Debabrata Das, J Bioproces Biotechniq 2016, 6:7(Suppl)
http://dx.doi.org/10.4172/2155-9821.C1.009

4th International Conference on

Bioprocess and Bio Therapeutics

October 20-21, 2016 Houston, USA

Improvement of gaseous energy recovery from organic wastes using biohythane process

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The rapid consumption of the fossil fuel resources causes an accelerated release of the bound carbon as CO_2, which causes greenhouse effect. The need of the hour is an efficient fuel with zero carbon footprints and this path can be achieved by producing hydrogen. Biological route of H_2 production has pitched itself as a renewable technology which not only serves the purpose of energy generation but also help in waste management. Dark fermentative H_2 production has shown production highest rate amongst the all the biological routes (photo-fermentation and Microbial electrolysis cells). Dark fermentative H_2 production has been carried out using acidogens present in the anaerobic digestion process. To make the process more economical and sustainable, the effluent generated from dark fermentation could be utilized by methanogens for methane generation. Such two stage integrated system for hythane production permits an increase in conversion efficiency of organic wastes to gaseous energy. Suitability of distillery effluent for hydrogen production was investigated using acidogenic mixed consortia developed from anaerobic sludge. Phylogenetic analysis of the developed consortia showed the dominance of *Clostridium spp*. in the consortia. Enriched consortia resulted in 63% increase in hydrogen production (142.8 mmol H_2/L) with hydrogen yield of 10.15 mol H_2/Kg COD reduced and 40% COD reduction. Further, to improve the overall gaseous energy recovery, spent media of hydrogen production was used for methane production in second reactor using methanogenic consortia developed from anaerobic sludge. Methane production of 29.5 mmol CH_4/L was observed using spent media from mixed consortia.

Biography

Debabrata Das has completed his PhD from Indian Institute of Technology, Delhi and Post-doctoral studies from University of Utah. He was MNRE Chair Professor and presently associated as Professor-in-Charge in PK Sinha Center for Bioenergy, IIT Kharagpur. He has published 2 books; more than 128 papers in reputed journals; 22 chapters in books and has been serving as an Editorial Board Member of *Int. Journal of Hydrogen Energy, Biotechnology for Biofuels, Indian Journal of Biotechnology* and Editor-in-Chief of *American Journal of Biomass and Bioenergy.* He received IAHE Akira Mitsue and BRSI Malaviya Memmorial Awards for his contribution in bio-hydrogen research.

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