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Research Article

Optimum Yield of Empty Fruit Bunches Cellulose Nanofibers by Deep Eutectic Solvent and Ultrasonication

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Abstract

Cellulose nanofibers (CNFs) are extensively utilized as affordable, renewable materials. The conventional technique for making CNFs is time-consuming, requires hazardous toxic chemicals, and consumes enormous amounts of energy. CNFs from empty fruit bunches (EFB) were produced via deep eutectic solvent (DES) and ultrasonication. The DES treatment conditions were optimized using the central composite design (CCD) approach of response surface methodology (RSM). Analysis of variance (ANOVA) revealed that the reaction time, DES molar ratio, and temperature were all significant variables. The experimental results closely correspond to the theoretical model of CNFs yield. X-ray diffraction (XRD) studies demonstrated that the crystallinity index of the CNFs increased significantly after sonication. It could be stated that DES treatment and ultrasonication were effective ways to successfully generate CNFs from EFB. This study may serve as foundation for high-yield, industrial-scale synthesis of nanocellulose using DES treatment.

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