

Single Chamber MFC: Filtration of Arsenic with an Exoelectrogenic Biofilm

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Microbial fuel cells (MFC) are a more renewable, cost efficient, and more effortless form of energy production. MFC take advantage of specific ion producing exoelectrogenic bacteria (*G.sulfurreducens*) to conduct current through multiple electrodes. This provides a novel approach to solving both energy crisis' and heavy metal pollution in drinking water. The creation of a biofilm around a high surface area anode creates a portable and semi-permanent bacterial culture that can act as a renewable battery and filter. This may reduce heavy toxins such as arsenic, a growing issue to many developed/industrialized areas like Bangladesh or Argentina. This research explores the effect of inorganic arsenic on MFC biofilm development and efficiency. Using a 500ml reactor with a wool carbon anode and a PVDF-AC air cathode, MFC reactors (3) used a standard media recipe (Arnold et. al 2014) inoculated with *G.sulfurreducens* and were sealed in an anaerobic condition. MFC efficiency was collected and charted in mV. Reactor media was eventually swapped for pseudo-media of varying arsenic concentrations. Media before MFC exposure was later compared to media from after the MFC to show change in arsenic concentrations. *G.sulfurreducens* tested positive for unfazed filtration of arsenic (0.5mM) but operated at 77% efficiency when exposed to a higher concentration of arsenic (1mM). This research discovered the mobilization of arsenic inside *G.sulfurreducens*, and demonstrated heavy metal filtration with simultaneous energy production inside single chamber MFC.

Awards Won:

Third Award of \$1,000