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Spherical Cellulose Nanoparticles Preparation from Waste Cotton using a Green Method

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ABSTRACT

Cellulose nanoparticles with spherical morphology were prepared through enzymatic hydrolysis of waste cotton fibers and sonication treatment. The nanoparticles were characterized with viscometer, field emission scanning electron microscope, particle size analyzer, fourier transform infrared spectroscopy, X-ray diffraction, and thermogravimetric analysis. The results indicated the average particle size of cotton fibers after hydrolysis and sonication process was 0.526 μm and less than 100 nm, respectively. The crystalline structure of cellulose was preserved following hydrolysis and ultrasonic processes, with the decline in its polymerization degree, though. Additionally, there was no significant change in the crystallinity. Moreover, thermal degradation showed the hydrolysis and sonication of cotton would have no effect on the chemical fingerprints of the cellulose.

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