Intermediates confinement effect of Cu wrinkle for high selectivity CO_2 reduction

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Research for carbon dioxide conversion to carbon monoxide and hydrocarbon is crucial for future life due to fossil fuel depleting and earth environmental problems. Carbon dioxide reduction (CRR) can solve these problems by carbon recycling.

Various metals can reduce CO_2 to C_1 products like HCOOH or CO, but copper is only metal can convert to hydrocarbons. To get low overpotential, high selectivity for product, and high-value products are research goals of CRR using Cu. Kinetics and surrounding environment are influence to catalytic activity of Cu. Controlling kinetics means regulating binding energy or binding site of Cu by doping, uncoordinated site, oxidation, and so on. Surrounding environment can be changed by nanofoam, cavities, and nanowire. These closed structures confine the reaction intermediates which promote to further reaction.

Herein, we demonstrate local concentration effect of Cu wrinkle to CRR. We regulate the confined structure and wavelength of wrinkle by degree of shrinkage and thickness of Cu. We compare the efficiency for high-value products and selectivity vary on confined structure.