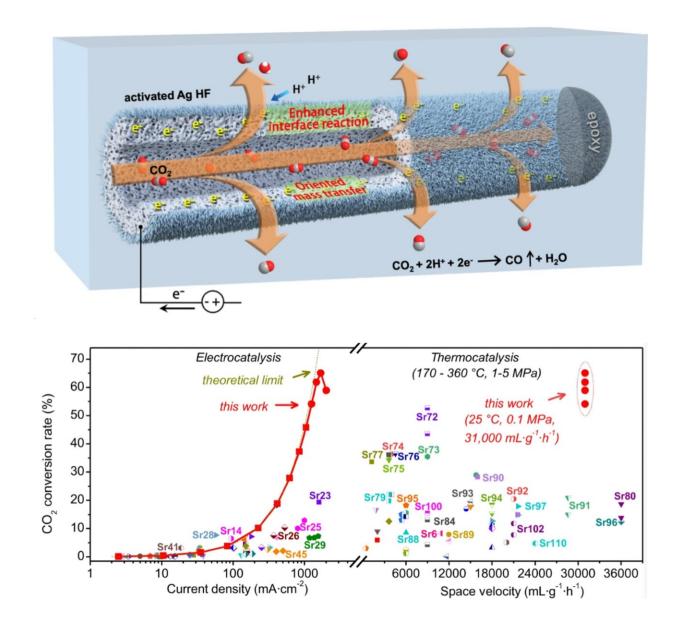


Novel silver hollow fiber boosts CO2 electroreduction

June 6 2022, by Li Yuan



Schematic illustration of hollow fiber electrode for boosting CO2 reduction to



CO. Credit: SARI

A research team led by Profs. Wei Wei and Chen Wei from the Shanghai Advanced Research Institute (SARI) of the Chinese Academy of Sciences have reported a hierarchical micro/nanostructured silver hollow-fiber electrode to boost CO₂ electroreduction.

The <u>electrode</u> reduces CO₂ to CO with CO₂ conversions exceeding 54% at a high space velocity of 31,000 mL gcat⁻¹·h⁻¹ under <u>ambient</u> conditions, maintaining stable large current densities (~1.26 A·cm⁻²) and high CO faradaic efficiencies (~93%).

The results were published in *Nature Communications* on June 2.

The electrochemical conversion of CO_2 into carbon-based fuels and valuable feedstocks by <u>renewable electricity</u> is an attractive strategy for CO_2 abatement and renewable energy consumption that can help achieve the goal of carbon neutrality.

CO is the key component of syngas, a mixture of CO and H₂ that can be directly converted into various value-added chemicals via well-developed <u>industrial processes</u> such as Fischer-Tropsch synthesis, methanol synthesis, etc. Therefore, CO₂ electroreduction to CO is considered one of the most promising means of obtaining cost-competitive products. However, highly efficient CO₂ conversion with high space velocity under <u>mild conditions</u> remains a challenge.

The hollow-fiber electrode with hierarchical micro/nanostructures in this study is composed of only metallic silver (Ag) for electroreducing CO₂ to CO. Such a porous, hollow-fiber Ag electrode acting as a CO₂ disperser not only enhances three-phase interface reactions but also



guides mass transfers during electrolysis.

Electrochemical results and time-resolved operando Raman spectra demonstrate that enhanced three-phase interface reactions and oriented mass transfers synergistically boost CO production.

This result provides new opportunities for heightening three-phase interface reactions and mass transfer kinetics simultaneously. In addition, it demonstrates that the micro/nanostructured Ag hollow fiber can be an ideal industrial electrode with excellent durability, representing an encouraging advancement in CO₂ electroreduction that may lead to scalable applications.

More information: Shoujie Li et al, Hierarchical micro/nanostructured silver hollow fiber boosts electroreduction of carbon dioxide, *Nature Communications* (2022). DOI: 10.1038/s41467-022-30733-6

Provided by Chinese Academy of Sciences

Citation: Novel silver hollow fiber boosts CO2 electroreduction (2022, June 6) retrieved 24 June 2024 from https://phys.org/news/2022-06-silver-hollow-fiber-boosts-co2.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.