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TANNIC ACID REDUCED GO AND ELECTROCHEMICAL PROPERTIES OF PANI/TA-RGO COMPOSITE

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Supercapacitor, which can be divided into electrochemical double layer supercapacitor (EDLC) and pseudocapacitor, is an attractive environment-friendly energy supplier. And composition is a promising way to combine the high power density of carbon-based EDLC and high energy density of pseudocapacitors based on conductive polymers or transition metal oxidant. Among the composites for the use of supercapacitor electrode, reduced graphite oxide-based polyaniline composite (PANI/rGO) is cost-efficient, easy to synthesize and suitable for large-scale manufacture. However, there are two main obstacles for the development of PANI/rGO composite. Firstly, commonly used reducers, such as hydrazine hydrate (HH) and sodium borohydride, are toxic. Secondly, rGO tend to restack after reduction, resulting in a non-uniform dispersion inside the PANI. In this study, we used an environment friendly tannic acid (TA) as reducer, and the electrochemical properties of PANI/TA-rGO composites were investigated. Additionally, TA is expected to interact with rGO and develop the dispersion of rGO, therefore additionally surface modification or addition of dispersant can be avoided. X-ray diffraction and Raman spectra indicate that, the reducing efficiency of TA could be enhanced by extending the reduction time. Compared with HH, TA presents a less reducing efficiency, but the rGO-TA shows better dispersion in the water than the rGO-HH. Therefore, the PANI/rGO-TA composites own much higher specific surface area and higher rate capability than the PANI/rGO-HH composite. The specific capacitance of PANI/rGO composite relies not only on the specific surface area, but also on the conductivity. PANI/rGO-TA-24h, in which the rGO was prepared by using TA as reduced for 24 h, shows the highest specific capacitance in this study. Moreover, the morphology of PANI could be influenced by the surface functionality of rGO.

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