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Microbial electrolysis cells and shifting microbial communities: Implications for improved biogas production

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Microbial electrolysis cells (MECs) are being studied for improving efficiency of anaerobic digester and reviewed for a new direction of enhancing efficiency of biogas production. This study operates general anaerobic digester (AD) and anaerobic digester combined with MECs (ADMEC) for food waste leachate. Using the effects of MECs on methane yield and the analyzing method of 454-pyrosequencing, we recognize the effects of MECs reaction on change of microbial communities. In result, steady state period in ADMEC was shortened than AD and methane yield during steady state was measured as 0.20 L CH4/g COD removed and 0.34 L CH_4/g COD removed each for AD and ADMEC, respectively. Analysis of Archaea during steady state period shows that the dominant species in AD was *Methanobacterium beijingens* and *Methanobacterium petrolearium*, and that the dominant species in ADMEC was *Methanosarcina thermophila* using acetate, methanol, methylated amines and *Methanobacterium formicicum* using H_2 and CO_2. There were no substantial differences in dominant bacterial species. *Clostridia* class was more abundant than Bacteroidia class in both reactors. Compared to AD and ADMEC showed a 40% increase in overall bacterial population, increasing the removal of organic matters and the conversion of volatile fatty acids (VFAs). In other words, the MECs reaction more effectively converts organic matters to VFAs and activates microbial communities favorable for methane production.

Biography

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