EFFECT OF TEMPERATURE ON THE THERMAL STABILITY OF CELLULOSE NANOFIBRIL (CNF) AND ITS FUNCTIONALIZED DERIVATIVE

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This Final Year Project Report entitled **"Effect of Temperature on the Thermal Stability of Cellulose Nanofibril (CNF) and Its Functionalized Derivative"** was submitted by Maizatul Saadiah Mesni, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry, in the Faculty of Applied Sciences, and was approved by

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ABSTRACT

EFFECT OF TEMPERATURE ON THERMAL STABILITY OF CELLULOSE NANOFIBRIL (CNF) AND ITS FUNCTIONALIZED DERIVATIVE

Nanocellulose possess good properties such as renewable, biodegradable and low cost which suitable in various application. The aim of this study is to isolate cellulose nanofibril (CNF) from oil palm empty fruit bunch (OPEFB) fiber using sodium hydroxide (NaOH) alkaline treatment at different temperature (45 ˚C, 55 ˚C, 65 ˚C, 75 ˚C, 85 ˚C). The isolated CNF was further functionalized with sodium monochloroacetic acid (MCA) by alkalization and etherification process to form carboxymethyl cellulose nanofibril (CM-CNF). All the product of CNF and CM-CNF was characterized using Attenuated Total Reflection-Fourier Transform Infrared (ATR-FTIR), Ultraviolet Visible (UV-Vis) and Thermal Gravimetric Analysis (TGA). The highest percentage yield obtained is CNF-55 with 28.97% as well as CM-CNF 65 with 93%. Infrared analysis of CNF showed the absence peaks at 1700 cm^{-1} and 1200 cm^{-1} indicating efficiently removed of hemicellulose and lignin after bleaching process. The CM-CNF spectra showed the new peak appeared at 1600 cm^{-1} represent the substitution of hydrogen atom to carboxyl group (COO^-). Analysis of visible light transmittance suggest, CNF has a smaller diameter size due to higher percentage transmittance obtained was above 90% which indicate in all condition. CNF-55 and CM-CNF 55 showed a better thermal stability due to the efficiency in removing lignocellulosic materials.