Sencha Power

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There is currently an interest in developing supercapacitor along with the booming of mobile electronic devices. Despite offering key performance advantages, many capacitors pose significant environmental hazards once disposed. The objective of this project was to find an environmentally benign alternative for building supercapacitor and key components. In our betanin-sulfonated carbon and quinone-sulfonated carbon supercapacitor, all the materials were derived from renewable biomass. Betanin and quinone extracted from beets and Sencha were preloaded on the sulfonated carbon nanosphere for boosting the composite performance. From our experiments, betanin-carbon based with the specific capacitance of 27.6 F/g was measured, while quinone-carbon composite showed performance with 48.4 F/g. It is believed that the nano-architecture with active functional groups of carbon nanosphere enabled various benefits of supercapacitor, such as allowing the composite to have high capacitance, high capacitance retention and stable specific capacitance. Superior electrochemical performance of quinone-sulfonated carbon composite could be attributed to the large accessible surface area of the porous structure with low interfacial resistance. It was more pH and thermal independent than betanine. The green electrochemical capacitor exhibited a promising capacitive performance of 209 F/g with high capacitance retention of over 90% after over 20000 cycles, which is much better than 77-145 F/g obtained from previous betanin-sulfonated carbon composite. This study has opened up new possibilities for the production of environmental friendly, cost efficient and lightweight energy storage system using renewable biomass as the basic building materials without harming the environment.

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