

Electrospun Iridium Oxide/Nafion Electrodes for PEM Water Electrolysis

Tech ID: 34140 / UC Case 2025-842-0

BRIEF DESCRIPTION

This technology introduces a novel method of producing high-efficiency, durable electrodes for polymer electrolyte membrane water electrolysis (PEMWE) using electrospinning.

FULL DESCRIPTION

The invention utilizes electrospinning to fabricate fiber-based electrodes composed of iridium oxide catalyst, Nafion polymer electrolyte, and poly acrylic acid (PAA), offering a significant improvement in the uniformity of IrOx particle distribution and catalyst utilization in PEMWE cells. This method simplifies the production process through a single pot preparation of the electrospinning ink, resulting in a mat ready for use in PEMWE without further treatment, such as heat treatment. The technique ensures the prevention of iridium oxide particle agglomeration and enhances the electrode durability and efficiency by optimizing the iridium oxide and Nafion distribution. This method also improves in-plane sheet resistance enabling deployment of ultra-low loadings of catalyst.

SUGGESTED USES

- » Increased catalytic activity and efficiency of the anode in PEMWE.
- » Improved uniformity of Iridium oxide particle distribution.
- » Prevention of particle agglomeration through high shear during electrospinning.
- » Enhanced durability of the electrode with PAA carrier content.
- » Simplified manufacturing process with a single pot preparation method.
- » Scalability potential due to the versatility and simplicity of the electrospinning process.

ADVANTAGES

- » Renewable energy production, specifically in clean hydrogen production through PEM water electrolysis.
- » Manufacturing of high-performance electrodes for energy conversion and storage devices.
- » Advancement in electrode architecture for increased catalyst utilization, reducing operational costs in PEMWE.
- » Potential applications in other sectors requiring efficient electrochemical reactions, such as in manufacturing and agriculture.

PATENT STATUS

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OTHER INFORMATION

KEYWORDS

electrolyzer, chemical process, bipolar electrolyzer, green hydrogen, water electrolysis, PEM water electrolyzer, clean energy, climate change, material engineering, electrospinning

CATEGORIZED AS

- » **Energy**
- » Other

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