

Process development for the preparation of cellulose fibers and nanocrystals from rice husk using alkaline catalyst

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Cellulose nanocrystals (CNC) and cellulose nanofibers (CNF) were produced from rice husk. Alkali treatment was applied to remove substances (ash, lignin, C5) except for cellulose from rice husk. The Response-Surface Methods (RSM) was used to optimize the reaction temperature, reaction time, and NaOH concentration for effective alkaline management. At the optimum condition (150 °C, 45 min, 6 wt% NaOH) obtained using RSM, the ash and lignin contents were 99.65% and 81.36%, respectively.

A bleaching process was performed using H<sub>2</sub>O<sub>2</sub> and ClO<sub>2</sub> in order to remove the residual lignin and the remaining impurities in the process. CNF were made of the bleached solids using physical milling (planetary milling) process. Chemical process was also used to produce CNC (80 °C, 15-150 min, 40 wt% sulfuric acid). The particle size and shape of the produced CNC and CNF were confirmed through XRD and SEM analysis.