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# ACTIVATED CARBON SYNTHESIZED FROM JACK WOOD FOR SUPERCAPACITORS

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Supercapacitors (SCs), a novel energy storage system, have attracted significant attention because of their higher power density and longer cycling stability compared to those of secondary batteries. In addition, their energy density is higher than that of traditional capacitors. As an electrode material, activated carbon has many advantages, such as high surface area and porous structure, high chemical and thermal stability, and comparably high electric conductivity. In this study, electrochemical double-layer capacitors (EDLC) are prepared using the activated carbon (AC) derived from Jack wood (*Artocarpus heterophyllus*). Porous carbon material with a high surface area was prepared by carbonization of the Jack-wood. Subsequently, activation was accomplished by NaOH treatment and heating to 800 ºC for 1 h. The AC-based electrodes were prepared on fluorine-doped tin oxide (FTO) substrate in order to build SCs. In this work, biomass-based AC was prepared as electrode material, while aqueous $H_2SO_4$ (1 M) was used as the electrolyte. The electrochemical properties of AC-based SCs were investigated using cyclic voltammetry and galvanostatic charge-discharge measurements. CV confirmed that charge storage takes place electrostatically without occurring any redox reactions. In addition, SCs exhibited a relatively high specific capacity of 147.19 F $g^{-1}$ at 2 mV $s^{-1}$ scan rate along with the aqueous 1 M $H_2SO_4$ electrolyte. Further, the supercapacitor demonstrated a power density of 68.47 W $kg^{-1}$ and an energy density of 8.02 Wh $kg^{-1}$ at the charge-discharge current density of 0.5 mA $cm^{-2}$. SCs showed ~94.98% of initial capacitance retention after 1,000 cycles implying excellent cycling stability and rate capability according to cyclic voltammetry. Recurrent charge/discharge curves confirmed specific capacitance retention of 92.58% at 3 mA $cm^{-2}$ after 100 cycles.

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