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SIGNIFICANCE ON XYLAN FOR THE STRUCTURAL FEATURES OF NANOCELLULOSIC MATERIALS

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ABSTRACT

The significance of xylan on the behavior and on the structural features of nanofibrillated cellulose (NFC) derived from birch pulp is discussed. The influence of xylan on the morphology of fibrils and films was investigated and the features detected on nanoscale and macroscale are compared. Addition to this, the changes in water sensitivity was monitored using Quartz crystal microbalance with dissipation monitoring (QCM-D) equipped with the humidity module. Xylan plays a significant role as an electrosteric stabilizer in dilute NFC dispersions when the surface forces are dominant. However, it seems that in more concentrated NFC dispersions in which the fibrillar network plays the dominant role and the role of xylan diminishes. When considering NFC thin films which are only few tens of nanometers thick, the films morphology seems to be more porous whereas solvent cast macroscale films are enough dense to maintain good oxygen transmission properties although high amount of xylan is removed. These findings are of high relevance when considering NFC as a template for high added value nanocomposite materials.