EFFECT OF THE OXIDE LOADING ON THE SURFACE CHARACTERISTICS OF $LaNiO_3$ OXIDE COATED ELECTRODES

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Abstract

The $LaNiO_3$ perovskite-type oxide is one of the most tested anode for the oxygen evolution reaction in alkaline solutions. It is well established that the oxide preparation conditions and the electrode fabrication are key factors to control the electrochemical behaviour of oxide coatings.

In a previous work the authors studied the influence of preparation conditions of the oxide and support type on the electrochemical behaviour of Ni foam coated $LaNiO_3$ electrodes. Ni foam was selected as support due to its unique characteristics namely low contact resistance between the oxide and support, possibility of high metal oxide loadings and dimensional stability [1]. No studies were performed, concerning the influence of the oxide loading.

Studies performed by Singh et al. on $LaNiO_3$ coatings on Ni foil supports have shown that the electrode roughness factor increased with increase in oxide loading at the beginning and finally attained a constant value around 0.03 g cm^{-2} [2].

The present work reports on the study of the dependence of roughness factor (R_f) and morphology factor (φ) on the oxide loading for Ni foam coated $LaNiO_3$ electrodes with loadings varying between 0.02 and 0.14 g cm^{-2}. Cyclic voltammetry and electrochemical impedance spectroscopy were used to evaluate the R_f and φ values, complemented by optical microscopy observations.

A non-linear increase of both R_f and φ with the oxide loading is observed, showing a level off when the oxide loading is increased. The level off was interpreted as a progressive exclusion of the crystallites from the contact with the solution as the oxide coating thickness increases.

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References

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