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Editorial

Innovative Electrocatalysts for Fuel Cell and Battery Applications

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1. Introduction

The development of sustainable energy systems is essential to hinder global warming and environmental pollution emergencies. In recent decades, fuel cells and batteries have undoubtedly emerged as the most promising technologies for stationary, portable, and automotive applications. Their large-scale commercialization is closely related to the research on innovative electrocatalysts, which are able to achieve efficient, durable, and low-cost energy conversion and storage with a low environmental impact. Particularly, for polymer electrolyte membrane fuel cells and their subcategories, the crossover between platinum scarcity, their high cost, and their low tolerance to alcohol has led to the requirement for alternative materials that can catalyze both oxygen reduction and fuel oxidation reactions in acid and alkaline environments. Further optimization could address the reliability and durability parameters that are required by the market when under critical temperature and relative humidity conditions. Regarding batteries, several drawbacks, such as their limited driving range, extended battery charging time, limited capacity, limited efficiency, and high storage system costs, have to be overcome by employing novel low-cost electrocatalysts that have high energy density, reversibility, and versatility. The development of outstanding bi-functional catalysts is essential for the simultaneous improvement of ORR and OER activities. This Special Issue deals with the preparation and characterization of novel electrocatalysts and their integration into efficient energy conversion and storage systems.

2. Special Issue

This Special Issue, entitled "Innovative Electrocatalysts for Fuel Cell and Battery Applications", is a collection of seven contributions from researchers all over the world. Two reviews were put together by Jang et al. [1] and Pérez-Sequera et al. [2], which were about recent studies on multifunctional electrocatalysts for fuel cells that used various nanomaterials and recent advances in the electroreduction of CO_2 over heteroatom-doped carbon materials, respectively. Mansor et al. [3] published an article focusing on NiPd supported on a mesostructured silica nanoparticle as an efficient anode electrocatalyst for methanol electrooxidation in alkaline media. Deganello et al. [4] clarified the role of the reducer-to-oxidizer ratio in the solution combustion synthesis of $Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$ oxygen electrocatalysts. Ruiz-López et al. [5] studied membrane-less ethanol electrooxidation over Pd-M (M: Sn, Mo, and Re) bimetallic catalysts, and Milikić et al. [6] wrote a manuscript in which ionic liquid-derived carbon-supported metal electrocatalysts were employed as anodes in direct borohydride-peroxide fuel cells. Finally, Lo Vecchio et al. [7] investigated water splitting with enhanced efficiency using a nickel-based co-catalyst in a cupric oxide photocathode.

Conflicts of Interest: The author declares no conflict of interest.

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