

**PEMANFAATAN LIMBAH KULIT BUAH NIPAH (*Nypa fruticans*)
MENJADI KARBON AKTIF SEBAGAI ELEKTRODA
SUPERKAPASITOR**

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ABSTRACT

UTILIZATION OF NIPAH (*Nypa fruticans*) FRUIT WASTE TO BECOME ACTIVE CARBON AS A SUPERCAPACITOR ELEKTRODA

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Activated carbon from nipah fruit peel (*Nypa fruticans*) has been used as a supercapacitor electrode material. This activated carbon was synthesized by dehydration method using 1 M H_2SO_4 and continued activation with KOH, then using urea as a source of N at a mass ratio of dehydrated carbon, KOH and urea which is 1:2:3 with a carbonization temperature of 400 °C for 2 hours. Activated carbon with a size smaller than 45 μm was characterized using Scanning Electron Microscopy-Energy Dispersive X-Ray (SEM-EDX), Fourier Transform Infrared Spectroscopy (FTIR), Surface Area Analyzer (SAA) and determined electrochemical properties with Electrochemical Impedance Spectroscopy (EIS) and Cyclic Voltammetry (CV) and Galvanostatic Charge-Discharge (GCD). SEM-EDX characterization results show the presence of carbon with a percentage of 70,00 %, oxygen by 25.56 % and nitrogen by 4.44 %. The presence of nitrogen is indicated by FTIR results at wave number 3351.66 cm^{-1} . Characterization of activated carbon using the BET method shows that the material is a type IV adsorption isotherm, which indicates a mesoporous structure, with a specific surface area of 11.43 m^2/g . The dominant pores formed are mesopores supported by the pore distribution curve with the BJH method with total pores of 5.52 nm showing the dominant mesopores. On the determination of the electrochemical properties of activated carbon with CV, GCD and EIS methods showed the value of specific capacitance (C_{sp}) 21.6 F/g. The synthesis of activated carbon by dehydration, carbon activation and N-doped methods has the advantages of low cost, simple preparation process and short synthesis time.

Keywords: Nipah Fruit Peel, Dehydration, Activation, Activated Carbon, Supercapacitor

