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Hemicellulosic bioethanol production from Paulownia wood

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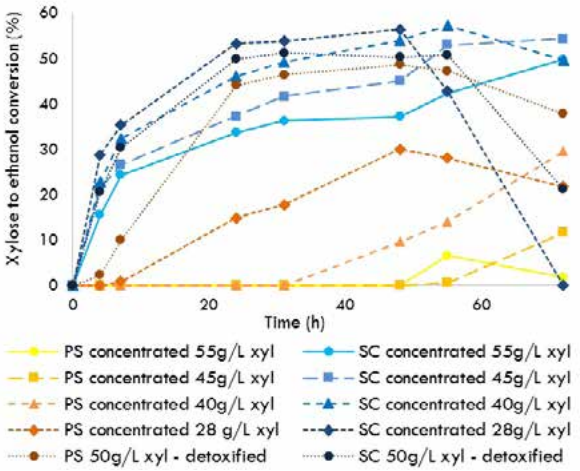
Lignocellulosic biomass is the most abundant and renewable organic compound in biosphere; comprising three major groups of polymers: cellulose, hemicellulose, and lignin. It leads to a need for search for efficient fermentation of sugar monomers. However, the chemical and physical processes used in the pretreatment and hydrolysis of polymers result in the production of chemical compounds (weak acids, furans, phenols) that can have harmful effect on fermentative microorganisms. The purpose of this work is to study the use of liquid fraction from Paulownia wood autohydrolysis for bioethanol obtention by comparing two yeast: *Pichia stipitis* CECT-1922T and *Saccharomyces cerevisiae* MEC-1133 (which is a genetically modified yeast from PE-2). Liquor was produced from Paulownia by autohydrolysis (210ºC) and posthydrolysis (in presence of sulfuric acid) to break down xylooligosaccharydes into xylose. This two-stage process led to solids enriched in cellulose and lignin (suitable as a substrate for pulping) and liquors containing xylose as major component. The liquid phase from post-hydrolysis also contained other sugars (glucose) and acetic acid. Liquor from post-hydrolysis was evaporated, increasing the amount of xylose and removing acetic acid (about 60% was removed). Neutralized liquors were employed (directly or after detoxification by ion exchange and activated charcoal) as fermentation media for hemicellulosic bioethanol production as described above. Genetically modified S. cerevisiae was able to fermentate concentrated liquors, reaching to ethanol concentrations of 14.23 g/L (corresponding to 63.93% conversion) in the most concentrated liquor. *P. Stipitis* was reached 14.16 g/L ethanol (corresponding to 60.65% conversion) in the detoxified liquor. In conclusion, genetically modified S. cerevisiae is more resistant to inhibitors than *P. Stipitis*, being able to ferment concentrated liquors without detoxification. However, with *P. Stipitis* higher concentrations of ethanol were reached in the liquors that have fewer inhibitors.



Biography

Elena Domínguez has her expertise in bioethanol obtention from lignocellulosic materials using friendly processes. Her PhD focuses on obtaining ethanol from Paulownia wood, by using pretreatments that allow efficient use of the liquid and solid fractions which are composed lignocellulosic materials.

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