

## Paramagnetic behavior of Ni-Fe Layered Double Hydroxide and their effect over the Electrocatalytic Activity towards Oxygen Evolution Reaction in Alkaline Media

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### ABSTRACT

In the present work the hydrotalcite like materials know as Layered Double Hydroxide (LDH) Ni-Fe with different Ni/Fe relationship were synthesized by co-precipitation method to constant pH, the LDH obtained were labeled H/Ni-Fe1 and H/Ni-Fe2, the hexagonal lattices with R3m rhombohedral symmetry, characteristic for this materials was verify by XRD, No secondary phases are observed for any materials. On the other hand, the electronic properties were evaluated by Electronic Paramagnetic Resonance (EPR), the results suggested that H/Ni-Fe1 exhibited a ferromagnetic behavior as a result of the combined action of NiIII-OH-NiII and FeIII-OH-NiII and FeIII-OH-FeIII pairs across the layers and ferromagnetic dipolar interactions operating between layers. Whereas, the H/Ni-Fe2 presented a Paramagnetic behavior due to intralayer magnetic superexchange between metal centers through the OH bridges across the cationic sheets and dipole-dipole interaction in sites of less distorted octahedral field which operating through the space between the magnetic layers. These materials were evaluated as electrocatalyst in the Oxygen Evolution Reaction (OER) in alkaline media, the results showed that OER begin c.a. to 1.4V/NHE, the tafel plots for both materials were around to 39mV dec-1 which is comparable with IrO in same media. However, the Turn Over Number (TON) value was 9.9 s-1 for H/Ni-Fe1 and 38.1 s<sup>-1</sup> for H/Ni-Fe2, indicating the higher electrocatalytic behavior in H/Ni-Fe2 than H/Ni-Fe1, this interesting result were discusses by electronic properties determinate in EPR experiments.

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**Keywords:** LDH, Paramagnetic, Turn Over Number

