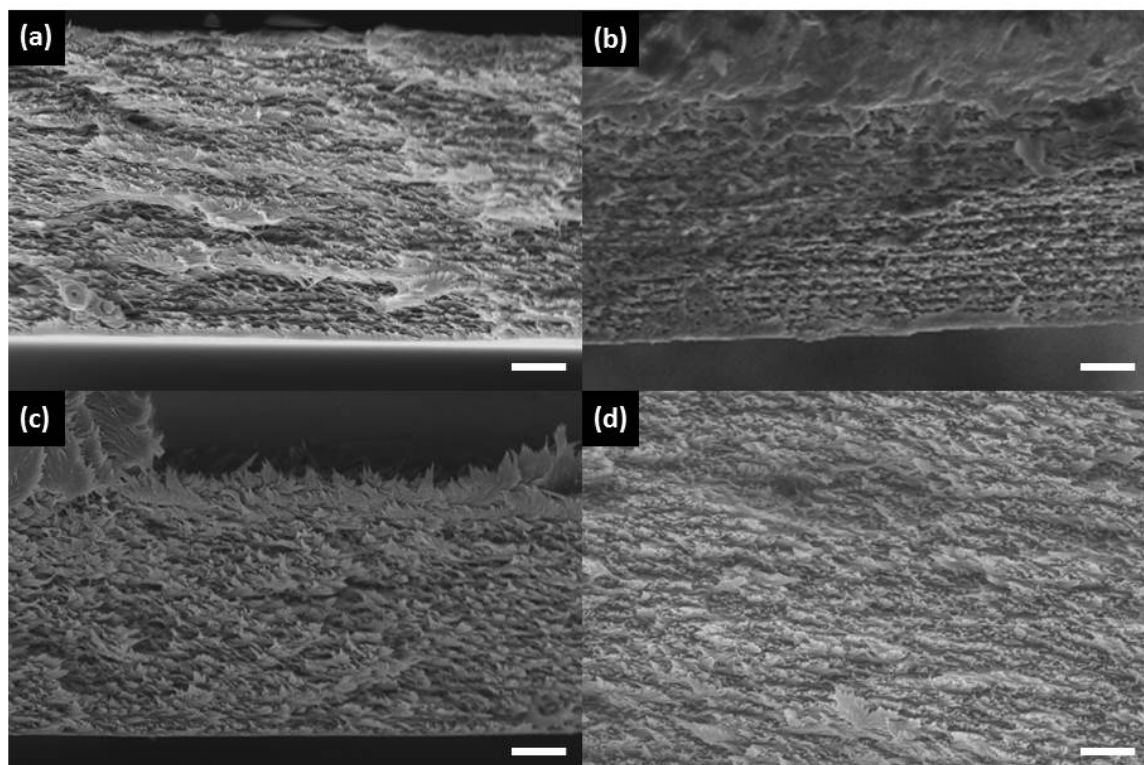
**Figure S3.** Pictures depicting dispersion of DMAPS-CNC complexes in various solvents, with their corresponding polarity index. DMAPS-CNC complexes, like pure CNC, are dispersible in polar protic solvents, like water, and some polar aprotic solvents, like N,N-dimethylformamide (DMF) and pyridine, but not in non-polar solvents, like toluene.



**Figure S4.** (a) Representative image of the CNCs (b) Length and height distributions of the CNCs. The average length and height are respectively 100 nm and 3.8 nm, for a total number of measured rods equal to 2331 for the length and 2303 for the height.



**Figure S5.** Bright and dark field micrographs, acquired for the left-, LCP, and for the right circular polarisation, RCP for the Na-CNC films with increasing amount of DMAPS. Scale bars are 100  $\mu\text{m}$ .



**Figure S6.** SEM images depicting the cross section of (a) pure CNC and DMAPS:CNC films prepared at (b) 1:0.1, (c) 1:0.41 and (d) 1:1 CNC:DMAPS mass ratios. No CNC/DMAPS segregation is visible confirming the excellent homogeneity of the fabricated films, whereas irregularities are due to film breaking-by-hand. Scale bars are 1 $\mu$ m.