# DOES AQUEOUS AMMONIA SOAKING PRETREATMENT INFLUENCE THE FERMENTATIVE PROCESSES OF BIOETHANOL AND BIOHYDROGEN PRODUCTION, FROM DIFFERENT LIGNOCELLULOSC FEEDSTOCKS?

G. Antonopoulou[1,*], H.N.Gavala[2], I.V. Skiadas[2] and G. Lyberatos[1,3]

[1] Institute of Chemical Engineering Sciences, Stadiou, Platani, Patras,26504, Greece

[2] Aalborg University (AAU), Department of Chemistry and Bioscience, Section for Sustainable Biotechnology, A C Meyers Vænge 15, DK 2450 Copenhagen SV Denmark

[3]School of Chemical Engineering, National Technical University of Athens, GR 15780 Athens, Greece

.*Corresponding author: Antonopoulou Georgia, geogant@chemeng.upatras.gr, +302610965318

## Abstract

Lignocellulosic biomass including agricultural and forestry residues, perennial crops, softwoods and hardwoods, can be used as feedstock in fermentative processes, such as Fermentative Hydrogen Production (FHP) and Bioethanol Production (BP) process. Although being abundant and almost zero cost feedstocks, the main obstacles of their use are the low efficiencies and yields attained, due to the recalcitrant nature of their lignocellulosic content. However, with the application of a pretreatment process, depolymerization of cellulose and hemicellulose and breaking the lignin seal can be achieved facilitating the liberation and subsequent uptake of simple sugars (hexoses and pentoses), that can be converted to final products (hydrogen or bioethanol) in consecutive steps, by microorganisms such as bacteria or yeasts, leading thus to higher yields.

Among different pretreatment technologies, aqueous ammonia soaking (AAS) presents certain advantages since ammonia is relatively safe to handle, non corrosive, easily recoverable and presents a high selectivity towards the lignin reactions, while preserving the carbohydrates [1]. AAS is a novel and promising pretreatment process that has been applied in few lignocellulosic feedstocks towards bioethanol production [2,3], however it has not used so far, for enhancing biohydrogen production process, from any type of lignocellulosic biomass .

In the present study AAS was tested as a pretreatment method for biethanol and biohydrogen production process of three lignocellulosic feedstocks of different origin: one agricultural residue: sunflower straw, one perennial crop: grass and one hardwood: poplar. BP process was performed by using the yeast *Pichia stipitis*, while FHP was conducted by using mixed microbial cultures. All fermentations were performed in a Simultaneous Saccharification and Fermentation (SSF) concept. The effect of the AAS pretreatment on the BP and FHP yield of the feedstocks was assessed while a detailed characterization of the pretreated feedstocks in terms of their structural characteristics was also performed. .Characterization through techniques such as scanning electron microscopy (SEM) and IR spectroscopy will also be presented.

## References

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