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Chemical and structural changes of pretreated empty fruit bunch (EFB) in ionic liquid-cellulase compatible system for fermentability to bioethanol (Article)

Elgharbawy, A.A.^a, Alam, M.Z.^a, Moniruzzaman, M.^b, Kabbashi, N.A.^a, Jamal, P.^a

^aBioenvironmental Engineering Research Unit (BERC), Department of Biotechnology Engineering, Faculty of Engineering, International Islamic University Malaysia, Gombak, Kuala Lumpur, Malaysia

^bChemical Engineering Department, Centre of Research in Ionic Liquids (CORIL), Universiti Teknologi PETRONAS, Bandar Seri Iskandar, Malaysia

Abstract

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The pretreatment of empty fruit bunch (EFB) was conducted using an integrated system of IL and cellulases (IL-E), with simultaneous fermentation in one vessel. The cellulase mixture (PKC-Cel) was derived from *Trichoderma reesei* by solid-state fermentation. Choline acetate [Cho]OAc was utilized for the pretreatment due to its biocompatibility and biodegradability. The treated EFB and its hydrolysate were characterized by the Fourier transform infrared spectroscopy, scanning electron microscopy, and chemical analysis. The results showed that there were significant structural changes in EFB after the treatment in IL-E system. The sugar yield after enzymatic hydrolysis by the PKC-Cel was increased from 0.058 g/g of EFB in the crude sample (untreated) to 0.283 and 0.62 ± 06 g/g in IL-E system after 24 and 48 h of treatment, respectively. The EFB hydrolysate showed the eligibility for ethanol production without any supplements where ethanol yield was 0.275 g ethanol/g EFB in the presence of the IL, while lower yield obtained without IL-pretreatment. Moreover, it was demonstrated that furfural and phenolic compounds were not at the level of suppressing the fermentation process. © 2018, Springer-Verlag GmbH Germany, part of Springer Nature.

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Cellulase Hydrolysis Ionic liquid Lignocellulose Pretreatment Structure

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🔍 Alam, M.Z.; Bioenvironmental Engineering Research Unit (BERC), Department of Biotechnology Engineering, Faculty of Engineering, International Islamic University Malaysia, Gombak, Kuala Lumpur, Malaysia; email:zahangir@iiium.edu.my

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