Mahamudul Hassan et al., J Biosens Bioelectron 2017, 8:2(Suppl)
DOI: 10.4172/2155-6210-C1-033

Application of twin-working electrode cell in characterizing biological electron mediators

Mahamudul Hassan[1,2], **Ka Yu Cheng**[1,3], **Goen Ho**[1] and **Ralf Cord-Ruwisch**[1]
[1]Murdoch University, Australia
[2]University of Chittagong, Bangladesh
[3]CSIRO Land and Water, Australia

Electron mediators often play a key role in facilitating microbial extracellular electron transfer (EET) to oxygen or insoluble compounds. This study aims at developing a novel electrochemical cell consisting of two closely (250 μm) mounted working electrodes (WEs), hence Twin-WE; to detect and quantify redox active compounds in a micro-scale (304 μL) environment. A fixed voltage window between two WEs using common counter and reference electrodes was maintained and the individual currents of both WEs were monitored. To detect electron mediators, an optimized voltage window (50 mV) was shifted through a defined potential range (between –1 V and +0.5 V vs. Ag/AgCl) by changing a fixed voltage step (12.5 mV) after the establishment of steady equilibrium current in both WEs. When the voltage window was maintained at the midpoint potential of a mediator, concurrent oxidation and reduction of the mediator occurred as evidence by the concurrent maximal anodic and cathodic current recorded at the two WEs. The electrical current difference plot against the potential scale enabled the identification (by peak location in the potential scale) and quantification (by peak height) of the mediators tested. Our technique enabled a precise determination of riboflavin, anthraquinone-2, 6-disulfonate (AQDS) and two mediators from a pyocyanin producing *Pseudomonas aeruginosa* (WACC 91) culture both individually and from their mixture. The described Twin-WE cell device is suitable for studying microbial electron transfer processes under a simulated redox environment which prevails in natural habitat. The bio-electrochemical principle underpinning this new method may also be useful for advancing biosensor development.

Biography

Mahamudul Hassan has completed his BSc (honors) and MS in Microbiology from University of Chittagong, Bangladesh. Currently, he is pursuing his PhD at Murdoch University and he aims to investigate the role of electron mediators in microbial extracellular electron transfer (EET) processes.

M.Hassan@murdoch.edu.au

Notes: