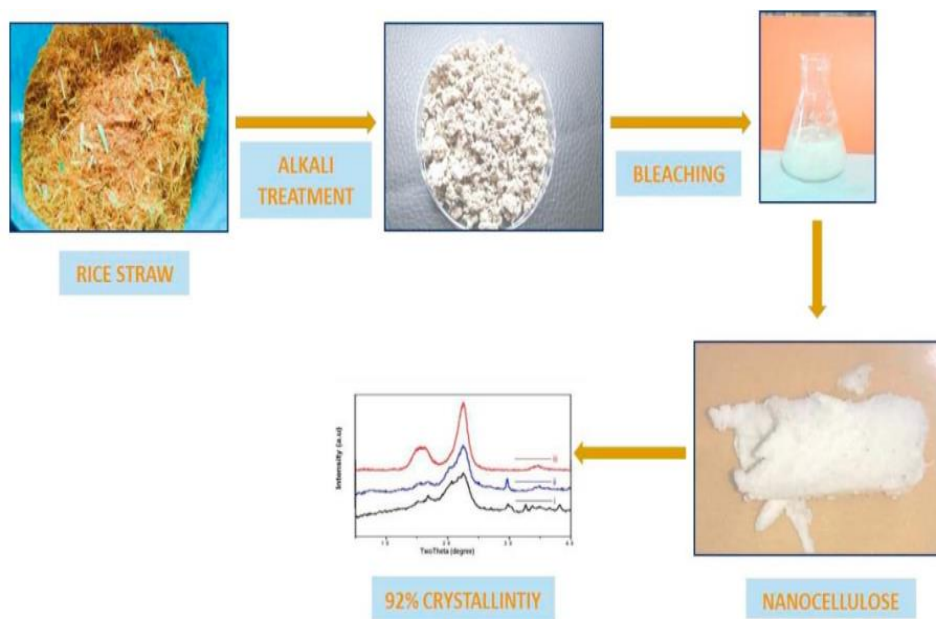


Development of cellulose nanofibers from rice straw with improved delignification and better crystallinity

In this work the effect of alkaline pretreatment and delignification on rice straw (RS) for the production of cellulose nanofibers (CNF) was studied. RS was initially treated with NaOH at moderately high temperature, which resulted in alkaline cellulose fibers (ACF) with 31% yield. Furthermore, delignification of ACF with sodium chlorite at moderate temperature generated in α -cellulose was carried out. Subsequent mechanical treatment with high pressure homogenization effectively converted α -cellulose into nanocellulose with minimum residual lignin content and good crystallinity index (92%) as found by X-ray diffraction analysis. Complete removal of lignin was confirmed by FTIR and TGA studies. Importantly, the dimensions of the nanocellulose particles derived from rice straw was in the range of 10-50 nm as observed by Transmission Electron Microscopy (TEM). The work has been carried out at DBT's Center of Innovative and Applied Bioprocessing (CIAB), Mohali.



The biorefinery of the extraction of cellulose from rice straw biomass via chemo-mechanical process for the development of cellulose nanofibers has been presented in this work. The process was optimized for pretreatment and delignification followed by mechanical treatment for conversion to nano-dimensions. The process described in this study will be useful for scale up.

Rice is a widely grown crop that leaves substantial quantity of post harvest straw in the field. Rice straw (dry stalks of rice) can be defined as an underutilized by-product. In recent

decades nanocellulose has become an attractive choice for several end users due to their exceptional mechanical, thermal, and biological properties. Nanocellulose is non-toxic, completely biodegradable and biocompatible and it doesn't create any adverse effect on health and environment.

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