Asymmetry of Multi-electron Transfer Kinetics in Oxygen Electrocatalysis and its Application for Highly Active Catalyst Design

Technology #14882

Applications

Applications include hydrogen fuel cells and solar-driven water splitting electrolyzer.

Problem Addressed

This technology overcomes these current problems:

- Oxygen evolution reaction (OER) and oxygen reduction reaction (ORR) are two limiting processes that each contributes to ~0.4 V loss
- Cost and scarcity of noble metal oxide catalysts is prohibitive for practice applications

Technology

The invention describes a method to design efficient, abundant, non-precious-metal catalysts for OER. The design principle looks to develop a more active OER catalyst by engineering the eg filling to a value of ~1.3-1.4. With proper understanding, tuning surface electronic features like the transition metal eg filling is a promising strategy to develop highly active non-precious-metal containing oxide catalysts that can have higher activity than state-of-the-art precious metal-containing material.

Advantages

- Highly active non-precious-metal containing oxide catalysts for O2 electrocatalysis
- Step toward implementation of hydrogen-based renewable energy
- More cost-effective

Categories For This Invention:

Energy
Fuel Cells
Solar
Photosynthesis

Intellectual Property:

Electrochemical methods and systems using catalytic materials
Issued US Patent

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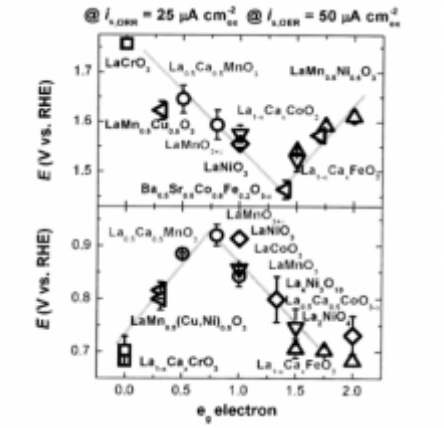
Publications:

A Perovskite Oxide Optimized for Oxygen Evolution Catalysis from Molecular Orbital Principles
Science
9 December 2011: Vol. 334 no. 6061 pp. 1383-1385
Highly Efficient Oxygen Catalyst Found
MIT News
October 28, 2011

External Links:

Electromechanical Energy Laboratory
http://web.mit.edu/eel/

Image Gallery:



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