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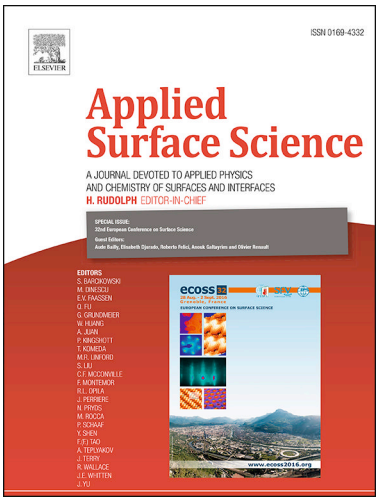

Full Length Article

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Lignin-based hierarchical porous carbon nanofiber films with superior performance in supercapacitors

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Abstract

Lignin, a renewable resource, has been used as carbon precursor to prepare porous carbon nanofiber films by electrospinning with PVP as spinning agent and $Mg(NO_3)_2.6H_2O$ as additive. The effect of the content of $Mg(NO_3)_2.6H_2O$ on the morphology, microstructure, surface chemistry, specific surface area and porous structure of the lignin-based porous carbon nanofiber films (LCNFs) is investigated. Results show that with the increase of the content of $Mg(NO_3)_2.6H_2O$ in the spinning solution, the average diameter of fibers is decreased obviously, while specific surface area and mesoporosity are increased significantly. When mass ratio of $Mg(NO_3)_2.6H_2O$/lignin is 2: 1, the resultant LCNFs possessed an increased specific surface area of 1140 $m^2 g^{-1}$ and a significantly improved mesoporosity of 78%, and showed hierarchical porous structure. LCNFs were cut into electrode for supercapacitors directly and were evaluated in three-electrode and two-electrode cell. With increase of $Mg(NO_3)_2.6H_2O$, the capacitive performance of LCNFs turn better. When mass ratio of $Mg(NO_3)_2.6H_2O$/lignin was 2: 1, the specific capacitance of LCNFs reached 248 F g^{-1}

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