

SIMULTANEOUS CATTLE MANURE WASTEWATER TREATMENT AND POWER GENERATION BY MICROBIAL FUEL CELL IN CONTINUOUS PROCESS

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Abstract

Cattle manure is one of the most abundant lignocellulosic resources, which contains large amount of cellulose, hemicellulose and lignin. These compounds can be employed in MFC as rich sources of energy for electricity production. In this study, the performance of a laboratory scale microbial fuel cell (MFC) fed with cattle manure was investigated. Once the system has reached to steady state and stable condition, the power production, produced current, COD and nitrate removal, coulombic efficiency (CE), coulombic recovery (CR), harvest rate and pH variation were investigated. In order to enhance the treatability of manure in MFC, the anolyte was continuously transferred into cathode for further treatment. The results revealed that an acceptable current and power density can be achieved by constructed MFC which was equal to values reported in literatures. The maximum power density reached to 1.2 W.m⁻³ for the continuous operation, with external resistance of 200 Ω. The results also showed a good capacity of the process for COD and nitrate removal of about 60 and 63%, respectively. The pH indicated negligible change over the process. The proposed design of MFC showed a great performance in simultaneous wastewater treatment and power generation.

Keywords

Microbial fuel cell, Cattle manure, Current generation, COD removal, Nitrate removal