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Achieving high hydrogen peroxide selectivity through critical activation from carbon-rich solid wastes

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Hydrogen peroxide (H_2O_2), a green oxidant used in wastewater and pulp treatment, is chiefly (>95%) produced via the anthraquinone process, which requires large infrastructure and poses safety risks. In situ electrogeneration offers a safer and more efficient alternative. Carbon black, particularly Vulcan XR72 and Printex L6, is widely used for H_2O_2 production due to its high surface area, oxygenated functional groups, and conductivity, but its petroleum-based origin makes it unsustainable. As a greener alternative, carbon-rich wastes can be converted into activated carbons (AC) [1]. Then, this study focused on producing activated carbon from mango (*Mangifera indica*) peels using phosphoric (H_3PO_4) acid and sodium hydroxide (NaOH) as activating agents, with the temperatures of synthesis being critical selected through thermogravimetric analysis (TGA). The materials were characterized by linear sweep voltammetry (LSV) using the *rotating ring-disk electrode* (RRDE) technique to quantify their activity for H_2O_2 electrogeneration. The material synthesized at 600 °C using H_3PO_4 achieved a selectivity of 89.86% at -0.8 V *vs.* Ag/AgCl (iR free) and a mass yield of 28,71 ±1,94%, showing that this could be an interesting route to obtain AC for H_2O_2 electrogeneration.

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References:

[1] D. C. Sperandio and J. C. Lourenço, Renewable Energy, 244, 122715 (2025).