Improved Electrocatalysts for Fuel Cells and Electrolysis

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing methods for catalyzing oxygen formation or consumption reactions using electrodes of mixed metal oxides.

OVERVIEW

Developing catalysts that effectively split water into its elements is critical to storing renewable energy in a practical way. Wind and solar energy, for example, can be harnessed for electrolysis and then stored as the resulting hydrogen gas. Another green technology – fuel cells – works in the opposite direction by consuming oxygen.

However, a substantial amount of energy traditionally has been required to drive such reactions – more than theoretically predicted. Efforts to reduce this ‘overpotential’ using specialized, mixed-metal anodes and cathodes have been frustrated. Specifically, it is challenging to develop materials that withstand degradation and don’t require expensive precious metals.

THE INVENTION

UW–Madison researchers have developed mixed-metal electrodes, such as anodes useful in water hydrolysis reactions to generate oxygen or cathodes to consume oxygen in a fuel cell.

The electrodes are made of at least three metal oxides, including nickel oxide and cobalt oxide. They can be prepared by mixing water soluble salts of the metals, typically presented as the nitrate, in a solvent. The resulting solutions are blended to produce a desired ratio of metals. The blend is coated on an electrode and then heated to calcine the deposits.
APPLICATIONS

• Water electrolysis
• Fuel cells
• Generating hydrogen for automobiles and storage
• Generating oxygen gas for industries like steelmaking
• Large scale production or residential generation of hydrogen fuel from renewable resources

KEY BENEFITS

• Materials are available and low cost.
• Improves efficiency by reducing overpotential requirements

ADDITIONAL INFORMATION

Related Technologies
For more information about improved electrolysis with electrocatalysts formed from cobalt and fluoride, see WARF reference number P100096US01.

Tech Fields
Clean Technology - Energy storage

CONTACT INFORMATION

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