BIOETHANOL PRODUCTION FROM LIGNOCELLULOSE: OPPORTUNITIES AND CHALLENGES

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ABSTRACT

Currently, ethanol counts for about 3% of annual fuel consumption of 140 billion gallons in the United States. Most of the ethanol is made from the starch contained in corn kernel. It is believed that the corn available in US can only produce enough ethanol to replace up to 12% of the nation's fuel supply. Beyond that, another source for the ethanol needs to be found. A promising and sustainable alternative is lignocellulosic biomass. It is the most abundant renewable resource on the earth. The available biomass for cellulose ethanol production includes agricultural crop residues (corn stove, cereal straws, and bargasse), forest residues (forest thinnings, small size and low quality trees), and wastes from industrial processes (sawdust and paper sludge) as well as special energy plants (switchgrass and fast growing trees). However, different from starch in corn kernel, the cellulose in the plants is blocked by other plant components such as lignin and hemicellulose in a matrix, thus not readily available (accessible) to enzymes. How to expose the cellulose to enzymes is one of primary technical and economical challenges in cellulose ethanol production. Other challenges include the development of more efficient enzymes and high-value co-products from lignin and hemicellulose to offset the expensive processing cost. This presentation will briefly review the cellulose ethanol production. The topics covered include:

- Status of bioethanol production
- Difference between corn ethanol and lignocellulose ethanol
- Available processes for lignocellulose ethanol production
- Barriers to lignocellulose ethanol
- Commercialization of lignocellulose ethanol
- Development of biorefineries

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