Structure and rheological properties of cellulose nanocrystals from defatted rice bran

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Abstract: The properties of cellulose nanocrystals (CNCs), for example size, aspect ratio, and shape, depend on the original source of cellulose. In this research, CNC-R and CNC-J were isolated from defatted rice bran (DRB) obtained from 2 species of rice which were Riceberry (R) and Jasmine (J). The morphological investigation of CNC-R and CNC-J by transmission electron microscopy (TEM) showed needle-like structure. The average cross diameter and length of CNC-R were 12.7 and 327 nm and those of CNC-J were 7.4 and 368 nm, respectively. The rheological behaviours were investigated for both CNC-R and CNC-J in the form of aqueous suspensions as a function of concentration. The relationship between the microstructure of CNCs obtained from DRB and their rheological properties which is still remaining a great challenge was first reported on gel-like behavior. This should help provide better decision-making for process design and optimization of CNCs extraction and subsequent handling.

Keyword: Cellulose nanocrystals; Defatted rice bran; Riceberry; Jasmine rice; Agro-waste