New catalyst boosts carbon dioxide electroreduction to multicarbon products

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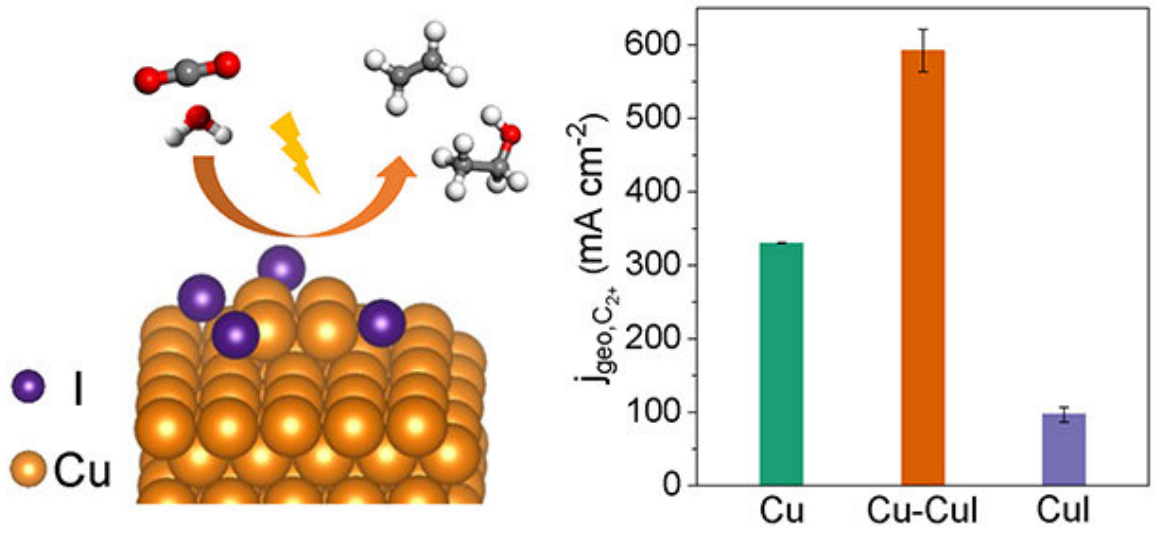

A Cu-CuI composite catalyst achieves highly efficient production of C_2^+ chemicals from electrocatalytic CO_2 reduction. Credit: LI Hefei and LIU Tianfu

Electrocatalytic CO_2 reduction reaction (CO2RR), using clean electricity to convert CO_2 and water into chemicals and fuels, is an effective way to simultaneously close the carbon cycle and store renewable energy.

It's difficult to generate multicarbon (C_2^+) products due to the multiple proton-electron transfer, the complex intermediates and the sluggish C-C

coupling step during CO_2RR to C_2^+ products, leading to low selectivity and production rate for C_2^+ formation.

Recently, a research team led by Prof. Wang Guoxiong, Prof. Gao Dunfeng and Prof. Bao Xinhe from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences (CAS) designed a Cu-CuI composite catalyst, achieving efficient production of C_2^+ chemicals from CO2RR.

This study was published in *Angewandte Chemie International Edition* on April 10.

The researchers designed the catalyst with abundant Cu_0/Cu_+ interfaces by physically mixing Cu nanoparticles and CuI powders.

Structural characterizations indicated that the Cu-CuI composite catalyst underwent significant reconstruction under CO2RR conditions, which was induced by alkaline electrolyte and applied potential.

The high-rate C_2^+ production over Cu-CuI was ascribed to the presence of residual Cu^+ and adsorbed iodine species, which improved CO adsorption and facilitate C-C coupling.

"This work presents a new strategy for designing efficient catalysts towards high-rate CO_2RR to C_2^+ products," said Prof. Wang.

More information: Hefei Li et al, High-Rate CO 2 Electroreduction to C_2^+ Products over a Copper-Copper Iodide Catalyst, *Angewandte Chemie International Edition* (2021). DOI: 10.1002/anie.202102657

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