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Synthesis and characterization of sago starch nanocrystal laurate as a food grade particle emulsifier

Abstract

Starch nanocrystals (SNCs) are tiny particles that possess unique qualities due to their small size, such as increased crystallinity, thin sheet structure, low permeability, and strong resistance to digestion. Although sago starch nanocrystals (SNCs) are naturally hydrophilic, their properties can be modified through chemical modifications to make them more versatile for various applications. In this study, the esterification process was used to modify SNCs using lauroyl chloride (LC) to enhance their surface properties. Three different ratios of LC to SNC were tested to determine the impact on the modified SNC (mSNC). The chemical changes in the mSNC were analyzed using FTIR and 1H NMR spectroscopy. ##The results showed that as the amount of LC increased, the degree of substitution (DS) also increased, which reduced the crystallinity of the mSNC and its thermal stability. However, the esterification process also improved the hydrophobicity of the SNC, making it more amphiphilic. The emulsification capabilities of the mSNC were investigated using a Pickering emulsion, and the results showed that the emulsion made from mSNC-1.0 had better stability than the one made from pristine SNC. This study highlights the potential of SNC as a particle emulsifier and demonstrates how esterification can improve its emulsification capabilities.

Keywords

Esterification; Lauroyl chloride; Pickering emulsion; Sago starch; Starch nanocrystal