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NANOFIBRILLATED CELLULOSE FROM TEMPO-OXIDIZED EUCALYPTUS FIBRES: EFFECT OF THE CARBOXYL CONTENT

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The present work aims at the study of how the carboxylic content affects the high pressure defibrillation of oxidized eucalyptus (softwood pulp) from micro to nanoscale size. Actually, it has been shown that TEMPO oxidation of dried softwood pulp does not only facilitate the defibrillation process, but also reduces the number of passes necessary to get the gel as well as it prevents the clogging of the homogenizer. In fact, these effects became apparent up to a carboxylic content about 300 $\mu\text{mol/g}$, and over 500 $\mu\text{mol/g}$, the yield in the nanofibrillated cellulose exceeded 90%, namely at defibrillation pressure of 600 bar. Besides, the morphology of the ensuing microfibrillated cellulose (nanofibrillated) and its crystallinity degree were characterised by FE-SEM and DRX measurement, respectively. The evolution of the transparency degree and the viscosity according to the oxidation degree and defibrillation pressure were also studied by UV-Vis transmittance measurement and rheological measurement.

The reinforcing potential of the ensuing nanofibrillated was investigated using dynamic mechanical analysis (DMA) carried on nanocomposite film prepared by casting a mixture of nanofibrillated suspension and a commercial latex of poly(styrene-co-butyl acrylate).