

The Effects of Advanced Organosolv Pretreatment Strategies on Woody Biomass

Background

- Fractionation of biomass into individual components in a cost-effective and sustainable manner that preserves the value of each fraction should be a key element of future biomass pretreatment methods.

Approach

- The effects of the advanced organosolv pretreatments including tetrahydrofuran (THF) and γ -valero lactone (GVL) on biomass structural characteristics were systematically investigated using the same woody biomass of poplar.

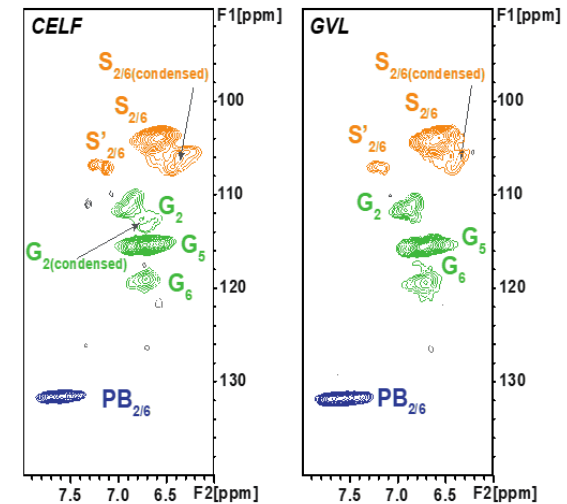
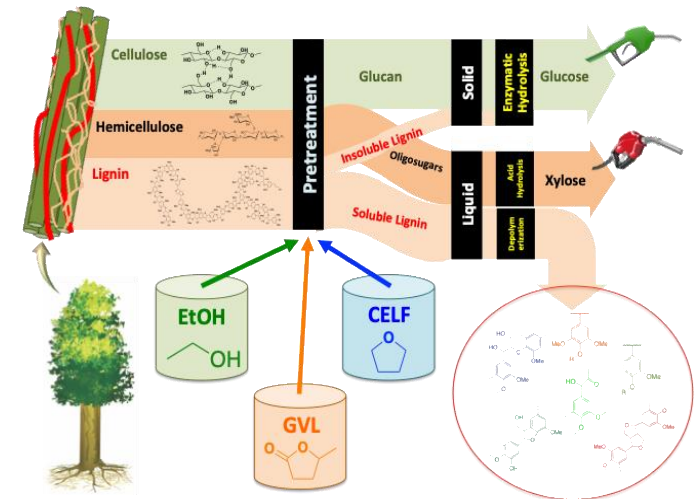
Outcome

- THF pretreatment primarily extracted the lignin without significantly disrupting the cellulose ultrastructure.
- GVL lignin conserved a significant amount of β -O-4 ether linkages.
- Ethanol pretreatment caused the most significant change to cellulose degree of polymerization, while GVL pretreatment triggered the most damage to crystalline cellulose.
- All pretreatments led to delamination and changes in the shape of cell walls due to high lignin removals and high pretreatment temperatures.

Significance

- This study provides a detailed understanding of the effects of various organic solvents in biomass pretreatment and structural information of the fractionated lignin which helps improving lignin valorization strategies.
- This work is part of the ORNL SFA Dynamic Visualization of Solvent Disruption of Biomass and Biomembranes.

Meng X.; Bhagia, S.; Wang, Y.; Zhoud, Y.; Pu, Y.; Dunlap, J.R.; Shuai, L.; Ragauskas, A.J.; Yoo, C.G., Effects of the advanced organosolv pretreatment strategies on structural properties of woody biomass,(2020) *Industrial Crops and Products* 146, 112144



HSQC spectra of lignin