

## **Enhanced Methane Production from Cattle Manure via Development of a Biocathode Catalyzing Electromethanogenesis**

Electromethanogenesis is a novel method where methane is produced by direct conversion of electrical current and carbon dioxide to methane. The process is taking place in a bioelectrochemical cell, referred here as microbial methanogenesis cell (MMC). An MMC is a modification of a microbial electrolysis cell, where a bioanode and biocathode is present and a small external voltage is added to derive the carbon dioxide reduction reaction. The key part of electromethanogenesis cells is biocathode and most of the biofilm formation studies for biocathode development have been carried out by simple substrates such as acetate. Even though in some studies organic wastes such as wastewater have been used for biofilm development on electrode, there is no standard method of biocathode development. Especially there is a gap in the literature in biocathode development for complex wastes such as cattle manure. The main goal of this thesis is to investigate the impact of different substrates

on bioelectrode development and determine the potential of using cattle manure as substrate in electromethanogenic reactors. Once, the biocathode development is finalized we plan to use the selected method for enhancement of methane production in novel biotechnological organic waste processing systems such as integrated anaerobic digestion and MMCs.

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