

Modeling and Control of Fuel Cell Water Dynamics

Jason B. Siegel

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Chapter 1

NIST Round 2: Simultaneous Neutron Imaging and Gas Chromatography

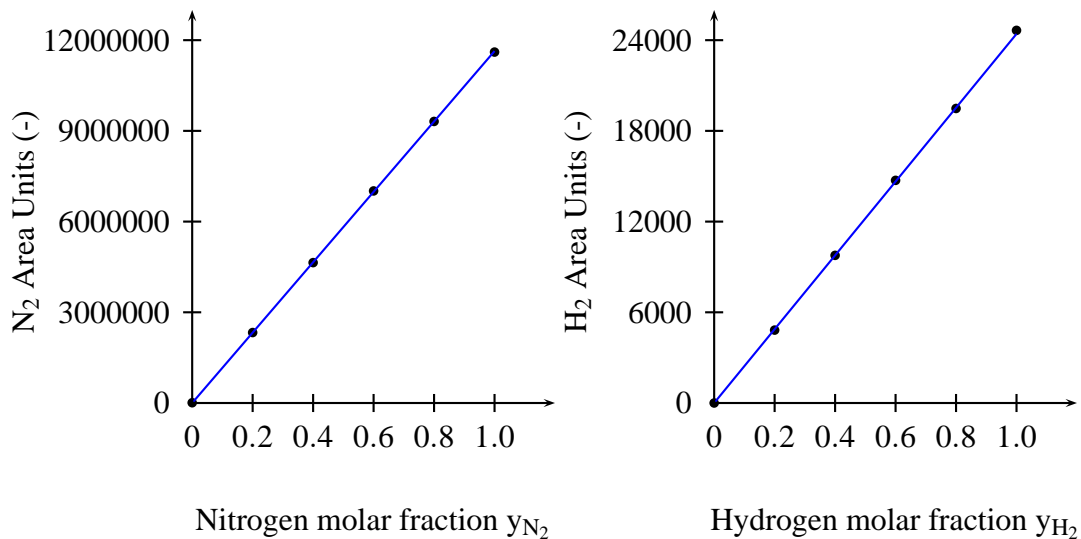


Figure 1.1: GC linear response, with variation in nitrogen concentration

- Conditions: Temperature, Pressure, Flow rate. (Same as used for experiment)
- N_2 average response (area units/ y_{N_2})=1163897
- H_2 average response (area units/ y_{H_2})=24416
- Sample size taken from the anode volume is $300\mu\text{l}$.
- $10\mu\text{l}$ is captured in the 6-port valve and injected into the GC for analysis.
- Anode Volume is $6500\mu\text{l}$.
- 25 parallel straight channels on the anode.
- anode channel depth is 1.78mm.

- anode channel width is 2.08 mm.
- anode land width of 0.838 mm.
- anode channel length is 7.3 cm.

