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Food-grade particle stabilized pickering emulsion using modified sago (Metroxylon sagu) starch nanocrystal

Abstract

Starch nanocrystals (SNC) have become the focus of exponential growth to develop new materials that combined innovative properties and sustainability. In this study, the physicochemical properties of SNCs extracted from Sago starch and its role as a proficient Pickering emulsifier were highlighted. Round and oval-shaped Sago starch nanocrystals (Sago-SNC) were obtained by using a conventional acid hydrolysis method. Sago-SNCs produced about 25 ± 0.2% (w/w) of the total mass yield with the mean droplet diameter ranging from 25 to 100 nm. The peak-to-peak correlation of IR analysis confirmed that there was no new chemical bond formed in Sago-SNC in comparison to native sago starch. The result from the X-ray diffraction analysis showed that the SNC has a crystallinity of 45.67 ± 0.43%. Further investigation made has discovered that the physicochemical properties of Sago-SNCs including water holding capacity, swelling power, solubility, pasting profile and thermal properties were significantly changed as all amylose was removed during the hydrolysis process. For the application and stability evaluation, Pickering emulsion prepared by using 3.5% (w/v) Sago-SNC performed good stability, appearing with no sign of creaming during two months of storage at room temperature. The results demonstrated that this natural-based nanocrystal may potentially be used as a stabilizer, filler, and emulsifier for colloidal systems.

Keywords

Nanocrystal; Particle emulsifiers; Pasting properties; Pickering emulsion; Sago; Starch