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Kiros Hagos, Chang Liu, Xiaohua Lu

PII: S1004-9541(17)30703-6
DOI: doi:10.1016/j.cjche.2017.08.005
Reference: CJCHE 902

To appear in:

Received date: 5 June 2017
Revised date: 7 August 2017
Accepted date: 7 August 2017

Please cite this article as: Kiros Hagos, Chang Liu, Xiaohua Lu, Effect of endogenous hydrogen utilization on improved methane production in an integrated microbial electrolysis cell and anaerobic digestion: Employing catalysed stainless steel mesh cathode, (2017), doi:10.1016/j.cjche.2017.08.005

Energy, Resources and Environmental Technology

Effect of endogenous hydrogen utilization on improved methane production in an integrated microbial electrolysis cell and anaerobic digestion: Employing catalysed stainless steel mesh cathode☆

Kiros Hagos[1,2], Chang Liu[1]*, Xiaohua Lu[1]*

[1]State Key Laboratory of Materials-Oriented Chemical Engineering, Nanjing Tech University, Nanjing 210009, China

[2]Mizan-Tepi University, Mizan-Aman 260, Ethiopia

☆ Supported by Chinese MOST 973 project (2013CB733501), the National Natural Science Foundation of China (21476106), Natural Science Foundation of Jiangsu Province (BK20130062), and the Priority Academic Program Development of Jiangsu Higher Education Institutions (PAPD).

*Corresponding authors:
Email: change94@qq.com (Chang Liu), xhlu@njtech.edu.cn (Xiaohua Lu)

ABSTRACT

Improving the production of methane, while maintaining a significant level of process stability, is the main challenge in the anaerobic digestion process. Recently, microbial electrolysis cell (MEC) has become a promising method for CO_2 reduction produced during anaerobic digestion (AD) and leads to minimize the cost of biogas upgrading technology. In this study, the MEC-AD coupled reactor was used to generate and utilize the endogenous hydrogen by employing biocompatible electrodeposited cobalt-phosphate as catalysts to improve the performance of stainless steel mesh and carbon cloth electrodes. In addition, the modified version of ADM1 model (ADM1da) was used to simulate the process. The result indicated that the MEC-AD coupled reactor can improve the CH_4 yield and production rate significantly. The CH_4 yield was enhanced with an average of 48% higher than the control. The CH_4 production rate was also increased 1.65 times due to the utilization of endogenous hydrogen. The specific