Naiyasit Yingkamhaeng 2014: Isolation and Characterization of Nanocellulose from Mango and Rambutan Peels Obtained by Steam Explosion Combined with Chemical Treatments. Master of Science (Biotechnology), Major Field: Biotechnology, Department of Biotechnology. Thesis Advisor: Mr. Prakit Sukyai, Dr.nat.techn. 72 pages.

The aim of this work is to isolate nanocellulose from mango and rambutan peels that abundantly found in food processing industries in Thailand. The environmentally friendly uncatalyzed steam explosion combined with bleaching treatment was used for nanocellulose extraction. The chemical composition of fibers in different processing stages revealed the a-cellulose content from mango and rambutan peels increased to 94% and 81%, respectively, while hemicellulose and lignin content were significantly decreased during extraction processes. It was found that those methods showed great potential for removing of hemicellulose and lignin. The scanning electron microscopy (SEM) and fourier transform infrared (FTIR) spectroscopy analysis were used to confirm the removal of lignin and hemicellulose in their components. Atomic force microscopy (AFM) analysis was utilized to support that obtainable nanocellulose in both raw fibers exhibited rod-like shape and the size of fibers showed a relative uniform size with length and width of below 200 nm and around 5-40 nm, respectively. The crystallinity of fibers was determined by X-ray diffraction (XRD) method which displayed the increase of crystallinity of nanocellulose comparing with raw fibers. Thermogravimetric analysis (TGA) found that nanocellulose from rambutan peel presented higher thermal stability (329 °C) comparing to nanocellulose from mango peel (265 °C). This indicated that cellulose source has an effect on the nanocellulose properties. We hope that in this study will be used as a model for nanocellulose investigation from other lignocellulosic materials.

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Student's signature

Thesis Advisor's signature

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