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## Highly active and stable heteroatoms-doped supported spinel nanoparticles as bi-functional oxygen electrocatalysts

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Rechargeable alkali metal-air batteries are one of the most promising energy storage systems due to its extremely high theoretical energy density. However, its development requires the design of effective and robust bi-functional electrocatalysts that act as air electrode for oxygen evolution (OER) and oxygen reduction (ORR) reactions, especially, reduction of nitrogen functionalities. The crystallinity of the nanocomposites was confirmed by X-ray diffraction (XRD). Transmission electron microscopy (TEM) allowed investigating morphological characteristics. Rotating ring disk (RRDE) measurements revealed that the value of the reversibility criterion could be tuned depending on the chemical nature of the heteroatom-doped graphene-like material and on the morphostructural properties of the different catalysts. We also investigated the stability of the  $\text{Co}_3\text{O}_4/\text{N}$ , S-RGO in harsh conditions of repeated OER and ORR cycles. In 6 M KOH at  $10 \text{ mA cm}^{-2}$  (12 h per cycle) in OER and  $8 \text{ mA cm}^{-2}$  (8 h per cycle) in ORR, no loss in activity was detected after 200 h (Figure 1). The obtained results show that the synthesized nanocomposites are promising air electrode candidates for metal-air batteries.

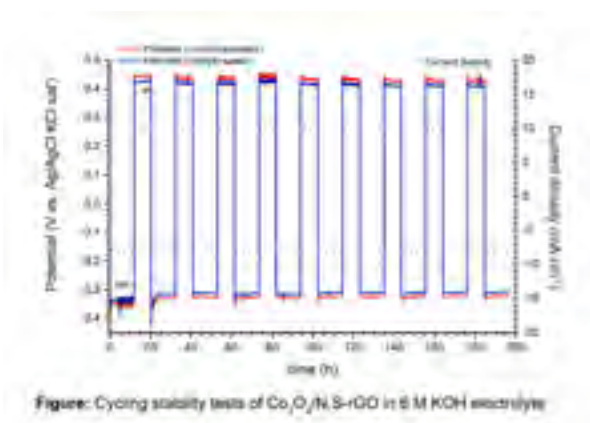


Figure: Cycling stability tests of  $\text{Co}_3\text{O}_4/\text{N}$ , S-rGO in 6 M KOH electrolyte

### Biography

I Abidat has a Master's degree in Material Sciences. Currently, he is in his third year of PhD in Electrocatalysis under the supervision of Dr. A Habrioux, Dr. C Morais and Dr. T Napporn, at the Institute of Chemistry of Poitiers, IC2MP in the University of Poitiers. (France). His research focuses on innovative nanomaterials with advanced properties, which are useful in energy conversion and storage systems. He is developing various hybrid materials of mesoporous and spinel metal oxides nanoparticles with heteroatoms doped graphene. These stable nanocomposites are reversible electrodes for both oxygen reduction reaction (ORR) and oxygen evolution reaction (OER). They are very good candidates for air electrodes in rechargeable metal-air batteries.

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