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Liu, H.; Ramnarayanan, R.; and Logan, B.E. (2004) Production of Electricity during Wastewater Treatment Using a Single Chamber Microbial Fuel Cell. *Environmental Science & Technology*, **38**, 2281.

In the study presented in this article, a laboratory-scale prototype of a single-chamber microbial fuel cell (SCMFC) was utilized to produce electricity from domestic wastewater for the first time, in addition to achieving biological wastewater treatment. The authors of this study conduct research for the Department of Civil and Environmental Engineering, the Department of Chemistry, and the Penn State Hydrogen Energy Center at the Pennsylvania State University. This particular study differs from past research in that the reactor design was modified to produce mediator-less MFCs suitable for the treatment of a continuous flow of dissolved organic matter.

The authors clearly indicate in this article that their research objective is to employ MFCs in the production of electricity, and to offset the substantial operating costs of wastewater treatment. Past research with MFCs, including small batch-fed systems using defined substrates and MFCs designed for marine sediments, is also outlined by the authors, and explained effectively in relation to the present research. The hypothesis in this preliminary research is rather simple, that their prototype reactor will generate electricity with a wastewater substrate. The progression of the research experiments, however, is not as evident in this article. The initial set of experiments with the SCMFC is described adequately, including the inoculation with a pure culture (*Geobacter metallireducens*), introduction of a wastewater substrate, and operation for one week in batch mode. In later testing, the hydraulic retention time ranges from 3 to 33h, the air flow rate is adjusted between forced and passive, the wastewater is used as the only inoculum, and the electrical load (resistance) is varied. Although the reasoning for the changes is explained, the experiments' methods are somewhat difficult to follow and assess.

The two controls implemented in this study, volume and electrode, seem appropriate to account for COD losses. Measurements are also taken in triplicate, to demonstrate the accuracy of the measurement value and to indicate potential errors. The quantity of data taken and number of experiments, however, are not recorded in this article. Was the effect of oxygen flow on electricity generation tested a few times, or only the once? Also, the graphs and description of Figure 5 is unclear; what was the resistance on the system represented in graph A?

Despite some ambiguity in reporting the research process, the results confirm the authors' hypothesis; the use of wastewater in the single-chamber MFC did generate some electricity. The MFC reactor also reduced the organic content of the wastewater (about 78% in terms of BOD and between 50 to 70% in COD). Unfortunately, the results indicated that other processes, which did not generate electricity, accounted for most of the removal of organic matter in the wastewater. The authors are wise, though, to point out the economic standpoint. The organic content of wastewater is essentially free, and if the MFCs can be made affordable, while still achieving COD removal, they could pose a more economical approach to wastewater treatment. First and foremost, as the authors realize, more research is needed with alternative system designs, optimization of operational factors, and the affects of electricity production on the reduction of organic matter.