High surface area $LaNiO_3$ electrodes for oxygen electrocatalysis in alkaline media

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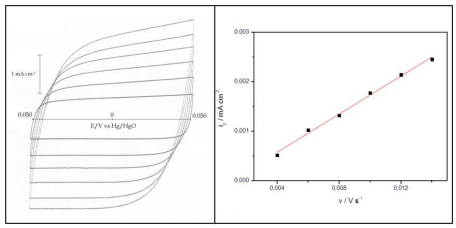
Nickel containing perovskite type oxides have been reported within the most active materials for OER in alkaline media and also with good electrocatalysts properties for OOR. The increase of the bifunctional character of these materials is the subject of research in view of the need for alternatives to noble materials and to the paramount importance of electrode development for the next generation of regenerative fuel cells. The $LaNiO_3$ oxide was prepared by a self-combustion method using citric acid. The electrodes were prepared by coating a nickel foam support with an oxide suspension. Electrochemical characterization was carried out by Cyclic Voltammetry (CV) and Electrochemical Impedance (EI).



(a) (b)

Fig1- CVs in the double layer region and i_c vs sr for $LaNiO_3$/Ni in KOH 1M; sr 4, 6, 8,10, 12, 14 mV s^{-1}.

The electrode's roughness factor has been estimated from the charging currents (i_c) recorded between -0.050 V and +0.050 V (Fig 1-a). From the linear variation between the i_c vs sweep rate (sr), the double layer capacitance of 0.208±0.015 μF cm^{-2} was calculated (Fig 1-b). EI spectra were fitted to an equivalent circuit that rendered capacity values in agreement with those estimated by CV.

The oxide coating roughness factor was estimated as 3463±250, representing a much higher value than those reported in the literature [1, 2] for the same oxide. This enhancement of the electrodes roughness can be associated with the oxide preparation method associated with the use of Ni foam as the oxide support.

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References

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