Acidified Activated Carbon with Enhanced Electrochemical Performance for Supercapacitors

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Activated carbons carrying oxygen functional groups have been subjected to extensive research due to their potential applications in adsorption, sensors, catalysis, drug delivery, and energy storage/conversion systems. In this paper, acidified activated carbon (AAC) has been prepared through chemical oxidation of commercial activated carbon (AC) in a mild oxidation environment, providing AAC with enhanced concentration of single-graphene layers, improved degree of graphitization, reduced specific surface area and micropore volume, and a surface dominated by C=O/C–O groups. The electrochemical performance of AC and AAC is investigated in the role of electrode materials for supercapacitors in a three-electrode mode. Compared with AC, AAC exhibits an enlarged working potential window and superior electrochemical performance at current densities lower than 10 A g⁻¹. After 5000 cycles at 1 A g⁻¹, the specific capacity of AAC is retained at 126.7 F g⁻¹, higher than that of 113.7 F g⁻¹ for AC.

Keywords: Acidified activated carbon; Chemical oxidation; Oxygen-containing functional groups; Electrode materials; Supercapacitors

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