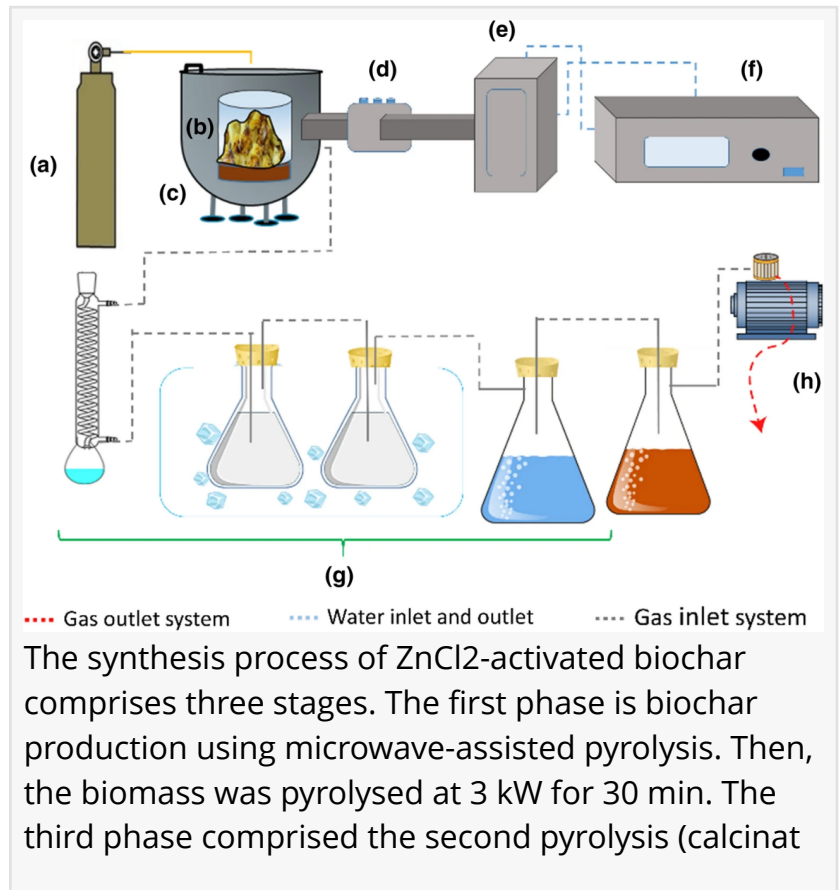


# Scientists develop high-performance electrochemical sensor using ZnCl<sub>2</sub>-activated biochar from pineapple peel waste

FAYETTEVILLE, GA, USA, July 21, 2023 /EINPresswire.com/ -- In a new study published in the journal [Waste Disposal & Sustainable Energy](#), researchers from James Cook University have successfully developed a high-performance electrochemical sensor using [ZnCl<sub>2</sub>-activated](#) biochar derived from pineapple peel waste. The study highlights the potential of transforming agricultural waste into valuable resources for environmental and economic sustainability.

ZnCl<sub>2</sub> is a chemical agent that enhances its electrocatalytic activity. The activated biochar exhibited a high surface area, micropore structure, and oxygen-containing functional groups, which are crucial for electrochemical sensing applications. The researchers applied the activated biochar to a glassy carbon electrode (GCE) through drop casting. The electrochemical properties of the ZnCl<sub>2</sub>-activated biochar-modified GCE were characterized using various techniques. The results showed a significant reduction in charge transfer resistance, indicating improved electron transfer kinetics. The electrochemical impedance spectroscopy revealed a 61% decrease in charge transfer resistance compared to the bare GCE. Furthermore, the sensor demonstrated excellent sensitivity, with a limit of detection of 0.97 μmol L<sup>-1</sup> for nitrite. It exhibited high selectivity, reproducibility (RSD=2.4%), and stability (RSD=2.6%) over ten days of storage. The sensor's performance was comparable to or better than existing electrochemical sensors reported in the literature.



This innovative approach to utilizing pineapple peel waste offers a sustainable solution for resource recovery and waste reduction. The conversion of agricultural waste into high-value

biochar through microwave-assisted pyrolysis, followed by chemical activation, provides a versatile material for various applications, particularly in electrochemical sensing. The researchers envision future applications of ZnCl<sub>2</sub>-activated biochar in environmental monitoring, food quality control, and medical diagnostics. The material's unique properties, such as its high surface area, micropore structure, and electrocatalytic activity, make it well-suited for detecting and analyzing different analytes of interest in these fields.

This study represents an important step towards a circular economy, and open up new opportunities for waste utilization and resource recovery, bringing us closer to a more sustainable and efficient future.

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#### About Waste Disposal & Sustainable Energy

Waste Disposal & Sustainable Energy (WDSE) publishes high-quality papers that advance waste disposal and sustainable energy. It broadly encompassed various traditional waste disposal and new sustainable energy sources related topics. The invention of instrumentation and new-methods on waste characterization and collection are also included. It emphasizes the application of waste disposal and sustainable energy technology to environmental and earth issues. It provides a platform not only for basic research but also for industrial interests.

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