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Characterization of Polyethylene Nanocomposite Prepared by One-pot Extrusion Method

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Abstract. This study attempts to produce polyethylene (PE) nanocomposites reinforced with cellulose nanofiber (CNF) derived from oil palm mesocarp fibers (OPMF). Unlike other polymers, PE has always been underestimated and it was extensively been used as packaging products. Therefore, instead of being continuously used for the manufacturing of low-value products, the prospect of PE for the manufacturing of high-end products should be identified. In order to do so, the properties of PE needs to be improved and one of the possible method to improve the properties of PE is by reinforcing CNF during composite processing stage. Most conventional methods however required two separated processing; nanofibrillation and composite fabrication. In this study, cellulose extracted from OPMF was nanofibrillated and subsequently fabricated into PE matrix by one-pot extrusion method. Results obtained from this study showed that nanocomposites prepared by one-pot extrusion recorded 57, 93, 198, and 25% higher for tensile strength, Young's modulus, flexural strength and flexural modulus, respectively compared to the neat PE. This study hence proved that one-pot extrusion method is able to produce nanocomposite with better mechanical properties compared to the neat PE.

Keywords: Nanocomposites, cellulose nanofiber, polyethylene, one-pot extrusion, mechanical properties