Activated Carbon Prepared from Rose Branch using H₃PO₄-hydrothermal Carbonization and Activation and its Application for Supercapacitors

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Charcoals of rose branch were prepared by the three different carbonization treatments: phosphoric acid hydrothermal method, traditional hydrothermal method and pyrolysis. Then these charcoals were activated under the same conditions to obtain activated carbons. It is found phosphoric acid plays two major roles: (1) improving the specific surface area and the pore volume of the charcoals; (2) increasing the reactivity of the charcoals, making charcoals easier to be activated. Electrodes using activated carbons from different carbonization methods were prepared, and electrochemical measurements were performed with a three-electrode cell using 1 M Na₂SO₄ as the electrolyte. Activated carbons prepared by conventional hydrothermal carbonization showed the lowest capacitance (137 F / g, at 0.2 A / g) and capacity retention (72.79%, at 2 A / g); while activated carbon prepared by phosphoric acid hydrothermal carbonization showed the highest specific capacitance (178 F / g, at 0.2 A / g) and capacity retention (91.01%, at 2 A / g).

Keywords: Activated carbons; Supercapacitors; H₃PO₄-hydrothermal carbonization; Rose branch; Capacitances

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