

Morphological, physiochemical and thermal properties of microcrystalline cellulose (MCC) extracted from bamboo fiber

ABSTRACT

Bamboo fibers are utilized for the production of various structures, building materials, etc. and is of great significance all over the world especially in southeast Asia. In this study, the extraction of microcrystalline cellulose (MCC) was performed using bamboo fibers through acid hydrolysis and subsequently different characterizations were carried out using various advanced techniques. Fourier transform infrared (FTIR) spectroscopy analysis has indicated the removal of lignin from MCC extracted from bamboo pulp. Scanning Electron Microscopy (SEM) revealed rough surface and minor agglomeration of the MCC. Pure MCC, albeit with small quantities of impurities and residues, was obtained, as revealed by Energy Dispersive X-ray (EDX) analysis. X-ray diffraction (XRD) indicates the increase in crystallinity from 62.5% to 82.6%. Furthermore, the isolated MCC has slightly higher crystallinity compared to commercial available MCC (74%). The results of thermal gravimetric analysis (TGA) demonstrate better thermal stability of isolated MCC compared to its starting material (Bamboo fibers). Thus, the isolated MCC might be used as a reinforcing element for the production of green composites and it can also be utilized as a starting material for the production of crystalline nanocellulose in future.

Keyword: Bamboo; Cellulose; Microcrystalline cellulose; Morphological properties; Structural properties; Thermal properties