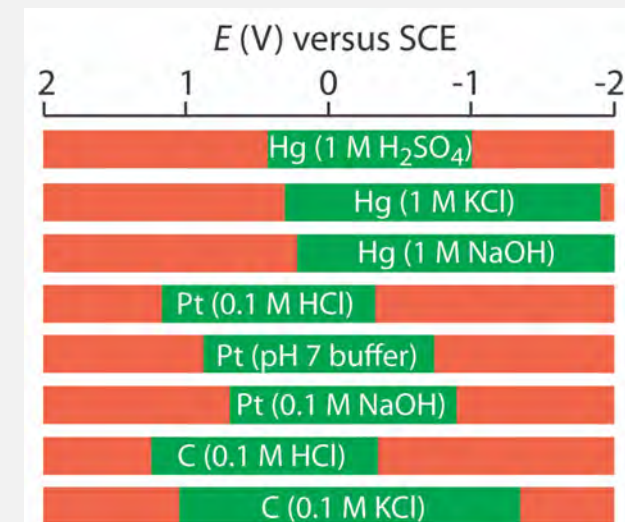
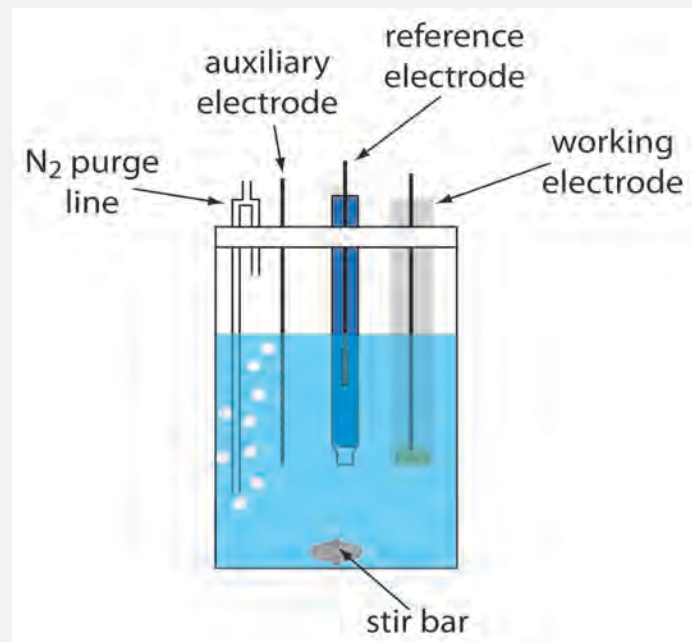


INDIVIDUALLY ADDRESSABLE MULTI-ELECTRODE ARRAY

By: Zach Wilhelm

ELECTROCHEMISTRY

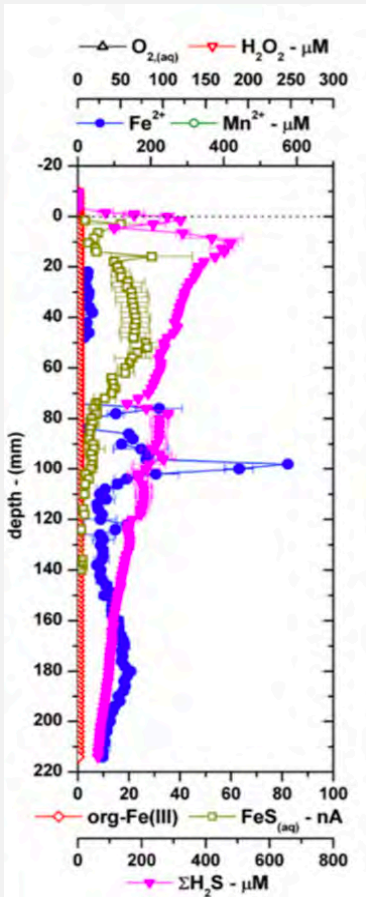
- Voltammetry - used to detect analytes within aqueous matrices
- Primary Working Electrode
- Counter or Auxiliary Electrode
- Reference Electrode



