

عنوان مقاله:

Milliliter-scale microbial fuel cell (MFC) fabricated by polyethersulfone (PES) hollow fiber membrane

محل انتشار:

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خلاصه مقاله:

Microbial fuel cell (MFC) is a technology of increasing interest recently. However, the lack of efficient and cost-effective membranes has hampered the commercialization of MFCs. polyether sulfone (PES) hollow fiber was utilized as the separator in the cylindrical ml-scale active-air MFC to treat domestic wastewater. The conventional aeration unit replaced with the silicon membrane tube that was only passed the oxygen of air across wall membranes and provides appropriate dissolved oxygen in the cathode chamber. The increase in hydraulic retention time (HRT) (from ۱.۴۳ to ۳.۹۷ min) drastically improved the power and current densities of the MFC from ۳۰۶.۴۱ ± ۱۷.۴۳ to ۵۴۰.۹۸ ± ۳۲.۰۰ mW/m^۲, and from ۱۸۴۲.۱۳۸ ± ۱۰۳.۱۸ to ۲۱۹۱.۸۳ ± ۱۶۰.۰۶ mA/m^۲, respectively. The electricity generation performance gradually continued to grow by further extending the HRT from ۳.۹۷ to ۱۰.۱۹ min. The maximum power and current densities of ۵۸۲.۹۷ ± ۲۸.۶۱ mW/m^۲ and ۲۴۰۴.۱۵ ± ۱۴۰.۶۱ mA/m^۲ are obtained at the HRT of ۱۰.۱۹ min. Similarly, the coulombic efficiency as well as the current and voltage generation of the MFC is enhanced by the increment of HRT. The maximum open circuit voltage and current of ۷۶۸ ± ۱۴.۱۰ mV, and ۰.۴۱۸ ± ۰.۰۰۴ mA (with the external resistance of ۹۸۶Ω) are yielded at the HRT of ۱۰.۱۹ min. The rather low response time which was obtained for this hollow fiber-MFC (۴۵۰ min) shows its potential applicability as a biosensor.

کلمات کلیدی:

Microbial fuel cell (MFC), Ultrafiltration Hollow fiber, Domestic wastewater treatment, Hydraulic retention time (HRT), Scale-down, biosensor

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