High Specific Surface Area Activated Carbon with Well-Balanced Micro/Mesoporosity for Ultrahigh Supercapacitive Performance

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High specific surface area activated carbon derived from coconut shell was prepared using low-temperature carbonization followed by KOH activation method. The resulting activated carbon exhibited excellent supercapacitance performance with an obtained specific capacitance of 325 F g^{-1} at 0.1 A g^{-1} . Moreover, the supercapacitor electrodes retained 71% of the initial capacitance at elevated current densities of 100 A g^{-1} and 89% after 10000 cycles when tested in 6 M KOH aqueous solution. Also, the equivalent series resistance of the system was recorded to be only 0.36Ω . Meanwhile, testing of the supercapacitor electrodes in ionic liquid based-electrolyte delivered substantial specific capacitance of 198 F g^{-1} and an ultrahigh power density of 74.2 kW kg^{-1} .

Keywords: Coconut shell; Supercapacitors; Pore size distribution; Power density

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