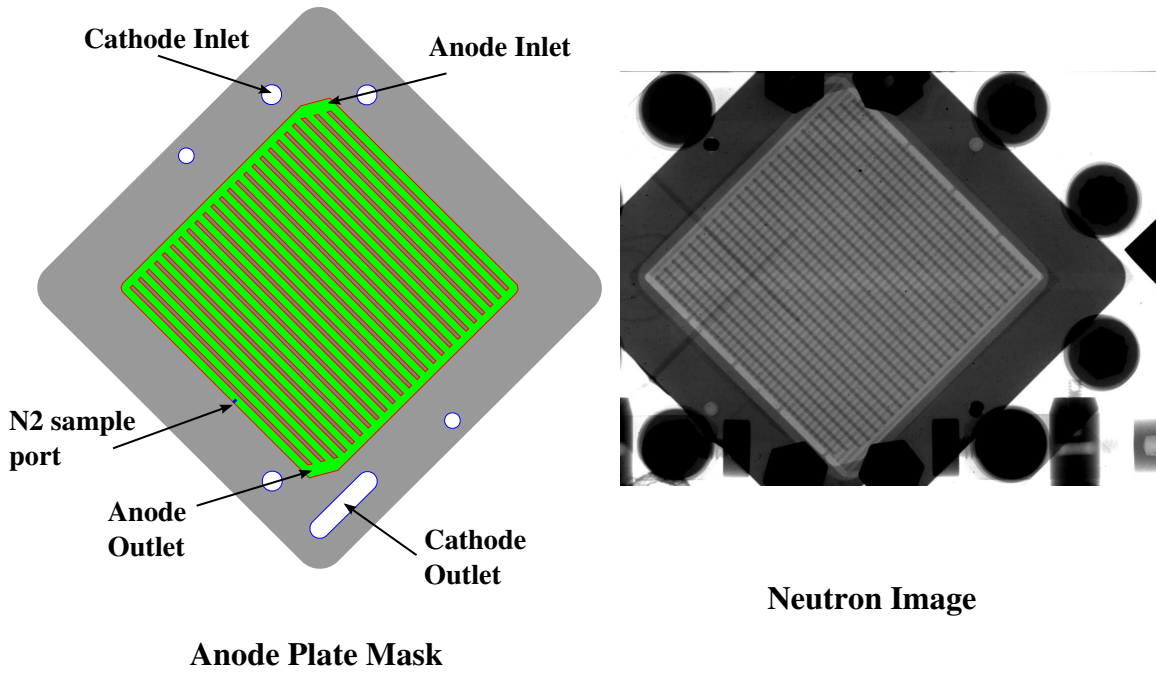
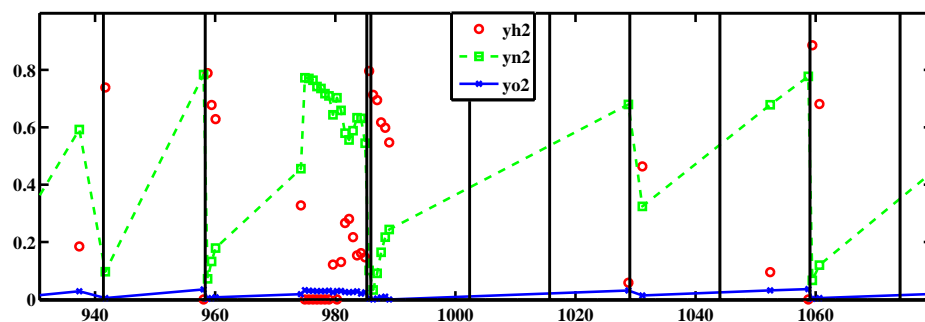
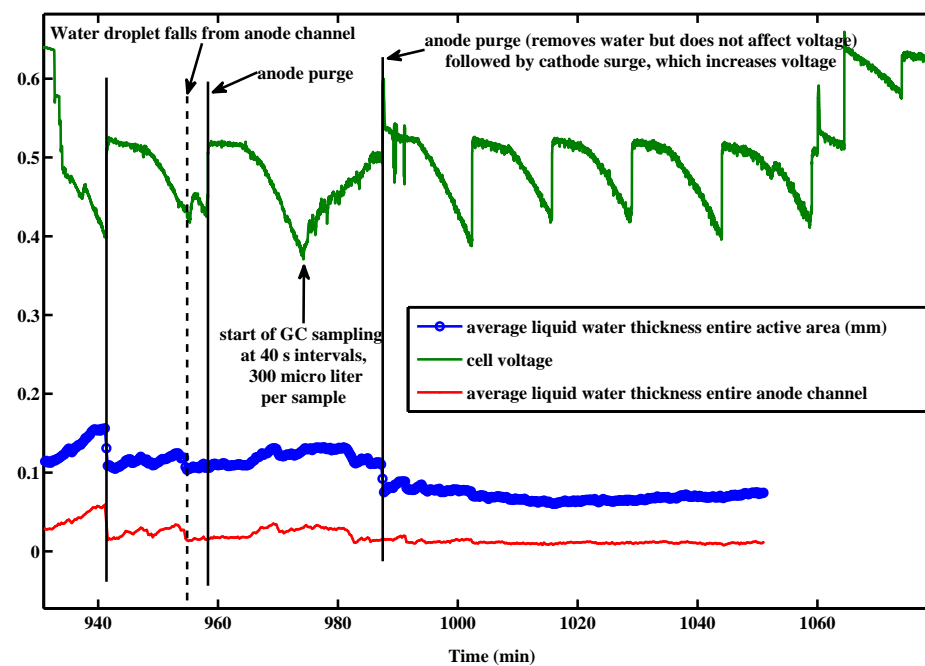


Figure 1.2: Anode flowfield orientation.



