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Lab scale production of nanocrystalline cellulose (NCC) from rice husk biomass

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The objective of the study is to produce nanocrystalline cellulose (NCC) from rice husk by chemical extraction process. In order to produce NCC, raw rice husk (RRH) was grinded and converted to powder form. Powder rice husk was obtained by sieving and the particles in the 75-710 μm size range was used for experimental work. The production of NCC was conducted into the jacketed glass reactor at 80°C temperature under predetermined experimental conditions. In this work NaOH (4M) solution was used for delignification process. After certain experimental time delignified powder RH was collected from the reactor then washed, bleached and finally hydrolyzed in order to degrade cellulose to nanocrystalline cellulose (NCC). For bleaching and hydrolysis processes NaOCl (20%) and H₂SO₄ (4M) solutions were used, respectively. The resultant products from hydrolysis was neutralized by buffer solution and analyzed by FTIR, XRD, SEM, AFM and TEM. From the analysis, NCC has been identified successfully and the particle dimension has been confirmed to be in the range of 20-50 nm. From XRD results, the crystallinity of NCC was found to be approximately 45%.

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