

ABSTRACT

Conventional batteries pose significant environmental and health risks due to their hazardous material content. This research aims to develop an environmentally friendly Aluminium-Copper (Al-Cu) battery prototype utilizing an electrolyte produced through a solar-powered electrolysis process.

The system is equipped with an Internet of Things (IoT)-based monitoring system to measure battery performance in real-time. The research methodology includes system design, prototype fabrication, and performance testing. The prototype consists of a Copper (Cu) anode and an Aluminium (Al) cathode with a Potassium Hydroxide (KOH) electrolyte generated from the electrolysis of a KCl solution. The monitoring system employs an ESP32 microcontroller, an INA219 sensor for voltage and current monitoring, and an LCD panel for data display.

The results demonstrate the success of the solar-powered electrolysis process in producing a KOH electrolyte with a pH of 12.5. The resulting battery prototype was capable of powering loads such as a DC motor and a fan, exhibiting a measured capacity of 33.35 mAh with an average working voltage of 1.9 V. The IoT monitoring system was also successfully implemented to accurately visualize battery performance data in real-time.

Keywords: Al-Cu Battery, Electrolysis, Renewable Energy, IoT, Solar Power, KOH