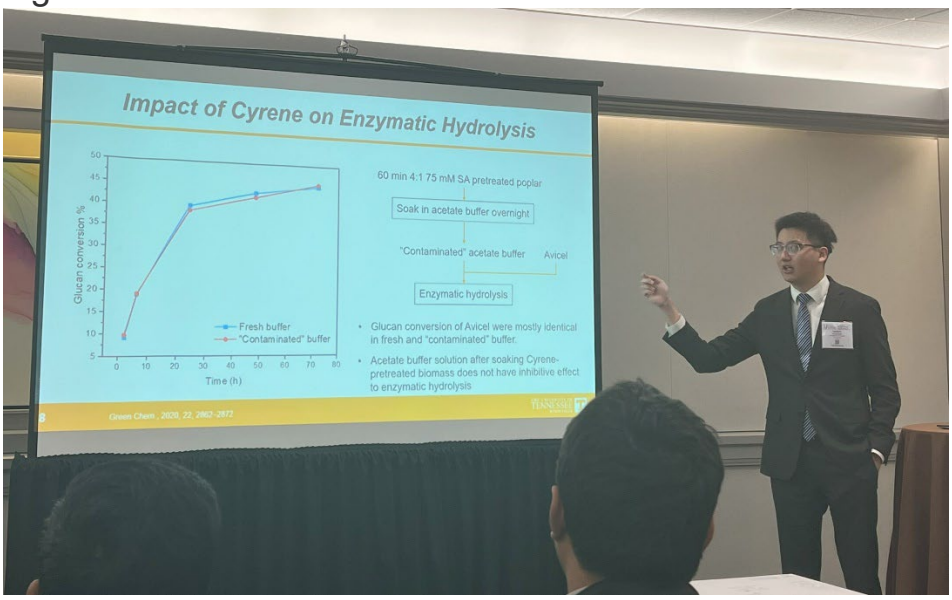
Application of Biomass-Derived Solvent Cyrene in the Pretreatment of Lignocellulosic Biomass



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Dihydrolevoglucosenone (Cyrene) is a biomass-derived solvent that can be produced via the catalytic pyrolysis of cellulose followed by hydrogenation. It became industrially available recently and is a promising alternative to various toxic polar aprotic solvents in materials chemistry, organic synthesis, and other research fields. To exploit the potential of this novel green solvent and achieve a sustainable biorefinery process, herein, a biomass pretreatment process using Cyrene is developed. The fractionation of both hardwood and softwood under Cyrene-based organosolv systems was investigated. Results show that Cyrene effectively removed lignin and hemicellulose from the biomass at a mild condition (120 ℃), leading to enhanced fermentable sugar yields after enzymatic hydrolysis. Lignin was recovered after pretreatment and structurally characterized to access its valorization potential and understand the interactions between Cyrene and biomass. Additionally, to better understand this novel solvent in biorefinery processes, investigation of the interactions between various components in the Cyrene-based solvent system was conducted, providing insight into future utilizations.


Background: Lignocellulosic Biomass Recalcitrance
Cellulose (30-50%)
Hemicellulose (20-35%)
Lignin (15-25%)