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Published in:
Book of Abstracts. DTU's Sustain Conference 2015

Publication date:
2015

Document Version
Publisher's PDF, also known as Version of record

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Citation (APA):
Aryal, N., Halder, A., Tremblay, P-L., Chi, Q., & Zhang, T. (2015). 3D Graphene-based bio-cathode for Carbon dioxide reduction in Microbial Electrosynthesis. In *Book of Abstracts. DTU's Sustain Conference 2015 [P-2]* Technical University of Denmark.

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3D Graphene-based bio-cathode for Carbon dioxide reduction in Microbial Electrosynthesis

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Microbial electrosynthesis (MES) is an attractive strategy to utilize carbon dioxide as a carbon source and electron from externally polarized cathode for the synthesis of multi-carbon chemical commodities. This technology is one of the efficient technologies for sequestration and conversion of carbon dioxide into the organic chemical. The electro-autotrophic bacteria fix CO₂ via Wood-Ljungdahl pathway and accept electrons from the cathode. This technology mainly depends on the performance of the electro-autotrophic bacteria; cathode material and reactor set up for the enhancement of microbe-electrode electron transfer. For the first time, we reported the catalytic activity of three-dimensional graphene-based electrodes in microbial electrosynthesis (MES) for Carbon dioxide gas reduction in pure culture platform. The carbon felt was modified with three-dimensional graphene for the enhancement of electron transfer in microbial electrosynthesis. The three-dimensional graphene-enhanced the adherence of bacterial cell on the electrode interface and formed the thick biofilm and hence production rate was increased by fivefold compared to the unmodified electrode

Keywords: - Microbial electrosynthesis, CO₂ reduction, Three-dimensional graphene, *Sporomusa ovata*