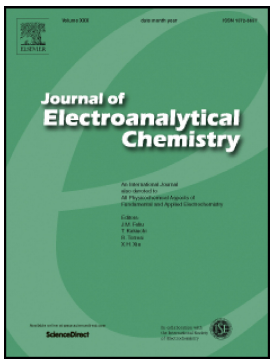

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PII: S1572-6657(17)30829-9
DOI: doi:10.1016/j.jelechem.2017.11.037
Reference: JEAC 3667

To appear in: *Journal of Electroanalytical Chemistry*

Received date: 6 September 2017
Revised date: 12 November 2017
Accepted date: 13 November 2017

Please cite this article as: Mosbah Ferkhi, Mouna Rekaik, Ammar Khaled, Sabah Amira, Michel Cassir, Jean-Jacques Pireaux , Study of the oxygen reduction reaction at low temperature on the Nd1.98Sr0.02Ni0.99Co0.01O4±δ material; synthesis and electrochemical behavior. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Jeac(2017), doi:10.1016/j.jelechem.2017.11.037

Study of the Oxygen Reduction Reaction at Low Temperature on the $Nd_{1.98}Sr_{0.02}Ni_{0.99}Co_{0.01}O_{4\pm\delta}$ Material; Synthesis and Electrochemical Behavior

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Abstract

In order to improve the electrochemical performances of the zinc-air cells, the material $Nd_{1.98}Sr_{0.02}Ni_{0.99}Co_{0.01}O_{4\pm\delta}$ was prepared following the citrate method and used as cathode materials for alkaline room temperature fuel cells towards the oxygen reduction reaction (ORR). The microstructure and morphology before and after the ORR process were characterized by X-ray diffraction (XRD) and scanning electron microscopy (SEM). The electrochemicals performances were followed by linear voltammetry and impedance spectroscopy. The results obtained are promising, the optical band gap is 1.36 eV showing that it is semiconductor and the voltammograms display two steps involving two electrons each. Moreover, the $Nd_{1.98}Sr_{0.02}Ni_{0.99}Co_{0.01}O_{4\pm\delta}$ material allows obtaining higher current densities compared to Black Carbon and Glassy Carbon at different rotational speed. Impedance spectroscopy results confirm the good electrochemical performances of the analyzed material.

Keywords: Zinc-air cells, Cathode, XPS analysis, ORR, Impedance spectroscopy.

1. Introduction

Oxygen is very abundant in the earths' crust [1].Oxygen reduction reaction (ORR) is important, on the one hand by the variety of the electrochemical processes and technologies, including corrosion (and the inhibition of corrosion), sensors, fuel cells [2], metal-air batteries