

# CO<sub>2</sub> UPGRADING INTO C<sub>2</sub> OXYGENATES WITH A CUAG TANDEM ELECTROCATALYST

Tech ID: 33955 / UC Case 2025-099-0

## PATENT STATUS

Patent Pending

## BRIEF DESCRIPTION

The challenge in carbon dioxide utilization is efficiently converting it into valuable, multi-carbon chemicals. Current carbon dioxide electroreduction methods often suffer from low selectivity and yield towards desirable products like two-carbon oxygenates, such as ethanol and acetate, which are key platform molecules for the chemical industry. This innovation, developed by UC Berkeley researchers, addresses this by using a novel Copper-Silver (CuAg) tandem electrocatalyst within a membrane electrode assembly (MEA) cell to efficiently upgrade carbon dioxide into two-carbon oxygenates. This technology offers significantly enhanced selectivity and efficiency for two-carbon oxygenate production directly from carbon dioxide compared to conventional single-metal or mixed-metal catalysts, presenting a more sustainable and economically viable route for chemical synthesis.

## SUGGESTED USES

- » Sustainable production of commodity chemicals like ethanol and acetate from captured or waste carbon dioxide, reducing reliance on fossil fuels.
- » Decarbonization of the chemical and fuel industries by providing a pathway for carbon dioxide utilization.
- » Integration into electrochemical energy storage and conversion systems, using renewable electricity to drive the carbon dioxide reduction reaction.
- » On-site production of two-carbon oxygenates at industrial carbon dioxide emission sources.

## ADVANTAGES

- » High selectivity for two-carbon oxygenates (ethanol and acetate) compared to competing byproducts (e.g., methane or carbon monoxide).
- » Enhanced efficiency due to the tandem catalytic effect of the Copper-Silver nanoparticles.
- » Scalable design enabled by the use of a membrane electrode assembly (MEA) cell, suitable for industrial applications.

## CONTACT

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## INVENTORS

» Yang, Peidong

## OTHER INFORMATION

### CATEGORIZED AS

- » **Energy**
- » Other
- » **Materials & Chemicals**
- » Chemicals
- » Nanomaterials
- » **Nanotechnology**
- » Other
- » Tools and Devices

### RELATED CASES

2025-099-0

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Reduced catalyst loading or improved lifetime due to the nanoscale and stable integration on a hydrophobic carbon substrate.

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Sustainable and environmentally friendly process that converts a greenhouse gas (carbon dioxide) into valuable products.

## RELATED MATERIALS

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### ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Methods to Produce Ultra-Thin Copper Nanowires for Transparent Conductors](#)
- ▶ [Semiconductor-Based Photo Redox Catalysts For Sustainable Dehydrogenation Reactions](#)



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