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Abstract Title: Nanomaterial from switchgrass

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Abstract (250 words or less): The advantage of cellulose nanocrystals' high modulus, low density, high aspect ratio, and negligible thermal expansion has attracted much attention from materials scientists recently. In this research, synthesis of nanomaterial from Switchgrass (*Panicumvirgatum L*), the three-dimensional morphology including length, width, thickness, surface roughness of individual cellulose nanocrystal (CNC), rheology behavior of CNC suspension, thermal and mechanical properties of CNC casting film were investigated. Results show that lognormal distribution was identified as the most likely for cellulose nanocrystals' size distribution. Height and width dimensions were shown to decrease toward the ends from the midpoint of individual CNCs, implying a spindle shape. Switchgrass CNC has a higher aspect ratio than cotton CNC. Switchgrass CNC films showed obvious liquid crystal characteristics and its mechanical properties increased sharply with reducing humidity or increasing temperature. The steady and dynamic rheological behaviors of Switchgrass CNC suspension show that the viscosity, storage and loss modules increased with increasing CNC concentration. The higher aspect ratio of switchgrass makes the suspension transitioned into a biphasic state and formed a hydrogel at lower concentrations.