Improved Quinone-Based Compounds for Electrochemical Cells

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WARF: P170383US02

Inventors: Shannon Stahl, James Gerken

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing quinone-based redox mediators that are water soluble and stable in aqueous acid solutions. These compounds can be used in fuel cells or flow batteries.

Overview

Fuel cells and other types of electrochemical cells often rely on costly platinum cathodes to drive oxygen reduction. A team of UW-Madison researchers recently developed a cost-saving scheme to improve the efficiency of oxygen reduction reactions in electrochemical cells. Instead of a platinum catalyst, their method combined a redox catalyst with a charge transfer mediator (such as a quinone) capable of transferring electrons and protons.

The Invention

The UW-Madison researchers have now identified alternative quinone-based redox mediators with improved stability for use in electrochemical cells. The new compounds feature sulfonated thioethers substituted at the C-H positions of the quinone.

The compounds have a high reduction potential in their oxidized form. They also are soluble in water and stable in aqueous acid solutions, making them useful as redox mediators in emerging technologies like fuel cells or flow batteries.

Applications

- Energy storage, such as flow batteries
- Energy delivery, such as fuel cells

Key Benefits

- High yields
- Uses benzoquinone rather than tetrachlorobenzoquinone as a feedstock
- Soluble in water
- Stable in aqueous acid solutions
- Enables lower cost, efficient catalysis

Stage of Development

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

For More Information About the Inventors

- Shannon Stahl

Related Technologies

- P140274US02
- P170232US02

Publications

- Gerken et al. 2020. Comparison of Quinone-Based Catholytes for Aqueous Redox Flow Batteries and Demonstration of Long-Term Stability with Tetrasubstituted Quinones. Adv. Energy Mater. doi.org/10.1002/aenm.202000340

Tech Fields

- Clean Technology : Energy storage, delivery & resource efficiencies

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854