Accepted Manuscript

Effect of oxygen vacancies in electrodeposited NiO towards the oxygen evolution reaction: Role of Ni-Glycine complexes

E. Arciga-Duran, Y. Meas, J.J. Pérez-Bueno, J.C. Ballesteros, G. Trejo

PII: S0013-4686(18)30394-3

DOI: 10.1016/j.electacta.2018.02.099

Reference: EA 31294

To appear in: *Electrochimica Acta*

Received Date: 5 September 2017

Revised Date: 4 February 2018

Accepted Date: 19 February 2018

Please cite this article as: E. Arciga-Duran, Y. Meas, J.J. Pérez-Bueno, J.C. Ballesteros, G. Trejo, Effect of oxygen vacancies in electrodeposited NiO towards the oxygen evolution reaction: Role of Ni-Glycine complexes, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2018.02.099.

Effect of oxygen vacancies in electrodeposited NiO towards the oxygen evolution reaction: Role of Ni-Glycine complexes

E. Arciga-Duran[a,1,*], Y. Meas[a,1], J. J. Pérez-Bueno[a], J. C. Ballesteros[b,1], G. Trejo[a,1,*]

[a]Centro de Investigación y Desarrollo Tecnológico en Electroquímica (CIDETEQ), Parque Tecnológico Sanfandila, C.P. 76703, Pedro Escobedo, Querétaro, México

[b]Universidad Politécnica de Lázaro Cárdenas (UPLC), Laboratorio de Sustentabilidad Energética, Avenida Galeanas S/N, Colonia Las 600 Casas, C. P. 60950, Lázaro Cárdenas, Michoacán, México.

Abstract

Herein we report the synthesis of efficient NiO electrocatalysts towards the oxygen evolution reaction (OER) in alkaline media. NiO films were obtained by thermal treatment of Ni electrodeposited from electrolytic solutions containing glycine at different pH values. NiO films were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and X-ray photoelectron spectroscopy (XPS). The grain size of electrocatalysts decrease from 160 to 70 nm and the oxygen vacancies content increases, as the pH of the solution was increased during the synthesis. Cyclic voltammetry (CV) and Chronoamperometry techniques were employed to evaluate the electrocatalytic activity of the films. NiO electrocatalysts obtained at pH values higher than 5 exhibit a better electrocatalytic performance than the obtained at pH values less than 4, such as an overpotential to reach 1 $mAcm^{-2}$ of 450 mV and 530 mV, respectively. NiO synthesized under alkaline conditions exhibit the best stability performance with a loss of current density of 7 % after 2h of water electrolysis, whereas NiO synthesized under acidic