**Oxygen Reduction Reaction Electrocatalysis by Cobalt-Ferrites: Effect of Borax on Electrocatalytic Activity**

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Proton Exchange Membrane Fuel Cell (PEMFC) is an energy conversion device, which converts chemical energy to electricity with high energy efficiency, high power density and zero emissions. Its commercialization is facing hindrance due to the need of Platinum catalyst for enhancing sluggish oxygen reduction reaction (ORR) kinetics at the cathode. Platinum is expensive and has insufficient durability. Therefore, non-precious cathode catalysts are required to suffice the slow kinetics in PEMFCs and make it commercially viable.1 Our approach is based on the synthesis of bimetallic oxide catalysts from cheaper solution combustion synthesis, so as to make use of the synergistic effects and hence make it more efficient for electrocatalytic application.

Cobalt ferrites for ORR electrocatalytic activity were synthesized by solution combustion synthesis with varied amounts of borax as additive (10 to 50 at.% boron). The synthesized catalysts were characterized by X-Ray diffraction, X-Ray Photoelectron Spectroscopy (XPS), and Scanning Electron Microscopy techniques. XPS showed the presence of Fe3+ and Co2+ in the prepared samples. The nitrogen adsorption-desorption isotherms indicated the positive effect of borax as additive on surface area. The RDE voltammetry studies exhibited that with increasing amount of borax (10 to 50 at.% boron), the ORR current density increased from 0.15 to 3.56 mAcm-2. The highest onset potential value of 0.77 V vs RHE was observed with lower Tafel slope value for FeCo, 10FeCo and 20FeCo at 66.4, 80.9 and 75 mVdec-1 respectively. Koutecky-Levich plot revealed a ~4e ORR process for 20FeCo. Fe׃Co = 1׃1 was found to be the optimum surface elemental composition for better ORR performance of cobalt-ferrites.

**References**

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