

6th World Congress on

BIOFUELS AND BIOENERGY

September 05-06, 2017 | London, UK



Nallusamy Sivakumar

Sultan Qaboos University, Oman

Production of ethanol from pretreated waste paper through separate enzymatic hydrolysis and fermentation

Waste paper is considered as one of the major components of municipal and industrial wastes and has the potential to be used as an excellent alternative feedstock for ethanol production. In this study, the effect of various pretreatments on efficient hydrolysis of waste office paper and newspaper into sugars and subsequent production of ethanol through fermentation was studied. The shredded papers were soaked in deionized water (5 % w/v), milled and dried at 60°C for 24 h. The dry matter was then milled again to remove most physical barriers of cellulose structure. The prepared waste papers were subjected to various pretreatments using sulphuric acid, phosphoric acid, sodium hydroxide and hydrogen peroxide at a concentration of 0.1, 0.5 and 1% (v/v). Pretreatment with H₂O₂ (0.5 % v/v) at 121°C for 30 min was considered as the most effective method as it increased the available cellulose, produced a high sugar yield, high delignification and less inhibitors formation. The effect of single (37 FPU/g solids) and two enzyme mixture (37 FPU + 25 CBU/g solids) was carried out using 2% (w/v) solid loadings. The solid loadings experiment was done by loading 1-4% (w/v) solids with 37 FPU + 25 CBU/g solids of enzyme loadings. The enzymatic hydrolysis of pretreated office paper and newspaper with 3% solid loadings resulted in the sugar yield of 23.48 and 13.12 g/L with hydrolysis efficiency of 91.8 and 79.6 %, respectively. Further, the hydrolysates of office paper and newspaper were used as a substrate to produce ethanol through fermentation using *Saccharomyces cerevisiae* resulted about 11.15 and 6.65 g/L with the productivity of 0.32 and 0.28 (g ethanol/L/h), respectively. Thus, the improved yields achieved through the pretreatment with 0.5% H₂O₂ and subsequent ethanol production suggested that the wastepaper could be used as a potential feedstock for bioethanol production.



Figure 1: Different stages of pretreatment of waste paper

Biography

Nallusamy Sivakumar has expertise in Microbial Fermentation. His areas of research interests are enzyme production, bioenergy, biofuel and bioprocessing. He is working on the possible utilization of different waste materials as alternative, cheap and renewable substrates for the production of microbial enzymes and other value added products. He established the Bioprocess Lab in Sultan Qaboos University and supervising the team of students working in bioprocessing. He is also working on bioactive compounds. In this, he is concentrating on the effect of different plant extracts and their essential oils on pathogenic bacteria and their possible mode of action.

apnsiva@squ.edu.om