



## Platinum-Free Catalysts for Fuel Cells

**INVENTORS • Shannon Stahl, James Gerken, Colin Anson**

**WARF: P140274US02**

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a cost-saving electrocatalytic oxygen reduction scheme.**

### OVERVIEW

Fuel cells and other types of electrochemical cells rely on platinum cathodes to drive oxygen reduction. Although efficient, platinum cathodes are expensive given the element's relative scarcity. One approach has been to surface coat ubiquitous substrates with cheaper metals such as iron and cobalt, but the search for alternative methods and materials continues.

### THE INVENTION

UW-Madison researchers have developed a new scheme to improve the efficiency of oxygen reduction reactions in electrochemical cells. Their method combines a redox catalyst with a charge transfer mediator capable of transferring electrons and protons. Careful redox mediator/redox catalyst pairings avoid the need for expensive metal cathodes (or anodes). Favorable pairings include quinones with cobalt or iron-containing redox catalysts, and nitroxyl-type materials paired with nitric oxide-type redox catalysts.

### APPLICATIONS

- Improved catalysts for fuel cells (automotive, trains, stationary power sources) and electrosynthetic cells (e.g., reduction of carbon dioxide to hydrocarbons)

### KEY BENEFITS

- Enables lower cost, efficient catalysis
- Outperforms existing technology

### THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.



## STAGE OF DEVELOPMENT

Actual – the inventors have tested two systems: (i) cobalt and benzoquinone and (ii) nitrogen oxide and TEMPO. Both showed improved electrochemical oxygen reduction compared to existing catalyst systems.

The development of this technology was supported by the WARF Accelerator Program. The Accelerator Program selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones. WARF believes that these technologies are especially attractive opportunities for licensing.

## ADDITIONAL INFORMATION

### Related Technologies

For information about the researchers' development of mixed metal oxide catalysts for producing hydrogen from water, see WARF reference numbers:

[P100096US01](#)

[P110007US02](#)

[P120118US02](#)

### Publications

[Read a news story about this technology.](#)

### Tech Fields

Clean Technology - Energy & resource efficiencies

Clean Technology - Biofuels & renewable fuels

## CONTACT INFORMATION

For current licensing status, please contact Mark Staudt at [mstaudt@warf.org](mailto:mstaudt@warf.org) or 608-960-9845.

