

# Building a Microbial Fuel Cell

March 3, 2017

- Mark Carlson, Ph. D.
- Peter Clancy, Ph. D.
  
- mcarlson@imsa.edu, 630-907-5975
- pclancy@imsa.edu, 630-907-5986

# Background and Motivation

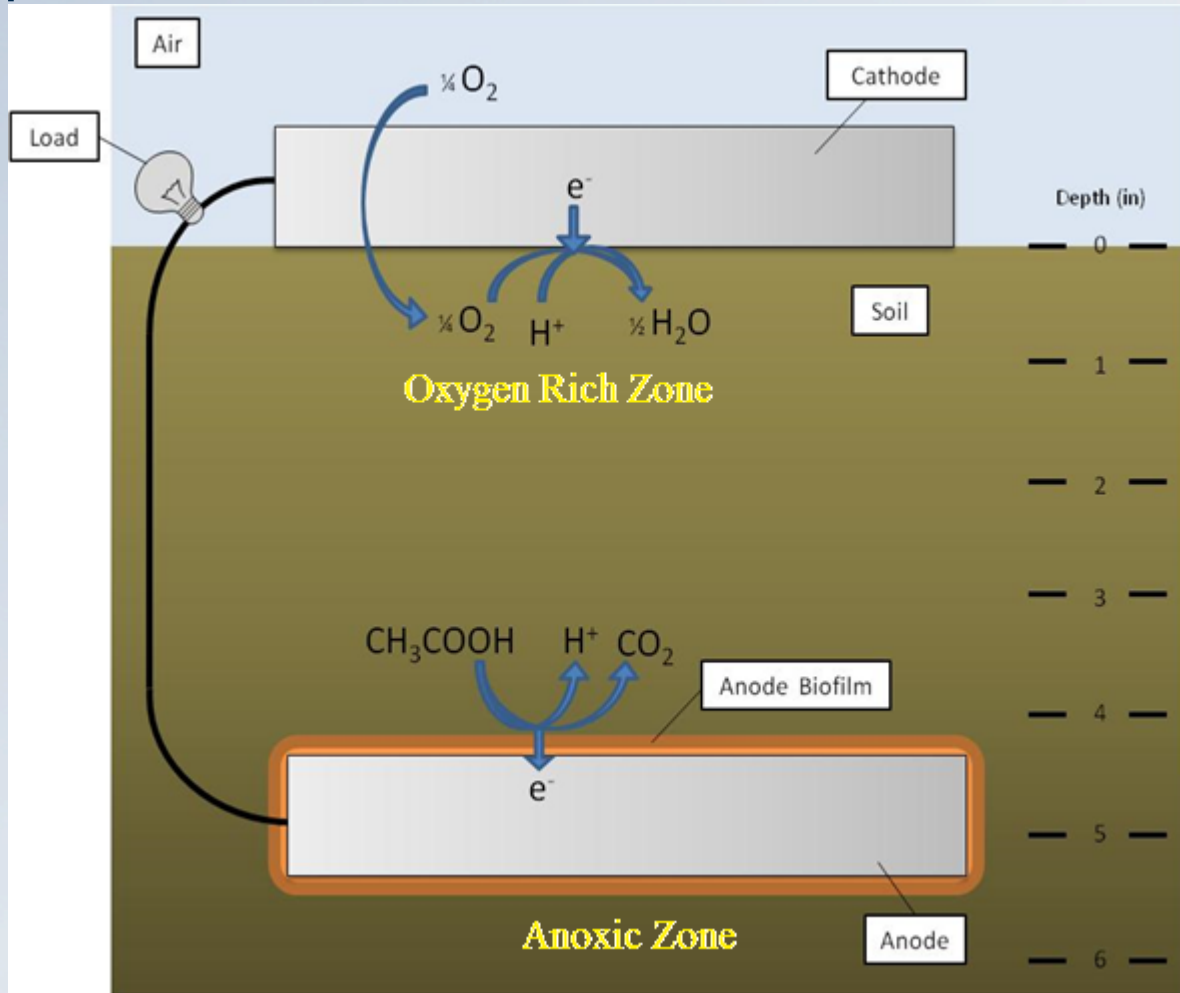
- IMSA offers an “Engineering” class—a one-semester, project-based class, in which students apply concepts and principles of science in constructing their projects.
- Create an alternative energy module which
  - Addresses the four Engineering NGSS standards, and
  - addresses global issues such as energy supply and demand, climate change, and CO<sub>2</sub> emissions.
- Break project into two phases (alpha and beta) to show students how engineering projects are phased into process development and scale-up, with optimization occurring all along the way.

# Benefits of Microbial Fuel Cell (MFC) Option

- **Students are exposed to:**
  - ▣ Wide variety of concepts (power vs energy, Ohm's law, galvanic cells)
  - ▣ Assessing environmental impact (CO<sub>2</sub> emissions, ecological and community impacts, etc.)
  - ▣ Test equipment (voltmeters, ammeters)
  - ▣ 2 phase projects (alpha and beta)
  - ▣ Written and oral reports

# Workshop Focus

- Explore the function and construction of MFC



# Potential MFC Construction Pitfalls

- **Moisture content of soil**
  - ▣ Maintain moisture with lid
- **Shorting of wires**
  - ▣ Ensure top cathode contact with soil
  - ▣ Avoid short circuits between electrodes.
- **Soil/microbial nutrients and additives**
  - ▣ Sugary foods drinks can increase voltage, but beware of noxious-smelling byproducts
- **Maintaining anoxic and oxygen-rich zones**
  - ▣ Avoid air pockets during assembly
  - ▣ Iron (steel wool/nails) is good oxygen scavenger