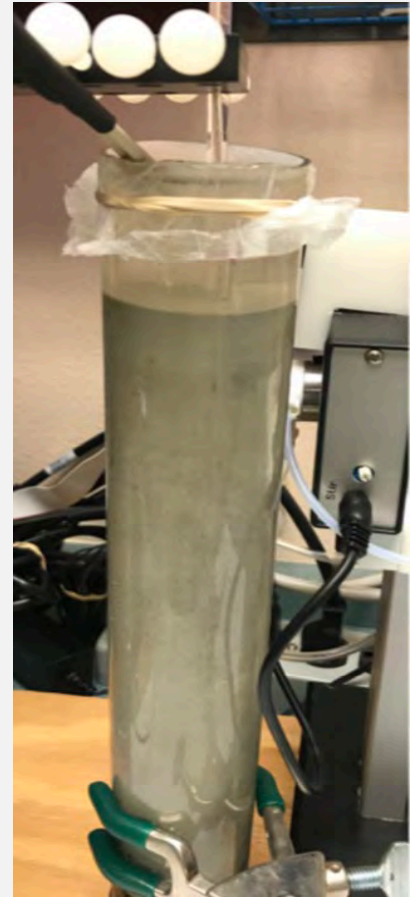
USES

- Used to detect biological respiratory analytes in river, estuarine and marine water column and sedimentary environments
- Can be used for both sediment columns and In-Situ
- Understand the pathways and rates of organic carbon degradation to better understand carbon cycling

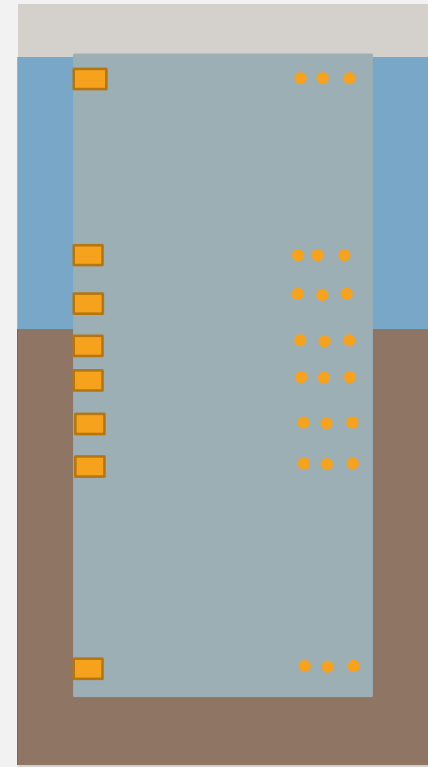
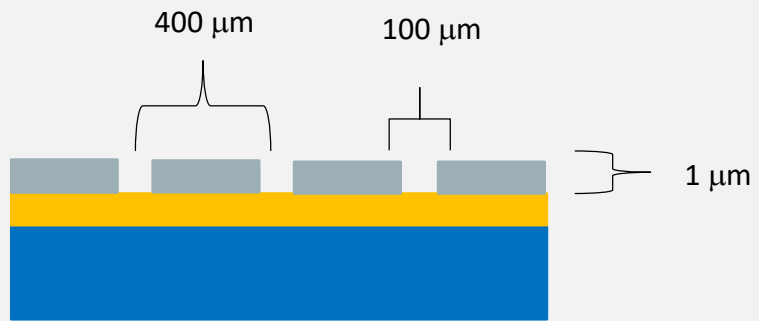
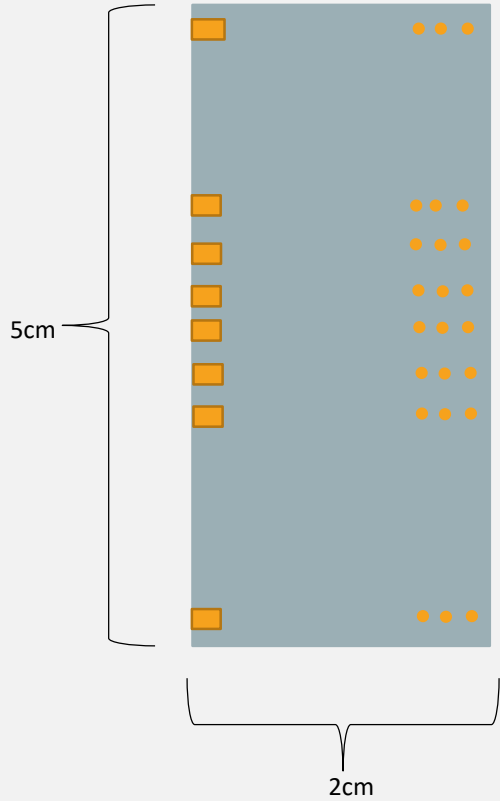
CURRENT TECHNIQUE



