Microbial Fuel Cells (MFC) in Pipes and "Mudonna" Recirculation Chamber

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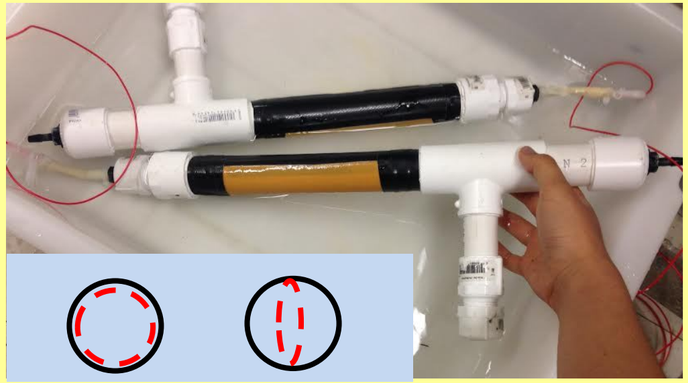
Objectives: Design and build 2 anaerobic anode chambers with carbon cloth/titanium mesh lining as anode

- Design #1: Carb cloth lined pipe (Fig 1) pumped with external nutrient source (1% mud solution)
- Design #2: Carb cloth lined chamber (Fig. 2) with internal recirc of (~17% mud solution)

Pipe flow with carb cloth inserts

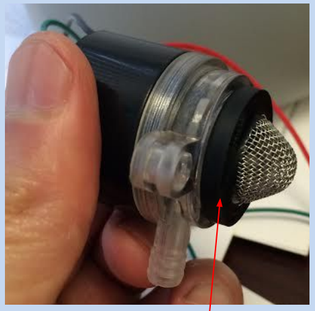


Design:

- circle and oval shaped anodes (titanium mesh with carbon cloth)
- large cation exchange membrane area for flow of H+ ions
- bleed valve to allow expulsion of air bubbles within the system

Results:
The pipe tubes were initially anaerobic; however overtime the membrane was discovered to allow not only H+ions across but also water and dissolved oxygen, which caused the system to turn aerobic and cathodic.

"Mudonna" recirculation chamber



Design:

- Submersible pump recirculates 17% mud solution in inner chamber to feed bacteria growing on carbon cloth
- Inner anode chamber (titanium mesh and carbon cloth) and outer cathode chamber (wired carbon cloth)

Results:
Although Mudonna experiment is in early stages, graph below shows upward trend denoting power production and bacterial growth just days into the test. Over the next few weeks we will evaluate how much power Mudonna can produce with pumping. The graph below shows Mudonna before pumping.