Morphological Control of Au Dendrite Electrocatalysts for CO$_2$ Reduction\textsuperscript{1} NATHAN T. NESBITT, Boston College, MING MA, TU Delft, BRITTANY E. CARTER, LUKE A. D’IMPERIO, JEFFREY R. NAUGHTON, DAVE T. COURTNEY, STEVE SHEPARD, MICHAEL J. BURNS, Boston College, WILSON A. SMITH, TU Delft, MICHAEL J. NAUGHTON, Boston College — Au has demonstrated the highest catalytic selectivity, activity, and stability for CO$_2$ reduction to CO of any metal, but the mechanism for this performance remains unclear. Studies of nanoparticle films have shown that higher index facets have improved performance, but the preeminent nanoparticle films, from oxide-derived Au, lack well-defined facets and morphological stability to illuminate their enabling mechanism. More recent work has shown Au needles with a sub 5 nm radius of curvature have excellent performance and stability, independent of crystal facet. The same studies, however, still show calculations expecting a facet dependence. Here we demonstrate a facile and novel dendrite fabrication process with tunable morphology. The dendrites show high catalytic selectivity, activity, and stability for CO$_2$ reduction to CO, along with morphological stability after 18 hours of operation, allowing correlation between morphology and performance. The influence of exposed facets will be discussed.

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