(a) N₂ accumulation



(b) Voltage drop

Figure 1.3: N₂ accumulation and Voltage Response

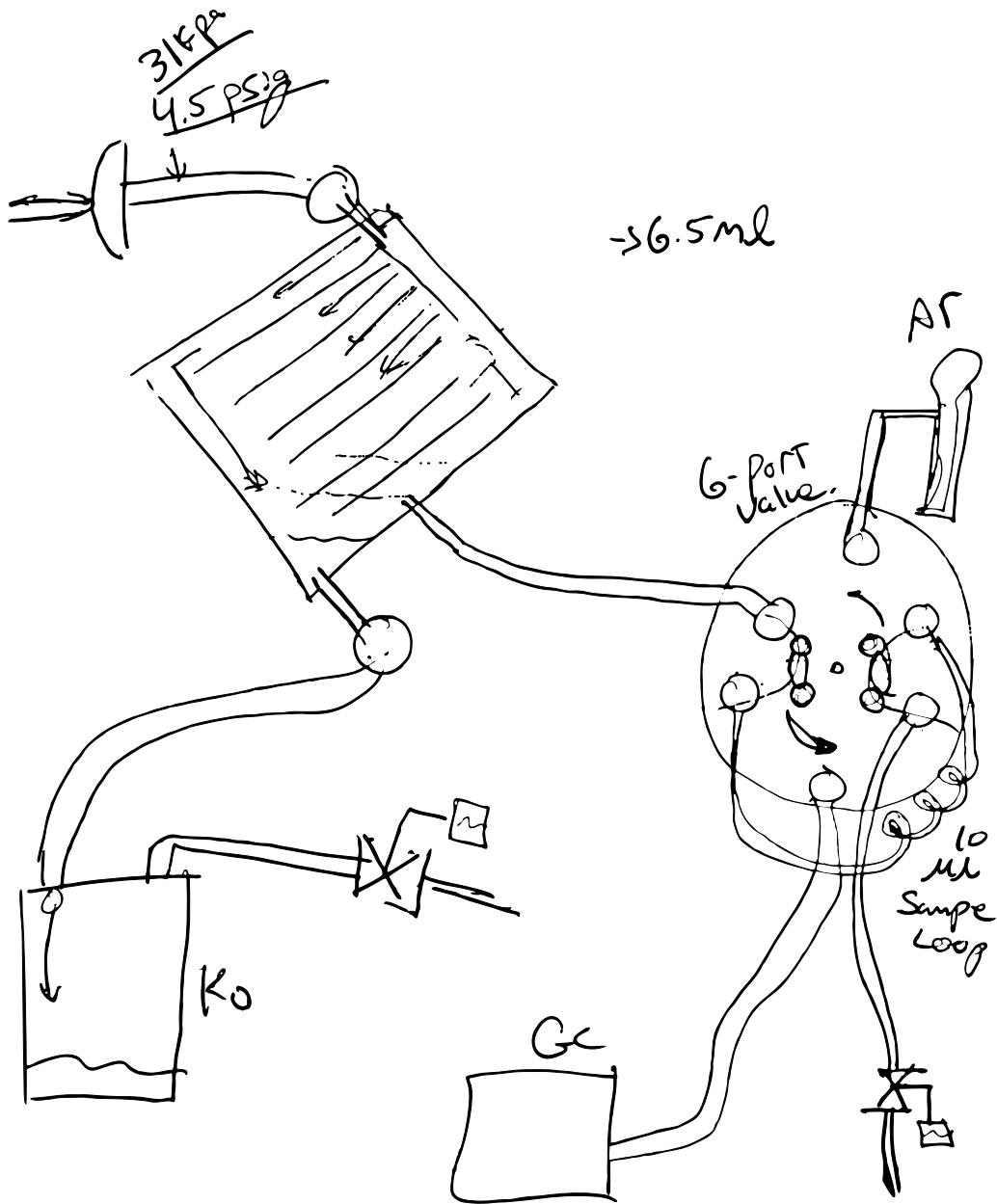


Figure 1.4: GC setup with 6-port rotating valve

Bibliography