Acid-Free Synthesis of Electrocatalyst Technology

Tech ID: 33243 / UC Case 2022-99C-0

BRIEF DESCRIPTION

The present invention describes a novel method for acid-free pyrolytic synthesis of metal-nitrogen-carbon (M-N-C) catalysts for use in fuel cell/energy conversion applications. This method allows for rapid production of M-N-C catalysts that exhibit high activity and selectivity for CO2 electroreduction without needing harsh acids or bases.

SUGGESTED USES

• Fuel cell/energy conversion applications

• Supports CO2 reduction efforts

• Possible use in N2 reduction reactions

FEATURES/BENEFITS

• Acid-free synthesis that lowers manufacturing cost and lowers risk to personnel

• Synthesis time of 1 day (compared to 10-14 days for other M-N-C catalyst processes)

• Exceptional catalytic performance (Ecath = -1.1 V vs. RHE compared to competing M-N-C catalysts of Ecath = -0.7 V vs. RHE)

TECHNOLOGY DESCRIPTION

This technology developed at UCI uses a mechanochemical process to produce highly active electrocatalysts. Through a series of ball milling and two-step pyrolysis techniques, M-N-C catalysts are synthesized which exhibit high activity and selectivity for CO2 electroreduction without needing harsh acids or bases. This technology is beneficial as it addresses: (1.) issues in CO2 electroreduction efficiency (2.) Costly and hazardous chemical disposal of acid after catalyst synthesis, mitigating environmental concerns (3.) lengthy manufacturing time required with current processes.

STATE OF DEVELOPMENT

This method is at the working prototype stage. A synthesis has been optimized for CO2 reduction. Further optimization (e.g. oxygen reduction reaction) could be tested for industrial applications. A provisional patent describing this method has been filed.

PATENT STATUS

Country	Type	Number	Dated	Case

CONTACT

Richard Y. Tun
tunr@uci.edu
tel: 949-824-3586.

INVENTORS

» Atanassov, Plamen

OTHER INFORMATION

CATEGORIZED AS

» **Energy**
» Hydrogen
» Other
» **Materials & Chemicals**
» Chemicals
» **Nanotechnology**
» Materials
» **Semiconductors**
» Design and Fabrication
» Materials
» **Transportation**

United States Of America	Published Application	20230416934	12/28/2023	2022-99C	» Automotive

RELATED CASES

2022-99C-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Method For Rapid In Situ Detection Of Ammonia

UCI Beall Applied Innovation

5270 California Avenue / Irvine,CA
92697-7700 / Tel: 949.824.2683