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Critical parameters selection in polarization behavior analysis of microbial fuel cells

Wenjuan Zhao and Shuiliang Chen*

Department of Chemistry and Chemical Engineering and Institute of Advanced Materials, Jiangxi Normal University, 330022 Nanchang, China.

Abstract

Polarization behavior analyses of two microbial fuel cells equipped with non-capacitive and capacitive anodes, respectively, were conducted by using linear sweep voltammetry (LSV) and varying circuit resistance (VCR) methods at various parameters. The LSV took short time, but the measured maximum power density (P_{max}) varied greatly when the parameters like open circuit time (t_{oc}), scan rate (r_{scan}) and scanning direction were not chosen properly. It suggested that relatively accurate P_{max} could be obtained by scanning the MFCs from 0 V to open circuit potential with t_{oc} of about 0.5 h and r_{scan} below 0.5 mV s^{-1} . On the contrary, the VCR took relatively longer time but the measured P_{max} was more stable and accurate once the time duration was in a suitable range, e.g. 0.25~2 h, regardless of the anode type; moreover, the effects caused by the measuring direction and t_{oc} were not obvious.

Keywords: microbial fuel cell, polarization analysis, linear sweep voltammetry, varying circuit resistance, power performance

*Corresponding author. Tel.: +86 791 8120536; fax: +86 791 8120740.
E-mail address: shuiliangchen@163.com (S. Chen).

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