

## Energy accumulation and improved performance in microbial fuel cells

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### Abstract

The mechanisms for electron transfer from the microorganisms found in anaerobic sludge to the anode electrode in microbial fuel cells (MFCs) have been investigated. In doing so, both the energy accumulation and improved performance were observed as a result of the addition of exogenous Na<sub>2</sub>SO<sub>4</sub>. Treatment of anaerobic sludge by centrifugation and washing can provide samples devoid of sulphide/sulphate. Addition of exogenous sulphate can give matched samples of S-deplete and S-replete suspensions. When these are compared in an experimental MFC, the power output of the S-deplete is only 20% that of the S-replete system. Moreover, repeat washing of the anodic chamber to remove suspended cells (leaving only cells attached to the electrode) and addition of buffer substrate gives MFC that produce an output between 10 and 20% that of control. We conclude that anaerobic sludge MFCs are a hybrid incorporating both natural mediator and anodophilic properties. We have also shown that disconnected MFC (open circuit) continue to produce sulphide and when reconnected gives an initial burst of power output demonstrating accumulator-type activity.

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