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1-amino anthraquinone as a Printex L6 carbon modifier for H2O2 generation: an electrochemical characterization study.

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Carbonaceous materials catalyze the electrochemical in *situ* generation of hydrogen peroxide (H_2O_2) from the 2-electron oxygen reduction reaction (2e- ORR) [1]. Organic modifiers, like amino anthraquinones, can reduce the reaction overpotential, as the amine group enhances electron donation to the aromatic ring [2]. We modified Printex L6 Carbon (PL6C) with 1-amino anthraquinone (1-AAQ) to evaluate its activity and selectivity in H_2O_2 generation via 2e- ORR, using a rotating ring disk electrode. A catalytic ink containing PL6C and 7.5% w/w of 1-AAQ in 1 mL methanol was synthesized. Linear sweep voltammetry, recorded for both modified and unmodified PL6C, showed that the modification with 7.5% 1-AAQ in an alkaline medium resulted in the highest selectivity (reaching 91%). Electrochemical analyses, such as capacitance and impedance spectroscopy, were performed on the modified and pure samples. Several physico-chemical characterizations confirmed 1-AAQ in the PL6C structure. While scanning electron microscopy images showed the presence of 1-AAQ in PL6C, the EDS identified nitrogen in the modified material. Attenuated total reflectance spectra showed peaks at 1,650 cm^{-1} and 1,725 cm^{-1}, being attributed to C=O and N-H bands. Complementary analysis by Raman spectroscopy analysis showed the presence of two characteristic peaks of carbon-based materials: the D and G bands centered at 1350 and 1600 cm^{-1}, respectively. As a result, the modification with 1-AAQ led to the reduction of the intensity of D and G band compared to the PL6C. The data confirm effective PL6C modification, improving 2e- ORR and paving the way for high-current-efficiency H_2O_2 gas diffusion electrodes.

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