CO2 UPGRADING INTO C2 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.

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INVENTORS

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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

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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