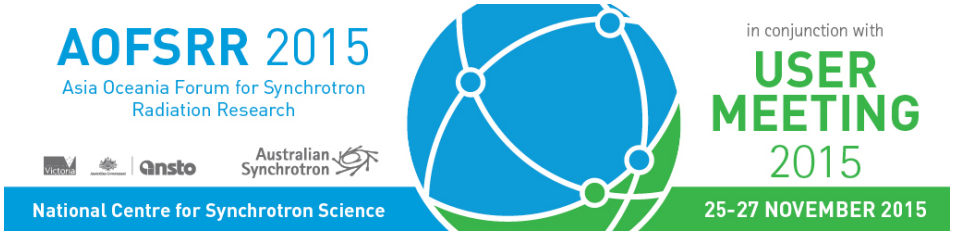

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Water and organic solvent behavior of thin and long cellulose nanofibrils easily deconstructed from Australian arid grass T. pungens

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The utilisation of lignocellulosic plant biomass has gained revived interest due to the increased awareness fuel economy and sustainable materials. Many teams around the world are producing nanocellulose by the careful removal of some or the entire matrix to produce nanocellulose. Recently we have discovered and patented a unique, very high quality grade of nanofibrillated cellulose (NFC) or cellulose nanofibrils which can be isolated from Australian native spinifex grass, with no aggressive chemical pre-treatment, and with the lowest reported mechanical energy [1]. When benchmarked against any known NFC in both academic and commercial materials, this nanocellulose has the highest aspect ratio (length-to-thickness) achieved at very low energy consumption. In order to understand and correlate the low-energy processing of nanofibrils with structural morphology of grass, we have studied the structural changes at length scales of fibrils and their bundles, upon those mild chemical and mechanical treatments using small angle neutron and X-ray scattering technique. Here we have made the simplification that all polymers while chemically distinct are homeogenous to the perspective of small angle x-ray / and neutron scattering.[2] Our preliminary investigation using X-ray diffraction, SAXS and SANS under dry and swelling conditions of the raw and isolated cellulose nanofibrils indicated that the cellulose nanocrystals are embedded in a water-responsive (swellable) polysaccharide matrix. The presentation will be made on the water and organic solvent behaviour of native and isolated cellulose nanofibrils and their relationship with low-energy homogenisation.

Keywords

Cellulose, T. Pungens

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