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Rational design of novel Cu-containing catalysts for effective CO₂ conversion

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The environmental pollution caused by massive carbon dioxide emissions has become one of the main obstacles to the national health and economic development. It is now an urgent problem to develop novel CO₂ conversion catalysts. According to current research, Cu electrode is reported to be the best CO₂ reduction catalyst among the commonly used metal electrodes. However, bulk Cu electrode is also faced with a few problems like high overpotential, poor selectivity on products and low reaction efficiency due to scaling relationships. In order to develop new Cu-based CO₂ reduction catalysts, we will focus on geometric optimization of low dimensional nanomaterials and study their catalytic performances. The introduction of Cu atom, Cu₂ dimer, Cu nanowires and nano-flakes to one or two dimensional organic or inorganic systems may bring unique catalytic characteristic and break the limits of bulk Cu electrode. These well-distributed Cu nanostructures are easier to control and may show novel physical and chemical effects including size effect, geometric effect, substrate effect, magnetic effect, curvature effect and spatial confinement effect, which may improve CO₂ catalytic reduction.

Biography

Dr. Qiang Sun is a professor at Peking University, China. His current research interest is in computational materials design for energy and environment applications. These include hydrogen storage, lithium batteries, solar energy, CO₂ capture and conversion.

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