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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)

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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.

Reaxys Database Information

View Compounds

Author keywords

Cellulase | Hydrolysis | Ionic liquid | Lignocellulose | Pretreatment | Structure

Indexed keywords

EMTREE drug terms: bioethanol | cellulase | ionic liquid | lignin

EMTREE medical terms: analytical parameters | Article | biocompatibility | biodegradability | biofuel production | biomass fermentation | biotransformation | Crystallinity index | Elaeis | Empty fruit bunch | enzyme activity | hydrolysis | infrared spectroscopy | microbial growth | nonhuman | priority journal | scanning electron microscopy

Chemicals and CAS Registry Numbers:

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