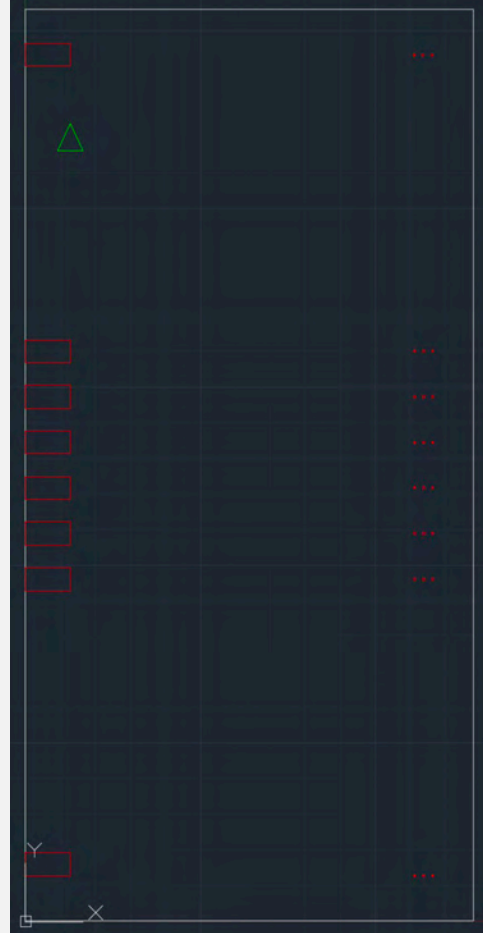
- A single disk electrode is positioned $\sim 2\text{cm}$ above the sediment/water interface
- We take three to four voltammetric scans of several different types (i.e. linear sweep, cyclic voltammetry, and square wave)
- Then lower the probe using an automated micromanipulator at sub-millimeter intervals, and then repeat the scans.
- Near sediment interface we take scans ever $.25\text{mm}$



NEW DESIGN



TECHNIQUES



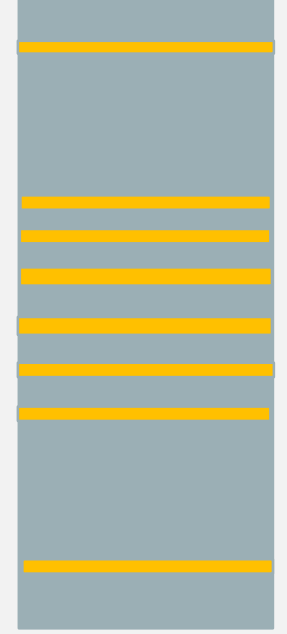
Glass Wafer –
Covered in AZ1518



The blue is
hardened AZ1518



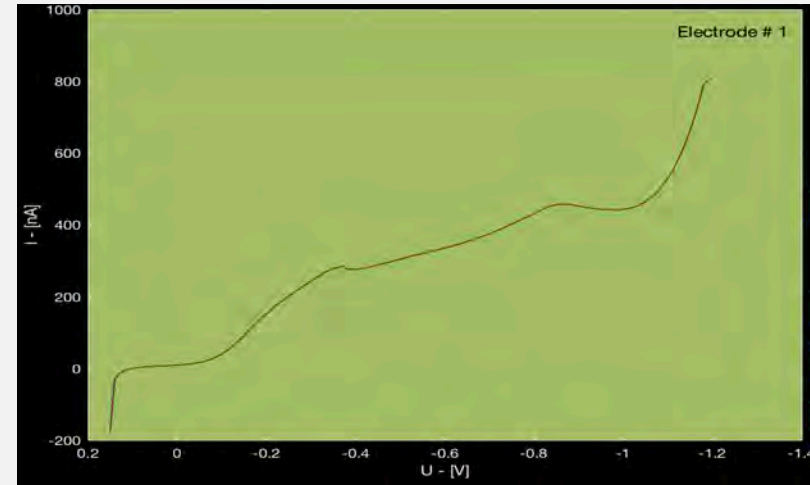
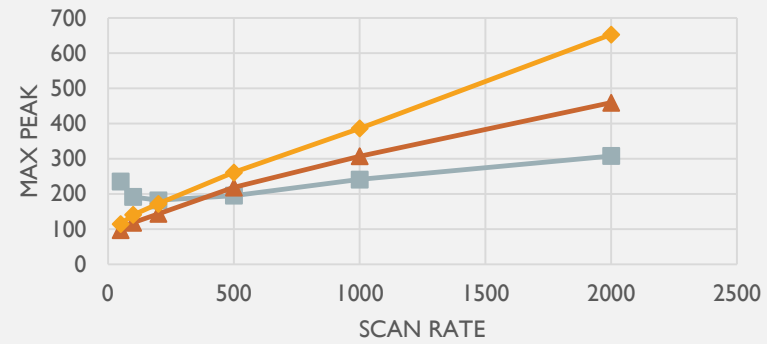
Gold sputtered
over entire board



