Synthesis and suitability characterization of microcrystalline cellulose from Citrus x sinensis sweet orange peel fruit waste-based biomass for polymer composite …	
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Abstract: Presently, waste management is the primary focus of scientific inquiry. The recyclable and reusable organic waste are dumbed a lot as landfills in the environment and that could be converted into application-oriented polymer reinforcing material. Cellulose is a widespread biopolymer that is found in the majority of bio waste materials. The organic waste Citrus x sinensis peel (Citrus × aurantium f. aurantium) is used as a raw material in this research. The waste material was utilized to extract the cellulose using optimum chemical conditions such as alkali treatment, acid hydrolysis, and bleaching and purification process. Fourier transform spectroscopy was applied to the cellulose to detect the functional groups it contained and indicated progressive removal of non-cellulosic constituents. The cellulose that was extracted has a yield percentage of 67.82% and a density of 1.413 g/cm3. The differential scanning curve analysis reveals that the temperature of degradation is 308.17 °C. Through the utilisation of thermogravimetric analysis, each phase of thermal activity was studied. According to an X-ray diffraction investigation, cellulose has a crystalline size of 9.63 nm and a higher crystallinity index of 72.54 percent exhibiting unique physicochemical properties. The Scanning electron microscopy shows the different size and shape of particles oriented with rough surface. Using ImageJ software, the other distinguishing characteristics of surface morphology, and particle size analysis are performed. The elemental analysis demonstrates the cellulose's organic nature by demonstrating its higher carbon and oxygen content. On the basis of the physicochemical characteristics of the celluloses, it could be considered as alternative sources of cellulose for potential value-added industrial applications and more applicable for the polymer composite reinforcement filler material.

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