

International Congress and Expo on **Biofuels & Bioenergy**

August 25-27, 2015 Valencia, Spain

The development of a bio refining strategy to convert municipal solid waste into bioethanol

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Municipal solid waste (MSW) contains high concentration of organic matters, which has been widely used for biogas production via anaerobic digestion. However, MSW also contains significant amount of lignocellulose, which is resistant to anaerobic digestion. In this project, we explored the possibility of converting the lignocellulosic components of MSW into bioethanol. In this first step, microwave, dilute acid, concentrate acid and alkali hydrolyses of MSW were assessed to identify a suitable condition to release fermentable sugars from MSW. The monomeric sugar compositions of the hydrolysate were determined together with the inhibitor concentrations. Phenotypic microarray analysis was used to identify a suitable yeast strain for the utilisation of MSW hydrolysate. Then yeast fermentations were carried out to examine the bioethanol production. The results revealed that the hydrolysate resulted from 30% sulphuric acid treatment led to the highest monomeric fermentable sugars, but a lower ethanol conversion yield (around 25%). In comparison, hydrolysis using 2% sulphuric acid led to a lower sugar release yield in the hydrolysate, but a higher ethanol conversion yield (around 47%).

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