Effect of Steam Explosion on Degradability and Accessibility of Loblolly Pine in Bioethanol Applications

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PROJECT MOTIVATION

Biomass is one of the most abundant potential energy resources for fuel nowadays. It is renewable and sustainable thus thought to be an excellent replacement for fossil fuels.

Comparing to grain and sugar based first generation biofuel, non-food lignocellulosic based second generation ethanol is more preferred due to the elimination of competition for food and environmental friendliness.

Lignocellulosic materials are known to be extremely recalcitrant to enzymatic hydrolysis due to the tightly-packed and highly-ordered 3D structure.

Loblolly pine, one of the most recalcitrant softwood species, was subjected to SO2 aided steam explosion and the resulting steam exploded loblolly pine (SELP) was used for a series of investigation.

CONCLUSIONS

1. XRD has been successfully utilized to determine the CrI of steam-exploded loblolly pine.
2. More severe pretreatment conditions result in increased initial rate and higher accessibility.
3. Adsorption of cellulase on SELPs follows Langmuir isotherm.
4. For pretreated lignocellulosics, crystallinity is a key parameter determining enzymatic hydrolysis rate.

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