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ABSTRACT

The combination of autohydrolysis and ionic liquid microwave treatments of eucalyptus wood have been studied to facilitate sugar production in a subsequent enzymatic hydrolysis step. Three autohydrolysis conditions (150 °C, 175 °C and 200 °C) in combination with two ionic liquid temperatures (80 °C and 120 °C) were compared in terms of chemical composition, enzymatic digestibility and sugar production. Morphology was measured (using SEM) and the biomass surface was visualized with confocal fluorescence microscopy. The synergistic cooperation of both treatments was demonstrated, enhancing cellulose accessibility. At intermediate autohydrolysis conditions (175 °C) and low ionic liquid temperature (80°C), a glucan digestibility of 84.4 % was obtained. Using SEM micrographs, fractal dimension (as a measure of biomass complexity) and laccunarity (as a measure of homogeneity) were calculated before and after pretreatment. High fractals dimensions and low laccunarities correspond to morphologically complex and homogeneous samples, that are better digested by enzyme cocktails.

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