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Enhanced fermentability of poplar by combination of alkaline peroxide pretreatment and semi-simultaneous saccharification and fermentation

Liming Zhang, Tingting You, Lu Zhang, Haiyan Yang, Feng Xu*

Beijing Key Laboratory of Lignocellulosic Chemistry, Beijing Forestry University,

Beijing, 100083, China

Abstract:

To improve ethanol productivity with few inhibitors generated, a novel process of combined alkaline peroxide (AP) pretreatment and semi-simultaneous saccharification and fermentation (SSSF) was developed in this work. Pretreatment with 10% ($\text{g}_{\text{H}_2\text{O}_2}/\text{g}_{\text{wood}}$) H_2O_2 at 160 °C for 2 h followed by SSSF was found to be the optimal combination with remarkably increased ethanol yield. The proposed process resulted in 63.1% of ethanol yield, which was about five times more than that of the untreated sample that was processed using conventional simultaneous saccharification and fermentation (SSF). The efficient conversion was ascribed to the high delignification efficiency (64.9%) of AP pretreatment, which led to incompact structure and generation of fewer inhibitors during SSSF (*c.* 6 g/L of lactic acid) than SSF (*c.* 10 g/L of lactic acid). This combined approach was proved to be an effective method for the promotion of the bioconversion of lignocellulosic materials.

Keywords: Poplar; Alkaline peroxide; Semi-simultaneous saccharification and fermentation; Bioethanol; Inhibitors

* Corresponding author. Tel/ Fax: +86-10-62336387.

E-mail address: xfx315@bjfu.edu.cn (F. Xu)

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