Salinity-gradient energy driven microbial electrosynthesis of value-added chemicals from CO2 reduction - DTU Orbit (01/12/2018)

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Biological conversion of CO2 to value-added chemicals and biofuels has emerged as an attractive strategy to address the energy and environmental concerns caused by the over-reliance on fossil fuels. In this study, an innovative microbial reverse-electrodialysis electrolysis cell (MREC), which combines the strengths of reverse electrodialysis (RED) and microbial electrosynthesis technology platforms, was developed to achieve efficient CO2-to-value chemicals bioconversion by using the salinity gradient energy as driven energy sources. In the MREC, maximum acetate and ethanol concentrations of 477.5±33.2 and 46.2±8.2mgL−1 were obtained at the cathode, catalyzed by Sporomusa ovata with production rates of 166.79±11.52 and 25.11±4.46mmolm−2 d−1, respectively. Electron balance analysis indicates that 94.4±3.9% of the electrons derived from wastewater and salinity gradient were recovered in acetate and ethanol. This work for the first time proved the potential of innovative MREC configuration has the potential as an efficient technology platform for simultaneous CO2 capture and electrosynthesis of valuable chemicals.

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