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## New insights about Co, Fe and V phthalocyanines supported in carbon black applied as electrocatalysts for oxygen reduction reaction in alkaline medium

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Carbon black Printex-L6 (PL6C) is a promising electrocatalysts for oxygen reduction reaction (ORR) due to its high surface area, porosity and presence of oxygenated functional groups that favor the hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) formation mechanism [1]. Although efficient, its electrochemical performance can be optimized by modification with metallic phthalocyanines, as these compounds exhibit structural characteristics that contribute to ORR [2]. In this work, PL6C was modified with cobalt (CoPc), iron (FePc) and vanadium (VPc) phthalocyanines and applied as electrocatalysts of ORR in alkaline medium. Structural characterization was carried out using Scanning Electron Microscopy, Raman Spectroscopy, X-ray fluorescence and X-ray Diffraction. Electrochemical behavior was investigated by linear sweep voltammetry, electrochemical impedance spectroscopy and capacitance. The results showed that the selectivity for H<sub>2</sub>O<sub>2</sub> formation increased from 88.5% (unmodified PL6C) to 94.3%, 94.5% and 99.8% when modified with 0.5% of CoPc, FePc and VPc, respectively. However, these modifications shifted the onset potential of reaction to more negative values, suggesting a different reaction mechanism compared to unmodified PL6C, which was confirmed by impedance analysis. The capacitance measurements revealed an increase in the electrical double-layer thickness attributed to the strong interaction between the modified surfaces and species present in the electrolyte, thus facilitating the charge transfer. The results obtained possibility to discuss a new mechanism to ORR catalyzed by these electrocatalysts.

### Acknowledgments:

FAPESP (#2022/12895-1) and CAPES (#88887.838468/2023-00).

### References:

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