Simultaneous Sulfide Removal and Hydrogen Production in a Microbial Electrolysis Cell

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Sulfide removal and hydrogen production in a microbial electrolysis cell (MEC) were simultaneously accomplished using potassium sulfide as the substrate. Experiments were conducted utilizing a single-chamber MEC under the applied voltage of 0.7 V with different concentrations of potassium sulfide (i.e., 500, 600, 800, and 1000 mg/L). MEC test results indicated that the optimum concentration of potassium sulfide was 600 mg/L with a maximum hydrogen production rate (Q_{H_2}) and overall energy recovery (η_{w+s}) of $0.913 \pm 0.023 \text{ m}^3 \text{H}_2 \text{m}^{-3} \text{d}^{-1}$ and $261\% \pm 6.5\%$, respectively. The sulfide removal rate was 80.7%. Microbial community analysis of the anode biofilm showed an extensive diversity of bacteria, including *Geobacter*(7.35%), *Desulfurella*(4.31%), *Sulfuricurvum*(3.33%), and *Sulfurospirillum*(2.82%). This study presents a new and effective method for sulfide removal.

Keywords: Sulfide removal; Hydrogen generation; Microbial community diversity; Microbial electrolysis cell

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