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Influence of Phenylsilane on the Textural, Structural, and Electrochemical Properties of Activated Carbon Nanofiber Composites

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Abstract

Activated carbon nanofibers (ACNFs) containing oxygen, nitrogen, and silicon are prepared from polyacrylonitrile (PAN) and phenylsilane (PS) by simple electrospinning. The PS introduction into a PAN solution causes a porous structure with functional groups by spontaneous sol-gel reaction without any catalyst of PS in the physical activation process. PS-ACNF electrode shows the highest specific capacitance, 200 F/g, and the highest energy density, 25.6 Wh/kg, 119.19 Wh/kg in the range of 400–10,000 W/kg in a 6 M KOH aqueous solution. Our results suggest that the porosity and functional groups of the supercapacitor electrodes have a strong impact on the enhanced electrochemical properties, resulting from an increased electroactive surface area.

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```