THE EFFECT OF CONCENTRATION AND DRYING METHOD ON ISOLATION OF NANOCELLULOSE FROM OIL PALM EMPTY FRUIT BUNCH BIOMASS

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ABSTRACT

THE EFFECT OF CONCENTRATION AND DRYING METHOD ON ISOLATION OF NANOCELLULOSE FROM OIL PALM EMPTY FRUIT BUNCH BIOMASS

In this study, cellulose nanocrystal (CNC) was isolated from oil palm empty fruit bunch (OPEFB) fiber using different concentration formic acid hydrolysis and cellulose nanofiber (CNF) was isolated from oil palm empty fruit bunch (OPEFB) using different concentration of sodium hydroxide alkaline treatment. CNC and CNF were characterized using Fourier transform infrared (FTIR) and Ultraviolet visible (UV-Vis). FTIR analysis show complete removal of lignin and hemicellulose due to the absence of peaks around 1200 cm^{-1} and 1700 cm^{-1} respectively. The wavelength for both CNC and CNF are around 750 nm with the highest percentage transmittance around 98%. Then, CNC and CNF were subjected to three drying methods: air-drying (AD), freeze-drying (FD) and oven-drying (OD). The crystallinity of the dried nanocellulose was evaluated using X-ray diffraction (XRD). The calculated crystallinity index (CI) of each drying method are different. CNC-FD and CNF-FD show the highest crystallinity index (CI) which are 78.20% and 74.85%, respectively. This comparative study could help in improving the isolation method of nanocellulose.