Nitrogen-Phosphorus co-doped Porous Carbon Based on Peanut Shell for Supercapacitor

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In this work, a porous carbon (PC) material derived from the peanut shell, with a fluffy structure, is activated by phosphorus (P-PC) or nitrogen and phosphorus (N,P-PC) using phosphoric acid and urea precursors, followed by pyrolysis in nitrogen atmosphere. The P doping or N,P co-doping are found to decrease the charge transfer resistance, facilitate the formation of a hierarchical porous structure and increase the graphitization degree. The morphology and characteristics of the modified PC materials are investigated by SEM, XRD and XPS together with electrochemical characterizations. As a result, among the P- PC samples the one with a doping ration 1:11 displays the highest specific capacitance (SC) of 284.8 F/g at the scan rate of 5 mV s⁻¹ while among the the N,P-PC samples, the one with 1:2 ratio shows the highest SC of 330.8 F/g at the scan rate of 5 mV s⁻¹ and 131.3 F/g at the current density of 1 A/g.

Keywords: Biomass, Co-doping, Supercapacitor, Specific capacitance

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