Electroreduction of CO on Polycrystalline Copper at Low Overpotentials

Cu is the only monometallic electrocatalyst to produce highly reduced products from CO₂ selectively because of its intermediate binding of CO. We investigate the performance of polycrystalline Cu for the electroreduction of CO in alkaline media (0.1 M KOH) at low overpotentials (−0.4 to −0.6 V vs RHE). We find that polycrystalline Cu is highly active at these potentials. The overall CO reduction rates are comparable to those of the nanostructured forms of the material, albeit with a distinct product distribution. While nanostructured forms of Cu favor alcohols, polycrystalline Cu produces greater amounts of C₂ and C₃ aldehydes, as well as ethylene.