
Use of sawdust in the synthesis of activated carbon for electrochemical applications in hydrogen peroxide generation.

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Hydrogen peroxide (H_2O_2), ranked as one of the 100 most important chemicals worldwide, serves as a versatile and environmentally benign oxidant with applications ranging from chemical synthesis and potential energy carriers to sterilization, sewage treatment and bleaching agents. The electrochemical oxygen reduction reaction (ORR) on carbon offers a compelling alternative for decentralized and on-site H_2O_2 production compared to the conventional anthraquinone process. Activated carbons (AC) prepared from carbon-rich byproducts[1] are a class of renewable materials for the synthesis of effective electrocatalysts. Building on this principle, this study describes the preparation of an AC using industrial sawdust waste and assessing its performance relative to the commercial reference material, Printex L6. Phosphoric acid (H_3PO_4) was used as the activating agent at temperatures optimized via thermogravimetric analysis (TGA). The efficiency of the resulting carbon for the electrochemical production of H_2O_2 was evaluated using the rotating ring-disk electrode (RRDE) technique combined with linear sweep voltammetry (LSV). The material synthesized at 600 °C using H_3PO_4 achieved a selectivity of 89.44% at -0.65 V vs. Ag/AgCl (iR free) and a mass yield of $6,8 \pm 2,14\%$, highlighting the potential of this pathway for fabricating AC tailored for H_2O_2 electrogeneration.

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References:

[1] T. P. Pôrto et al., *Biomass and Bioenergy*, 191, 107438 (2024).