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Extraction of Cellulose Nano Whiskers from Poplar Wood

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Abstract:

In this study, cellulose nano whiskers were extracted from poplar (wood plant) by a chemo-mechanical process. In the chemical step, non-cellulosic materials were removed treating fibers by sodium hydroxide and hydrochloric acid. Afterward, the obtained pulp was bleached twice using hydrogen peroxide (H_2O_2) and then in the final step sodium hypochlorite ($NaHClO$) was applied to eliminate the remained lignin. The results of chemical characterization revealed that hemicellulose and lignin were completely removed from the structure of cellulose. The percentage of cellulose in treated fibers' structure was 89.6%. In the mechanical process to disintegrate fibers to nano scale, an ultrasonication (400 W) and a super grinder were used. The SEM analysis showed that the diameter of extracted nano whiskers ranged between 15-35 nm.

Keywords: Poplar fiber, Cellulose, Nano whisker, Chemo-mechanical process, Super grinder.