Effect of delignification on the physical, thermal, chemical, and structural properties of sugar palm fibre

ABSTRACT

Eco-friendly composites can be prepared by substituting man-made synthetic fibres with various types of cellulosic fibres. Sugar palm-derived nanocrystalline cellulose is a potential substitute. The most important factor in determining a good nanofiller reinforcement agent that can be used in composites is the character of the nanofiller itself, which is affected during a preliminary treatment. Thus, to gain better nanofiller properties, the delignification ($NaClO_2$ and CH_3COOH) and mercerization ($NaOH$) treatments must be optimized. The main objective of this study was to identify the effects of the delignification and mercerization treatments on sugar palm fibre (SPF). In addition, the characteristics of the SPF for the preparation of the hydrolysis treatment to produce nanocrystalline cellulose (NCC) for reinforcement in polymer composites were examined. Sugar palm cellulose (SPC) was extracted from the SPF, and its structural composition, thermal stability, functional groups, and degree of crystallinity were determined via field emission scanning electron microscopy (FESEM), thermogravimetric analysis (TGA), Fourier transform infrared (FTIR) spectroscopy, and X-ray diffraction (XRD), respectively. The density, moisture content, chemical composition, and structure of the SPC were also analysed.

Keyword: Sugar palm fibre; Delignification; Mercerization; Sugar palm cellulose; Sugar palm acid-treated fibres