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## ISOLATION AND CHARACTERISATION OF CELLULOSE NANOCRYSTALS FROM SAGO SEED SHELLS

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### HIGHLIGHTS

- Isolation and characterisation of cellulose nanocrystals from seed shells are rare.
- Sago seed shells are agricultural waste materials discarded after taking the pith.
- Cellulose nanocrystals have been isolated from sago seed shells.
- Isolated cellulose nanocrystals characterized by different techniques.

### Abstract

Sago (*Cycas circinalis*) seed shells are agricultural waste materials discarded after taking the pith. In the present study Cellulose nanocrystals (CNCs) are isolated from the sago seed shells by acid hydrolysis. The hydrolysis was performed with 64% (w/w) sulphuric acid. The resulting CNCs were characterized by FTIR, XRD, SEM, TEM, AFM, DLS, Zeta ( $\zeta$ ) potential and TGA. FTIR spectrum of CNCs shows similar frequencies as that of  $\alpha$ -cellulose, but with reduced intensity. XRD diffraction pattern shows co-existence of cellulose I and cellulose II with crystallinity index of 72% for cellulose II, 69% for cellulose I and crystallite size dimension of 9.4 nm for cellulose I. SEM analysis clearly reveals the considerable size reduction during acid hydrolysis. TEM analysis shows that the isolated CNCs contain networked structures and almost spherical shaped particles having 10-15 nm in size. Morphological examination through AFM also shows that isolated CNCs are in nano dimensions, having the size ~50 nm. DLS analysis gives an average size of 50 nm and zeta

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