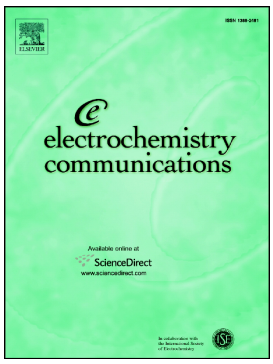

Electrochemical characterization of bed electrodes using voltammetry of single granules

Jose Rodrigo Quejigo, Luis F.M. Rosa, Falk Harnisch

PII: S1388-2481(18)30079-1
DOI: doi:10.1016/j.elecom.2018.04.009
Reference: ELECOM 6185

To appear in: *Electrochemistry Communications*

Received date: 21 February 2018
Revised date: 21 March 2018
Accepted date: 10 April 2018

Please cite this article as: Jose Rodrigo Quejigo, Luis F.M. Rosa, Falk Harnisch , Electrochemical characterization of bed electrodes using voltammetry of single granules. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Elecom(2017), doi:10.1016/j.elecom.2018.04.009

Electrochemical characterization of bed electrodes using voltammetry of single granules

Jose Rodrigo Quejigo, Luis F.M. Rosa, Falk Harnisch*

Helmholtz-Centre for Environmental Research GmbH - UFZ, Department of Environmental Microbiology, Permoserstraße 15, 04318 Leipzig, Germany.
Corresponding author: (F. Harnisch) E-mail address: falk.harnisch@ufz.de, Tel.: +49 341 235 - 1337

Abstract

In the search for high surface area electrodes and higher volumetric performances for bioelectrochemical systems, the use of bed electrodes has become a vital field of research. In bed electrodes, conductive particles, i.e. granules, are used as bulk material and are polarized for biofilm growth. One intrinsic constraint of bed electrodes is that these cannot be analyzed by dynamic electrochemical techniques like cyclic voltammetry (CV) due to their high internal resistance and poor polarization behavior. Therefore, solutions to elucidate the extracellular electron transfer (EET) fundamentals in bed electrodes are needed. In this study we show, using the example of a *Geobacter*-based bed electrode, that the thermodynamics of the EET of single granules can be revealed. This is achieved by cyclic voltammetry of single granules. A novel 3D-printed clamp working electrode is presented which can be exploited further for electrochemical analysis of biotic and abiotic electrode particles.

Keywords: microbial extracellular electron transfer, electrochemical analysis, cyclic voltammetry, 3D-printing, microbial fuel cell

* Corresponding author: falk.harnisch@ufz.de (F. Harnisch).