



## **The microbial fuel cell science experiment**

Electricity from rumen microorganisms

### **Objectives**

1. To assemble a microbial fuel cell (MFC)
2. To measure electrical voltage generated in an working MFC

### **Equipment and materials**

Needed by each group:

1. Two-compartment Plexiglas MFC
2. One proton exchange membrane, to fit between the chambers
3. Two rubber gaskets, to hold the membrane between the chambers
4. Four nuts and bolts, to join the chambers
5. Two graphite electrodes attached to a wire, one to be placed in each chamber
6. Two black rubber stoppers to seal the feeding ports on the top of each chamber
7. A 1000 Ohm resistor
8. A voltmeter and/or multimeter, to measure the voltage across the resistor

### **Procedure: Assembling an MFC**

1. Working in a team, start to assemble your MFC as demonstrated by the instructor.
2. Place an electrode inside both the anode and cathode compartments and pass the wires through the cord grip and tighten it in place (be careful with the wire-electrode connection – disconnecting the two could result in a short circuit).
3. Place the anode and cathode compartments on your desk with the open compartment facing up. Align a rubber gasket along the edges of both compartments.
4. Clamp the proton exchange membrane between the two compartments (anode and cathode) of the MFC using two rubber gaskets and four nuts and bolts. Make sure you do not over-tighten the nuts/bolts! Over-tightening may break your fuel cell.
5. Insert the black rubber stoppers into the feeding ports on the top of your cathode and anode chamber.
6. Attach the wires to each end of the 1000 Ohm resistor provided.
7. OPTIONAL: Fill anode compartment with rumen fluid or cow manure slurry; Fill cathode with distilled water.

