Available online at **www.joac.info**

ISSN: 2278-1862

Journal of Applicable Chemistry

2022, 11 (4): 539-548

(International Peer Reviewed Journal)

Synthesis of Nanocellulose from Groundnut Husk in Ionic Liquid Medium and its Characterization

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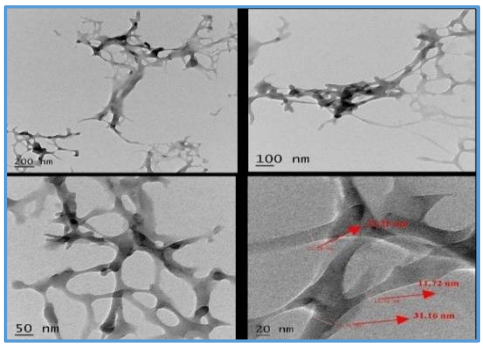
Accepted on 30th May, 2022

ABSTRACT

Cellulose creates a lot of interest because it is obtained from bio-renewable sources and possesses the properties such as considerable price, toughness, biocompatibility, and thermal stability. In this study, nanocellulose was extracted from the agricultural biomass Groundnut Husk. The alkali-treated cellulose was then bleached with sodium chlorite in order to expel lignin and hemicellulose. Ionic liquid 1-butyl-3-methylimidazolium chloride ([Bmim] Cl) solvent was used to synthesize the nanocellulose. The functionality of nanocellulose was then characterized by FTIR spectra. X-ray diffraction studies reveal the crystalline or semi-crystalline nature of synthesized nanocellulose. The surface architecture and size of the nanocellulose obtained are represented by SEM monographs. TEM images record the size and exact morphology of synthesized nanocellulose and this shows the size of synthesized is between 11.72 and 31.16 nm. Sonication leads to a substantial reduction of the nanocellulose as depicted by TEM. The thermal stability of the obtained nanocellulose was evidenced using TGA/DTA. The thermal studies insight that the synthesized nanocellulose samples possess appreciable degradation temperatures up to 467.0°C.

Graphical Abstract:



TEM Images of IL-GHNC

Keywords: Groundnut husk, Cellulose, Ionic liquid, Nanocellulose.