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Fabrication of High-performance supercapacitor electrode based on a polyaniline and N-doped activated carbon

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Polyaniline (PANI) and mesoporous activated carbon are used to fabricate a supercapacitor electrode material with enhanced electrochemical performance. The chemical and structural properties of the electrode are characterized by X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS) and Raman spectroscopy with confirmation of a semi-crystalline nature. The homogeneous growth of PANI on the meso porous carbon is visualized by field emission scanning electron microscopy (FESEM) and shows the morphology. The maximum specific capacitance of the nanocomposite electrode is found to be □980 F g−1 in 1 M H2SO4 within the potential window of −150 to 800 mV vs. Ag/AgCl at 10 mV s−1 scan rate (□1002 F g−1 at 1 mA cm−2 discharge current density). The high surface area offered by the conducting, N-doped mesoporous carbon stimulates effective utilization of the deposited PANI and improves electrochemical charge transport and storage. The super capacitor derived nanoporous materials exhibit excellent electrochemical performance with high specific energy and specific power, and excellent cycling stability.

Keywords: Polyaniline, supercapacitor, XRD, nanoporous carbon