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APEC
Advanced Biohydrogen and Green Growth Newsletter

APEC Meetings and Events

§ 42nd APEC- ISTWG
(Industrial Science and Technology Working Group) Meeting §

May 28 – June 1, 2012

Kazan, RUSSIA

Prof. SY Wu, Feng Chia University, Chinese Taipei reported the progress of the implementation of the project "Green Energy Demonstration System of Biological Technology for APEC". There were three principal issues to report of the project.

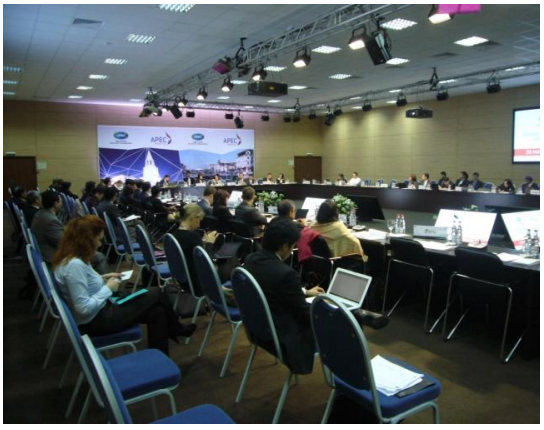
First, "The 2011 APEC Forum on Green Growth and Short-term Training Course on Green Technology" were held on Nov 2-5 2011 at Feng Chia University, Chinese Taipei. A total of **349 participants from 13 APEC members and 8 other countries attended** the forum.

Second, participation in the "2011 Asian Bio-Hydrogen and Biorefinery Symposium" held in Indonesia from October 13-14, 2011. A total of **101 participants from 10 APEC members and 2 other countries attended** the forum.

Third, Feng Chia University presented one Multi-Stage Green Energy Demonstration (MSGED) System of Biological Technology to Indonesia (APEC Member) in 2011. On Septmber, 2012, Feng Chia University will deliver another one to Indonesia (APEC Member).

43rd APEC ISTWG Meeting will held in Chinese Taipei on August 21-23, 2012. The three days event in which it will continue discussion about the way forward and towards a closer and more fruitful collaboration on industrial science and technology in the APEC community.

Delegates of Chinese Taipei in APEC Russia 2012



APEC 2012 KAZAN ISTWG meeting

The food security, climate change, energy security, interlinked challenges, and green growth for the APEC region.

Contents

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Research Note

§ Batch glycerol fermentation by enriched anaerobic cultures for biohydrogen production §

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Fossil fuel depletion has led to an increased demand of biofuels, and hydrogen being a clean and efficient fuel is getting most attention. Dark fermentative hydrogen production process requires renewable feedstock for sustainability. Glycerol is a major byproduct of biodiesel production and one kg of glycerol emerges as a byproduct per ten kg of biodiesel produced. Availability, low prices and a high degree of reduction make glycerol an ideal feedstock to produce hydrogen via dark fermentation.

This study evaluated the fermentative hydrogen production from glycerol using newly developed mixed microbial cultures. Batch fermentation of glycerol was demonstrated through studies wherein glycerol utilization and hydrogen production was evaluated. Developed mixed cultures from Lonar Lake sediments (LEC), India, and outlet sample of hydrogen bioreactor fed with distillery effluent (DEC) on glycerol were used as seed inoculum. Hydrogen producing bacteria were isolated from Lonar Lake sediment and slurry of hydrogen producing bioreactor fed with distillery effluent. Glycerol utilization, hydrogen production and end products were analyzed for four anaerobic isolates selected from the mixed cultures by following strict anaerobic culture conditions in an anaerobic chamber. A facultative anaerobe LEC02 appeared a suitable candidate for the fermentative hydrogen production due to its maximum glycerol utilization and maximum hydrogen production (730 ml/L) from 1% glycerol with major end products 1,3 PDO, lactic acid, and acetic acid.

Among the two mixed cultures (LEC and DEC), LEC gave cumulative hydrogen production of 2003 ml/L while DEC showed 1478 ml/L from 1% of glycerol at pH 7 and temperature of 30 ^{o}C. Effect of parameters like pH, concentration of glycerol in LEC exhibited significant influences on the production of hydrogen. The maximum hydrogen production using LEC was observed at pH 7.5, 1% glycerol and in presence of 1% peptone and yeast.

This study demonstrated that exploration of extreme habitats like Lonar Lake sediments could prove to be useful in relation to biohydrogen production from biodiesel waste glycerol. Moreover, this is the first report of biohydrogen production potential of Lonar Lake sediment microflora. The results indicated that mixed cultures exhibit higher hydrogen production potential than its pure isolates. In addition this study showed that exploration of pristine and adapted microbial communities may yield microorganisms capable of high volumetric hydrogen production from renewable feedstock.

Keywords: Biohydrogen, Glycerol, Lonar Lake, Mixed culture, Dark fermentation

Special Column

APEC Advanced Biohydrogen and Green Growth Newsletter is jointly edited by a group of professors, scientists, and technologists from the world. The members of the Editorial Committee include:

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