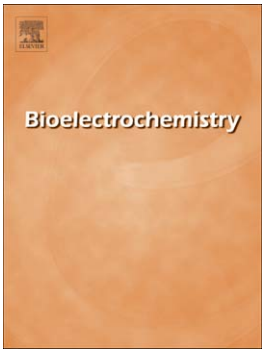

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Influence of the set anode potential on the performance and internal energy losses of a methane-producing microbial electrolysis cell

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Abstract

The effect of the set anode potential (between +200 and -200 mV *vs.* SHE, standard hydrogen electrode) on the performance and distribution of internal potential losses has been analyzed in a continuous-flow methane-producing microbial electrolysis cell (MEC).
Both acetate removal rate (at the anode) and methane generation rate (at the cathode) were higher (1 gCOD/L d and 0.30 m^3/m^3 d, respectively) when the anode potential was controlled at +200 mV. However, both the yield of acetate conversion into current and current conversion into methane were very high (72% - 90%) under all the tested conditions. Moreover, the sum of internal potential losses decreased from 1.46 V to 0.69 V as the anode potential was decreased from +200 mV to -200 mV, with cathode overpotentials always representing the main potential losses. This was likely to be due to the high energy barrier which has to be overcome in order to activate the cathode reaction. Finally, the energy efficiency correspondingly increased reaching 120% when the anode was controlled at -200 mV.

Keywords
Microbial electrolysis cell; microbial biocathode; set anode potential; irreversible potential losses; methane generation

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