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COMPOSITE VEGETABLE DEGRADATION AND ELECTRICITY GENERATION IN MICROBIAL FUEL CELL WITH ULTRASONIC PRETREATMENT

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Abstract

Vegetable waste was used as the fuel of a two-chamber microbial fuel cell (MFC) for simultaneous power recovery and waste degradation. Effects of ultrasonic pretreatment, organic loadings, anolyte pH adjustment on the MFC performance were investigated. Results showed that higher power generation and organic compounds removal efficiency were achieved in the MFCs with the vegetable waste pretreated with ultrasonication at $>1.0\text{W/mL}$ compared to the un-pretreated control. A maximum voltage of 491 mV (1000 external resistor), power density of 10.19 W/m^3 and 7-d TCOD removal rate of 62.5% were attained for the ultrasonic pretreated samples, while the corresponding parts for the un-pretreated control were 430 mV, 5.96 W/m^3 and 35.1%, respectively. For stable power generation and effective removal of the waste in the MFC system, the raw waste required a certain dilution and the anode solution should be adjusted to improve system buffering capacity.

Key words: vegetable waste, microbial fuel cell, substrate degradation, ultrasonic pretreatment

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