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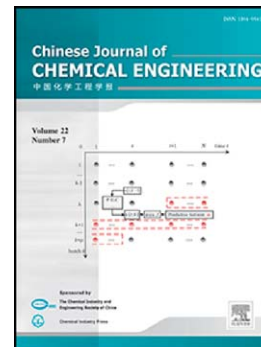
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Separation Science and Engineering

**POTENTIAL ASPECT OF RICE HUSK BIOMASS IN AUSTRALIA FOR
NANOCRYSTALLINE CELLULOSE PRODUCTION**

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Abstract

Nanocrystalline cellulose (NCC) was produced from rice husk biomass (*Oryza Sativa*) by chemical extraction process to explore the potential aspect of agro-waste biomass in Australia. In this work, the delignified rice husk pulp (D-RHP) was produced by alkaline delignification of raw rice husk biomass (R-RHB) using 4M alkali solutions (NaOH) in a jacketed glass reactor under specific experimental conditions. D-RHP was bleached using 15 % sodium hypochlorite, and the bleached rice husk pulp was coded as B-RHP. Finally, raw suspension of NCC was produced by the acid hydrolysis of B-RHP using 4M sulphuric acid. The raw suspension of NCC was neutralized by a buffer solution and analyzed by TAPPI, FT-IR, XRD, SEM, AFM, and TEM. FT-IR spectra of NCC are different to R-RHB but similar with B-RHP and D-RHP. From XRD results, the crystallinity of NCC was found to be approximately 65 %. In AFM analysis particle thicknesses have been confirmed to be in the range of (25±15.14) nm or (27±15.14) nm which almost same. From TEM analysis particle dimensions have been confirmed to be in the range of (50±29.38) nm width and (550±302.75) nm length with the aspect ratio ~ 11:1 (length/diameter) at 500 nm scale bar. On the other hand, at 200 nm scale bar the particle dimensions have been confirmed to be in the range of (35±17) nm width and (275±151.38) nm length with the aspect ratio ~8:1. The aspect ratio of individual crystalline domain was determined in TEM analysis which is 10:1 (100/10). Therefore the aspect ratios and dimensions of nanoparticles in NCC suspension are almost same and in nano-meter scale, as confirmed from both AFM and TEM results. The yield of NCC from B-RHP was found to be approximately 95%, and the recovery of cellulose from R-RHB is about 90%.

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