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A microwave-assisted aqueous ionic liquid pretreatment to enhance enzymatic hydrolysis of Eucalyptus and its mechanism

Xianfeng Hou ¹, Zhinan Wang ¹, Jin Sun, Meng Li, Shujie Wang, Kai Chen, Zhenzhong Gao *

College of Materials & Energy, South China Agricultural University, Guangzhou 510642, China

¹ These authors contributed equally to this work.

* Corresponding author

E-mail: zzgaoscau@163.com

Tel: +86 20 85280264; fax: +86 20 85280264.

Abstract

A novel pretreatment strategy based on combination of microwave and ionic liquid [TBA][OH] was developed for enhancing enzymatic hydrolysis of Eucalyptus sawdust. The sugar yield of pretreated sample achieved 410.67 mg/g in 48 h, which suffered from optimized microwave-assisted [TBA][OH] pretreatment. The work mechanism was illuminated by chemical composition, Fourier transform infrared spectroscopy (FTIR), ¹³C cross polarization/ magic-angle spinning solid state NMR (¹³C solid NMR), X-ray diffraction (XRD) and scanning electron microscope (SEM) analyses. The combined effect of microwave and [TBA][OH] leads to the violent deconstruction of lignin, removal of hemicelluloses, destruction of crystalline region and an eroded, pored and irregular micro-morphology. As a green, relatively inexpensive and high efficient pretreatment, microwave-assisted [TBA][OH] pretreatment has great potential in the field of bio-refinery.

Keywords: Microwave; Ionic liquid; Work mechanism; Enzymatic saccharification;

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