

Advanced Pretreatment Process for Lignocellulosic Biomass to Biofuels Production: A Review [†]

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Abstract: Biofuels production from lignocellulosic biomass can significantly reduce the energy dependency on fossil fuels and the effects on the environment. In this concern, cellulosic ethanol as an alternative fuel can become a viable energy source soon. Over the past few decades, tremendous effort has been undertaken to make cellulosic ethanol cost-competitive with conventional fossil fuels. The pretreatment step is always necessary to deconstruct the recalcitrant structures and make cellulose more accessible to enzymes. Many pretreatment technologies involving physical, chemical, biological, and combined approaches have been developed and tested at the pilot scale. Furthermore, various strategies and methods, including multi-enzyme complex, non-catalytic additives, enzyme recycling, high solids operation, design of novel bioreactors, and strain improvement, have also been implemented to improve the efficiency of subsequent enzymatic hydrolysis and fermentation. These technologies provide significant opportunities to lower the total cost, thus making large-scale production of cellulosic ethanol possible. This review discusses various pretreatment techniques, the mechanism of those pretreatments, and some advanced pretreatment methods with their parametric studies and merits.

Keywords: lignocellulosic biomass; pretreatment techniques; reducing sugars.

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Conflicts of Interest

The authors declare no conflict of interest.