

Office Waste Paper as Cellulose Nanocrystal Source

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Cellulose nanocrystals (CNC) were isolated from office waste paper using an alkali solution treatment and a subsequent acid hydrolysis process with 64 wt% H₂SO₄ at 45 °C for 30 min [1]. The CNC obtained after 2 wt% NaOH treatment and the subsequent acid hydrolysis was labelled as CNC1, while the CNC obtained after 7.5 wt% NaOH treatment was labelled as CNC2. Figure 1 shows the X-ray diffractograms of office waste paper and CNCs. All diffractograms showed peaks related to cellulose I [1,2]. Nevertheless, CNC2 sample showed peaks related to cellulose II [1,3] suggesting the partial conversion of cellulose I into cellulose II. Moreover, diffractograms of office waste paper showed peaks related to calcite [1,4] whereas in the diffractograms of CNCs, these peaks were not observed corroborating the removal of calcite. Figure 2 shows the micrographs obtained by atomic force microscopy (AFM). AFM micrographs confirmed the presence of cellulose nanocrystals and it was observed that the diameter of CNC samples was around 5-6 nm and the length of isolated CNC samples varied with the applied alkali treatment.

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Figures

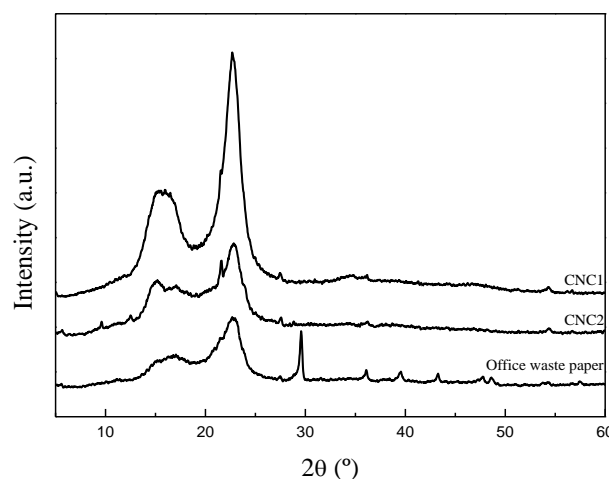


Figure 1: X-ray diffractograms of office waste paper and CNCs.

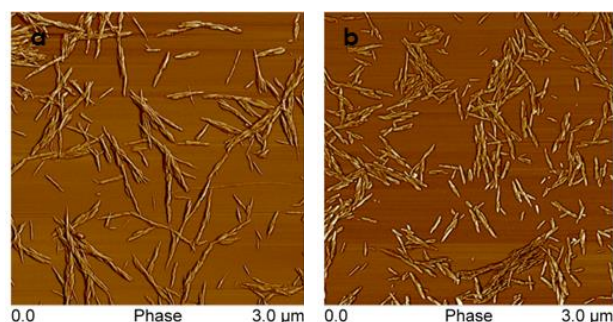


Figure 2: AFM of CNC samples obtained after different chemical treatment conditions: (a) CNC1 and (b) CNC2.