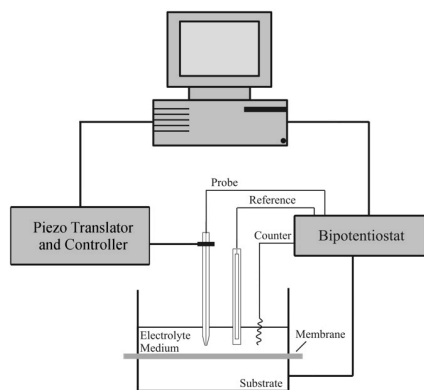
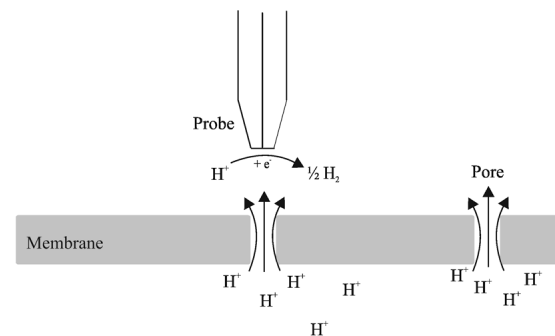


Probing the Dynamics of Ion Transport by Scanning Electrochemical Microscopy: Towards the Development of Enhanced Fuel Cell Membranes

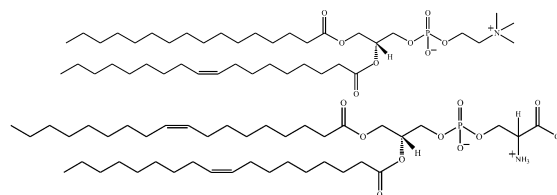
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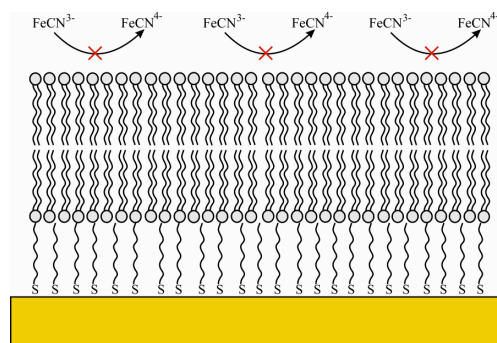
The Buzzeo group seeks to investigate ion transport and charge separation across membrane surfaces by scanning electrochemical microscopy (SECM). We are specifically interested in understanding the factors that most strongly influence the kinetics of these processes, with the ultimate goal of designing more efficient membrane materials for incorporation into hydrogen fuel cells. Current work is focused on characterizing membrane formation on modified gold substrates by a host of microscopy techniques.



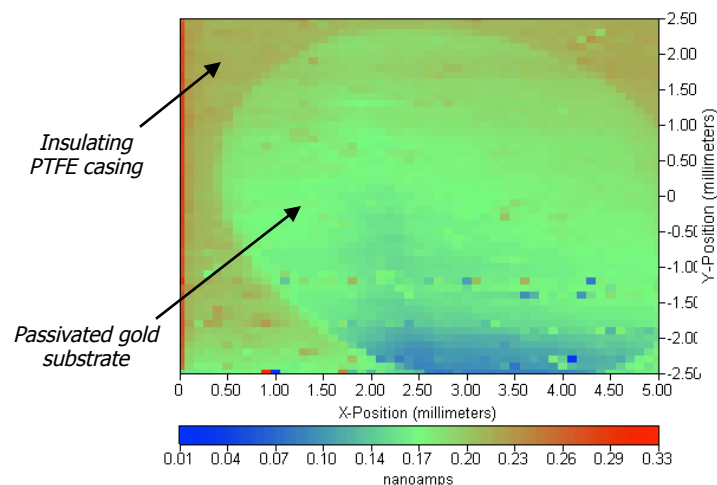
Schematic diagram of SECM set-up. The substrate gold electrode is first modified with a thiol agent and then phospholipids to allow for step-wise formation of a suspended bilayer membrane. Interrogation by the probe microelectrode allows for assessment of surface coverage and, ultimately, detection of hydrogen transport.



Phospholipids employed to construct bilayer membrane



Schematic diagram of suspended bilayer member. Redox-active species are blocked from the substrate electrode surface as evidenced by voltammetric measurements.



Typical area scan of a gold substrate modified with mercaptoundecanoic acid and phospholipids in the presence of solution-borne potassium ferricyanide. Low current density across the electrode indicates good surface coverage.