ContainerPower Energy Solutions

Perovskite flow battery

Overview

An international group of scientists claims to have created a high-efficiency, low-cost redox flow battery powered by perovskite-silicon tandem solar cells which combines storage and power production in one unit.Are perovskites a good material for electrocatalysis?

Perovskites have been attractive materials in electrocatalysis due to their virtues of low cost, variety, and tuned activity. Herein, we firstly demonstrate superior electrochemical kinetics of LaBO 3 (B = V, Cr, Mn) perovskites towards vanadium redox reactions in vanadium redox flow batteries (VRFBs).

Why do LA-based perovskites have superior electrode kinetics?

As corroborated by the density function theory (DFT), the superior electrode kinetics of La-based perovskites towards V3+ /V 2+ and VO 2+ /VO 2+ redox reactions are attributed to both decreased adsorption resistance of vanadium ion and enhanced charge transfer.

Can LA-based perovskite be used as a catalyst for vanadium redox reactions?

Herein, we successfully fabricated La-based perovskite of LaBO 3 (B = V, Cr, Mn, Fe, Co) as catalyst of graphite felt (GF) electrode for vanadium redox reactions (Fig. 1) and uncovered their underlying catalytic mechanisms. For perovskites, oxygen-containing functional groups are formed at B-O binding to boost the adsorption of vanadium ions.

What are the benefits of catalysis of perovskites?

Benefiting from the catalysis of perovskites, the flow cell polarization is remarkably reduced and the cell performance is significantly enhanced in order of GF < GF/LaVO 3 < GF/LaCrO 3 < GF/LaMnO 3 with GF/LaMnO 3 even successfully delivering an EE of 60% at 300 mA cm −2.

What is the intrinsic catalysis of perovskites for vanadium redox reactions?

The intrinsic catalysis of perovskites for vanadium redox reactions is in

increasing order of $LaVO_3 < LaCrO_3 < LaMnO_3$.

What are perovskites used for?

Perovskites, known for their effective application in solar cells as absorbers and in rechargeable batteries as cathodes, show great potential in addressing these challenges and advancing the development of efficient PVB devices 18, 19, 20, 21, 22, 23.

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