HYBRID MOLECULE-METAL INTERFACES FOR ELECTROCHEMICAL CO_2 REDUCTION TO MULTICARBON PRODUCTS

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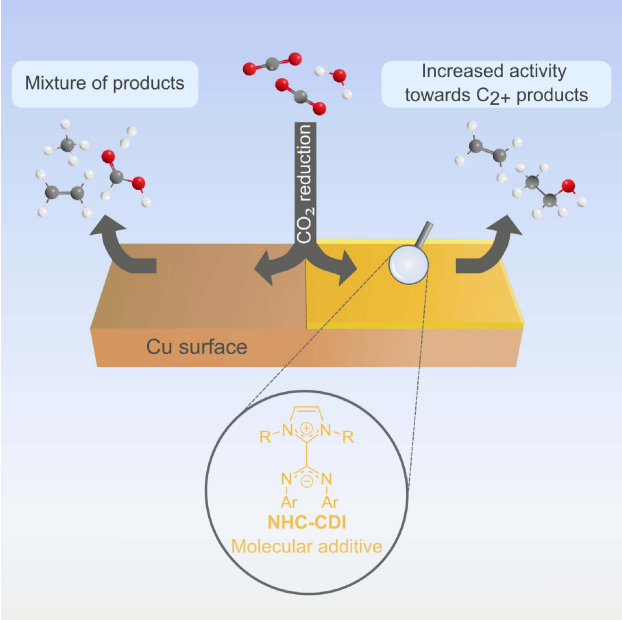
The unprecedented and ever-increasing levels of greenhouse gases such as carbon dioxide in the Earth's atmosphere stemming primarily from the burning of fossil fuels have led to a global climate crisis.[1] For this reason, green technologies that accelerate the transition towards carbon-neutral energy sources are highly needed. The electrochemical CO_2 reduction reaction (CO_2RR), powered by renewable-derived electricity, is a promising approach for the seasonal storage of electrical energy by converting CO_2 into molecules that can be used as energy vectors and value-added chemicals.[2,3] Utilization of this reaction requires the development of efficient and selective catalysts and here copper-based catalysts show unique potential in the conversion of CO_2 into multicarbon products.[4,5]

In this work, we present the preparation, characterization, and performance evaluation of hybrid copper-based catalysts modified with *N*-heterocyclic carbene-carbodiimide (NHC-CDI) ligands in the CO_2RR. Prepared via an electrodeposition method, the catalysts exhibit up to a 10-fold increase in the activity for multicarbon products such as ethylene and ethanol depending on the NHC-CDI ligand employed. This work exemplifies the ability of molecular additives to alter the intrinsic catalytic activity of copper surfaces in the CO_2RR.



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