

Influence of La on Increasing the ORR Activity of LaNi Supported with N and S Co-doped Carbon Black Electrocatalyst for Fuel Cells and Batteries

Authors : Maryam Kiani

Abstract : Non-precious electrocatalysts play a crucial role in the oxygen reduction reaction (ORR) for regenerative fuel cells and rechargeable metal-air batteries. To enhance ORR activity, La (a less active element) is added to modify the activity of Ni. This addition increases the surface contents of Ni²⁺, N, and S species in LaNi/N-S-C, while still maintaining a substantial specific surface area and hierarchical porosity. Therefore, the additional La is essential for the successful ORR process. In addition, the presence of extra La in the LaNi/N-S-C electrocatalyst enhances the efficiency of charge transfer and improves the surface acid-base characteristics, facilitating the adsorption of oxygen molecules during the ORR process. As a result, this superior and desirable electrocatalyst exhibits significantly enhanced ORR bifunctional activity. In fact, its ORR activity is comparable to that of the 20 wt% Pt/C.

Keywords : fuel cells, batteries, dual-doped carbon black, ORR

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