**Presentation title: Significant Performance Enhancement in Industrial Waste-Based Supercapacitors by Modulating the Aqueous Electrolytic Solution**

**Corresponding Author Name: Dr. P.Abdul Azeem**

**Affiliation:** **National institute of technology, Warangal, Telangana, India-506004**

**Ph. No:**

**Email ID’s: pujarao1606@gmail.com**

**WhatsApp No:** +917988803020

**Any alternative number:**

**Other Authors if any: Pooja Yadav**

**Presentation type:** Oral presentation

**Abstract:**

Prior to the supercapacitor fabrication, selecting an optimal electrolyte is crucial for performance enhancement. This study thoroughly investigates the influence of alkaline-based aqueous electrolytes on a supercapacitor electrode derived from industrial waste (fly ash and ground granulated blast furnace slag). In this, the electrodes are electrochemically characterized in 1.0M KOH, 1.0M NaOH, 1.0M KOH + 0.5M NaOH, and 0.5M KOH + 1M NaOH electrolytes to assess performance. The findings reveal distinct faradic redox properties of the electrode material in various electrolytes. The electrode tested in 1.0M KOH exhibits the highest specific capacitance due to the efficient intercalation efficiency of the smaller hydrated K+ cation compared to the Na+ hydrated cation. An approximate specific capacitance of 1400 Fg-1 is achieved at a 3 Ag-1 scan rate within a 0.35 V operational voltage window. Additionally, to investigate the impact of electrolyte molarity, solutions with 3, 5, and 7 molar KOH are prepared. It was observed that the 3.0M KOH electrolyte solution showed the best findings mainly in conductivity and contact angle measurement. Higher molarity causes the cations and anions to form a strong bond with a water molecule, which in turn lowers the number of free ions and ionic mobility. This leads to a decrease in specific capacitance and poor electrolyte conductivity. With a 3.0M KOH electrolyte, the electrode delivered an energy density of 24.5 Whkg-1 and a power density of 525 Wkg-1.

**Biography:**

Myself Pooja Yadav. I completed my masters from the Indian Institute of Technology (IIT), Ropar, India in 2019. During this duration, a short time research project has been carried out with the title " Β-Gallium Oxide Grown on Cost Effective Silicon Substrate by Interface Engineering Based High Power Electronics ". Currently, I am pursuing a Ph.D. from the National Institute of Technology (NIT), Warangal, India. My research area is the synthesis and characterization of active material for supercapacitors from recycling waste materials mainly industrial waste, food waste, agricultural waste, etc..