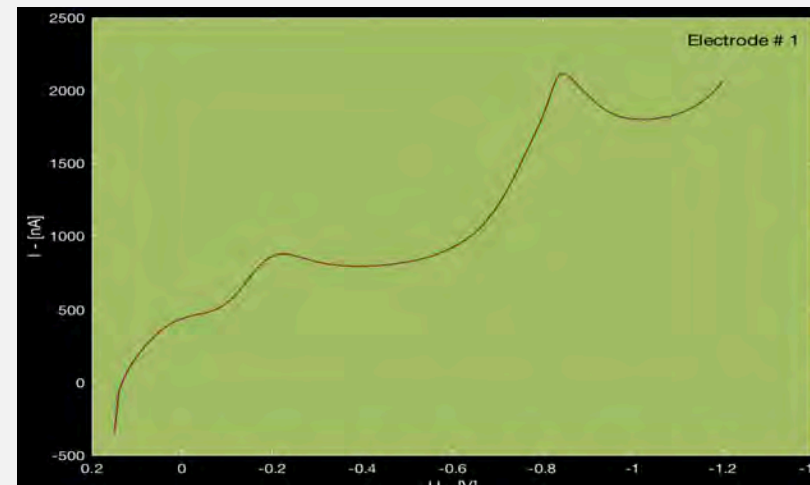
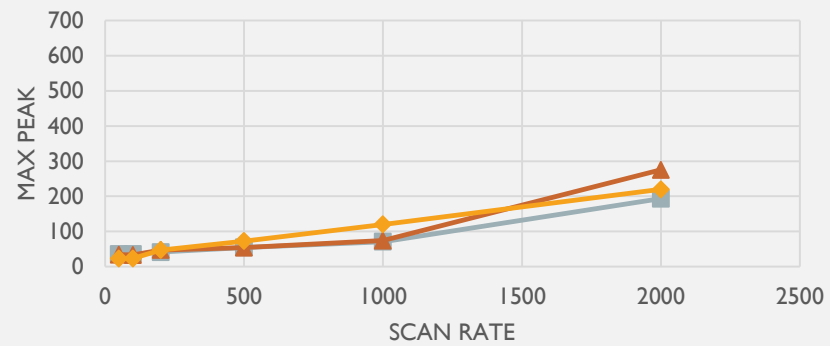
Gold is then etched off, exposing
the glass once more

SCAN RATE TESTS

250 MICRON OXYGEN

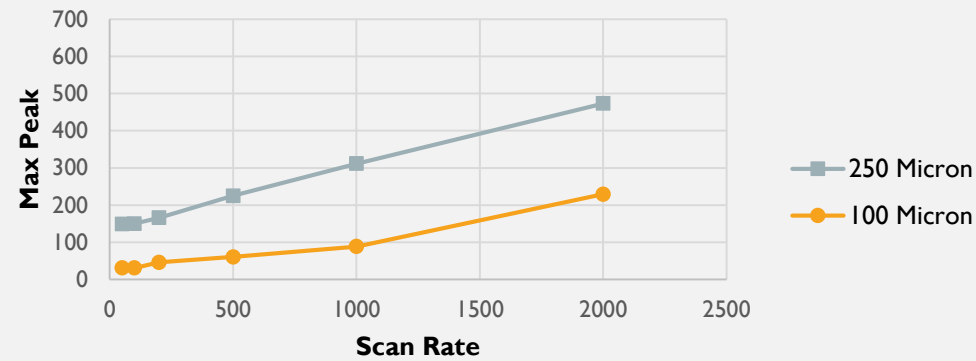


100 MICRON OXYGEN

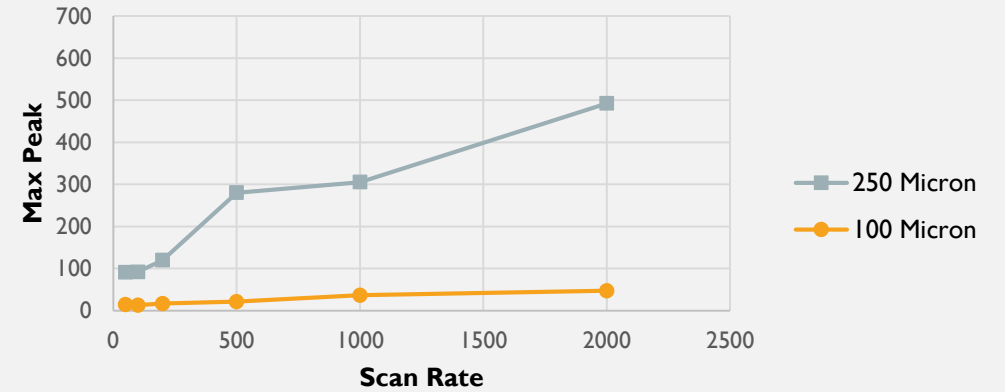


250 MICRON VS 100 MICRON ELECTRODES

100 μ m vs 250 μ m for Oxygen



100 μ m vs 250 μ m for O₂



OTHER PROJECTS

