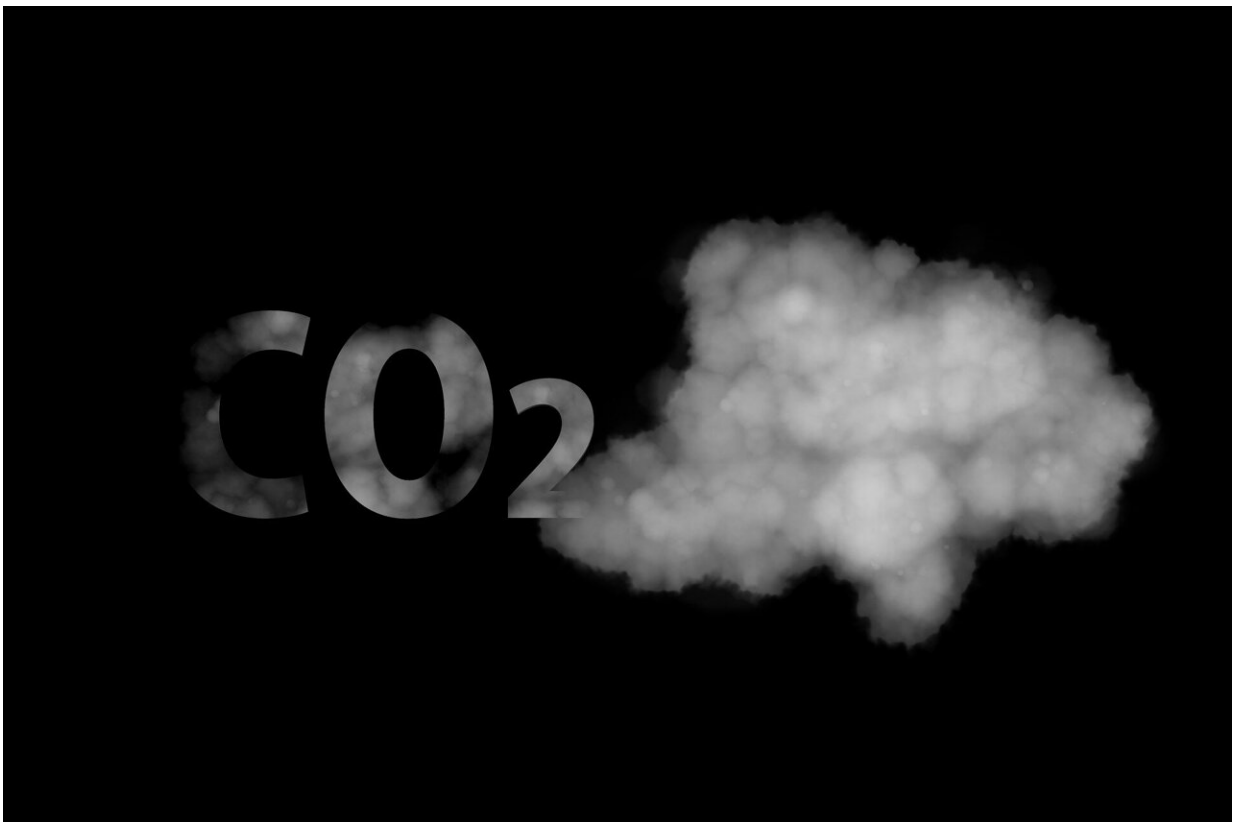


# Researchers design novel hollow-fiber Cu penetration electrode for efficient CO<sub>2</sub> electroreduction

January 17 2024, by Liu Jia

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Electrochemical conversion of CO<sub>2</sub> into value-added chemical fuels driven by renewable electrical energy has roles in reducing net CO<sub>2</sub>

emission and in addressing energy consumption.

Although considerable progress has been made in CO<sub>2</sub> electroreduction, carbonate formation can cause serious CO<sub>2</sub> loss. CO<sub>2</sub> conversion in acidic electrolyte is an attractive way to overcome the problem of CO<sub>2</sub> loss, however, selective reduction remains a challenge.

In a study published in [\*Energy & Environmental Science\*](#), a research team from the Shanghai Advanced Research Institute (SARI) of the Chinese Academy of Sciences designed a Cu hollow fiber penetration [electrode](#) to electroreduce CO<sub>2</sub> in [strong acid](#) with effective inhibition of hydrogen evolution reaction (HER).

By virtue of the unique penetration effect induced by Cu hollow fiber, abundant CO<sub>2</sub> molecules were supplied to Cu active sites. The Cu surface possessed enough high CO<sub>2</sub> coverage, which suppressed HER and facilitated CO<sub>2</sub> reduction to C<sub>2</sub><sup>+</sup> products.

Thus, a CO<sub>2</sub> single-pass conversion rate exceeding 51% with a C<sub>2</sub><sup>+</sup> Faradaic efficiency of 73.4% and partial current density of 2.2 A cm<sup>-2</sup> were achieved in acidic solution (pH = 0.71). The performance of the Cu penetration electrode was approximated to or even exceeded those of the state-of-the-art Cu base catalysts.

This work represents progress in the design and development of new electrode configurations to realize CO<sub>2</sub> electroreduction to high-value C<sub>2</sub><sup>+</sup> chemicals with scalable applications.

**More information:** Chang Zhu et al, Selective CO<sub>2</sub> electroreduction to multicarbon products exceeding 2 A cm<sup>-2</sup> in strong acids via a hollow-fiber Cu penetration electrode, *Energy & Environmental Science* (2023).  
[DOI: 10.1039/D3EE02867D](https://doi.org/10.1039/D3EE02867D)

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