

EXTRACTION AND CHARACTERIZATION OF CELLULOSE NANOCRYSTALS FROM FILTER PAPER USING SULFURIC ACID HYDROLYSIS

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Cellulose nanocrystals are celluloses at the nanoscale that are taken from natural fibres and arranged in a tightly structured crystalline particle structure. The aim of this study was to look into the utilization of Whatman filter papers as a source of raw materials for the extraction of cellulose nanocrystals. Whatman filter paper is a cellulose paper created by utilizing a significant amount of alpha-cellulose. Its contents are a sign of its consistency and excellent quality, as alpha cellulose is thought to be the most stable form of cellulose. Cellulose nanocrystals extraction from Whatman filter papers using sulfuric acid hydrolysis was studied, and extracted cellulose nanocrystals were characterized. The sulfuric acid hydrolysis was performed with 64% (w/w) sulfuric acid and combined using a liquor ratio of 1:20 with Whatman filter paper while being subjected to strong magnetic stirring at 50 °C for 90 min. The extracted cellulose nanocrystals have been characterized by Transmission Electron Microscopy (TEM) analysis, Fourier Transform Infrared (FTIR) spectroscopy analysis and X-ray Diffraction (XRD) analysis. The TEM analysis clearly showed the formation of needle-shaped CNC particles having a size range between 10-30 nm in diameter and 100-200 nm in length. The FTIR spectrum showed the functional groups of the isolated cellulose nanocrystals from Whatman filter paper using sulfuric acid hydrolysis. XRD pattern confirmed that the CNCs from the Whatman filter paper could be extracted through sulfuric acid hydrolysis.

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