Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Electrochemical CO_2 Reduction via Gas-Phase Catholyte[1] BRITTANY E. CARTER, NATHAN T. NESBITT, LUKE A. D'IMPERIO, JEFFREY R. NAUGHTON, DAVE T. COURTNEY, STEVE SHEPARD, MICHAEL J. BURNS, Boston College, DAVID A. VERMAAS, WILSON A. SMITH, TU Delft, MICHAEL J. NAUGHTON, Boston College — Reducing CO_2 to CO through electrolysis, for the eventual conversion to hydrocarbons, provides a path towards utility-scale seasonal storage of renewable energy. Electrochemical reduction of CO_2 has previously been achieved using a two chamber system. The chambers are typically separated by a semipermeable Nafion membrane, with an oxygen evolution catalyst anode on one side, a gold cathode on the other, and a solution containing CO_2 on both sides. If instead, CO_2 gas was in the second chamber, the reaction should yield more CO formed from CO_2 at a given overpotential; this would result from the increased concentration of CO_2 at the cathode surface and more facile mass transport of the CO and CO_2. With liquid in one chamber and gas in the other, electrolysis is performed by integrating the cathode onto the semipermeable Nafion membrane. This membrane electrode assembly is fabricated via nanoimprint lithography (NIL), simultaneously achieving high active surface area and permeability. Challenges to the Nafion NIL process, and the performance of the system in CO_2 reduction, will be presented.

[1]This material is based upon work supported by the National Science Foundation Graduate Research Fellowship under Grant No. (DGE-1258923).

Brittany Carter
Boston College

Date submitted: 11 Nov 2016 Electronic form version 1.4