OMICS Group Conferences
Accelerating Scientific Discovery
Global Biofuels & Bioproducts Summit
November 19-21, 2012 Hilton San Antonio Airport, USA

Optimization of enzymatic hydrolysis of NaOH pretreated wheat straw using response surface methodology

ZHANG Wei[1], LI Zekun[2], LIN Yan[1], WANG Xinze[1] and LI Yahong[1]
[1]Shanghai Jiao Tong University, China
[2]Environmental Monitoring Station of Dali Prefecture, China

Bioethanol produced from lignocellulosic biomass, especially from the agricultural waste straws has been regarded as a potential energy sources and gained a lot of popularity. Wheat straw is nowadays being considered to be the most promising lignocellulosic raw material for bioethanol production as an alternative to corn or sugar-containing feedstock. In this study, we used wheat straw as lignocellulosic material, which was pretreated with 1.0% NaOH to enhance the enzymatic efficiency. With an aim to obtain rapid enzymatic hydrolysis with high reducing sugar yields (response), five process variables having influence on enzymatic hydrolysis were investigated using a response surface methodology (RSM), which includes solid content (2.0-8.0%, w/v), enzyme loading (10-35 FPU/g substrate), temperature (40-50°C), pH (4.0-6.0) and hydrolysis time (12-96h).

The results showed that all the tested variables had significant effects ($p<0.05$) on reducing sugar yields. A well fitted regression equation with an adjusted R^2 of 0.9469 and a predicted R^2 of 0.8864 was obtained to predict the response. The model showed that increasing solid content had great negative effects on reducing sugar yields while other variables had positive effects. The predicted response value of 65.81% in the optimized conditions was confirmed for enzymatic hydrolysis (solid content of 8.0% (w/v), enzyme loading of 35 FPU/g substrate, temperature of 50°C, pH of 5.2 and hydrolysis time of 96h) by the experimental result of 60.73% with the glucose and xylose concentrations of 31.84g/L and 16.74g/L respectively.

Biography

ZHANG Wei is a graduate student majored in Environmental Science and Engineering in School of Environmental Science and Engineering, Shanghai Jiao Tong University, China. In September 2010, he entered Shanghai Jiao Tong University, and since then he began to be engaged in the research of the development and utilization of lignocellulosic biomass energy.