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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

[Link back to DTU Orbit](#)

*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* Article P-2 Technical University of Denmark.

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

Nabin Aryal<sup>1</sup>, Arnab Halder<sup>2</sup>, Pier-Luc Tremblay<sup>1</sup>, Qijin Chi<sup>2</sup>, Tian Zhang<sup>1\*</sup>

1: Novo Nordisk Foundation Center for Biosustainability, Technical University of Denmark, Kogle Allé 6 DK-2970 Hørsholm

2: Department of Chemistry, Technical University of Denmark, Kemitorvet, 2800, Kgs. Lyngby, Denmark

\*Corresponding author email: [zhang@biosustain.dtu.dk](mailto:zhang@biosustain.dtu.dk)

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 CO<sub>2</sub> 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, CO<sub>2</sub> reduction, Three-dimensional graphene, *Sporomusa ovata*