

ABSTRACT

Superbiocapacitors utilizing hair waste have been developed as an environmentally friendly and sustainable alternative for energy storage. This study aims to evaluate the potential of human hair as a dielectric material in supercapacitors by examining its capacitance, impedance, and stability characteristics. The hair collection process includes cleaning and assembly stages, so that the hair can function as an insulator between two metal electrodes without the need for electrolyte.

Test results show that hair has a dielectric constant that supports electric field formation as well as charge storage, although its capacitance value is lower compared to industrial materials such as activated carbon or ceramics. Analysis of the capacitance stability indicates that hair can maintain its capacitance value after several charge and discharge cycles, demonstrating its potential for use in long-term energy storage applications

In addition, the experimental results reveal a relationship between impedance and capacitance that is in line with theory, where an increase in impedance contributes to a decrease in capacitance. Thus, this study confirms that hair waste can be utilized as a dielectric material in superbiocapacitors, offering an economical and sustainable green energy storage solution.

Keywords: superbiocapacitor, hair waste, green energy storage.