THE EFFECT OF VARIATIONS IN CNT (Carbon Nanotube) CONCENTRATION IN PAPER BATTERY ON CURRENT AND VOLTAGE VALUES

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ABSTRACT

This study aims to analyze the effect of varying concentrations of Carbon Nanotubes (CNTs) that have undergone sonication on the current and voltage performance of a paper battery**.** Paper batteries are an environmentally friendly energy storage innovation based on paper, known for being lightweight, flexible, and biodegradable. The battery fabrication process involves several key steps, including the preparation of active materials—Zn as the anode and MnO_2 as the cathode—along with the addition of CNTs as a conductive additive in varying volumes of 0 mL, 10 mL, and 20 mL, followed by a 60-minute sonication treatment using distilled water as the solvent.
The resulting mixture forms a thick ink that is manually applied using a conventional painting method onto a paper substrate (for the anode) and a stainless steel mesh (for the cathode). The electrode drying process is carried out naturally by air-drying for 24 hours before assembling the battery cell. Testing was conducted in both single and series configurations.

The results of the study show that the addition of 10 mL of CNTs with sonication treatment yields slightly better performance, with an average voltage of 1.34 V and a maximum current of 0.30 mA. Conversely, the addition of 20 mL of CNTs only enhances performance initially, followed by a significant decrease within one hour during testing.

The study concludes that a higher CNT composition does not necessarily guarantee better performance, but with the right composition and proper sonication treatment, the efficiency of paper batteries can be improved.

Keywords: Paper battery, Carbon Nanotubes (CNT), Sonication, Voltage, Current