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Abstract

Currently, various chemical-mechanical treatments were widely used in biofuel production to achieve high total sugar yields. However, the interaction between two treatments was scarcely investigated. In this study, we employed a ball milling process to create ultrastructural changes for Douglas-fir (*Pseudotsuga menziesii*) micronized wood powders. The 0, 30, and 60 min ball milled wood powders resulted in a crystallinity index of 0.41, 0.21, and 0.10 respectively. It was found that the ultrastructural changes accelerate monomeric sugars production without influencing the yield of sugar degradation products. The optimal acid bisulfite treatment time was substantially decreased from 120 min to 40 min as the cellulose crystallinity decreased. Meanwhile, total sugar yield increased from 65% to 92% and had a linear relation with a decrease of the cellulose crystallinity.