Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The Use of Magnetite as a Polarisable Anode in the Electrolysis of Water[1] BJORN BERNTSON, Imperial College London, J. WOODS HALLEY, ANDY SCHOFIELD, University of Minnesota — We have studied the oxidation of magnetite to Fe_2O_3 in an electrolytic cell in which the cathode is magnetite and the anode is platinum. We report cyclic voltammogram data consistent with the hypothesis that magnetite, without oxygen gas production but with hydrogen gas production at the anode, is occurring. The reaction occurs at a potential at the cathode of about 0.3V vs SCE in 1M NaOH electrolyte, consistent with colloid experiments which also estimated the equilibrium potential of the hypothesized reaction. We find currents on the order of a milliamp per gram of magnetite electrode with the pelletized magnetite powder electrodes which we are using. Electrode characterization results using BET, XDS and macroscopic volume and mass measurements are reported, as well measurements of the amount of hydrogen gas generated per unit current. The quantity of gas generated is also consistent with our hypothesis concerning the electrode chemistry. Some samples exhibit evidence of two oxidation reactions occurring at the cathode and a possible interpretation of these is also discussed.

[1]This work was supported by a grant from the Center for Urban and Regional Affairs at the University of Minnesota and by the University of Minnesota Supercomputing Institute.

Bjorn Berntson
Imperial College London

Date submitted: 11 Nov 2011 Electronic form version 1.4