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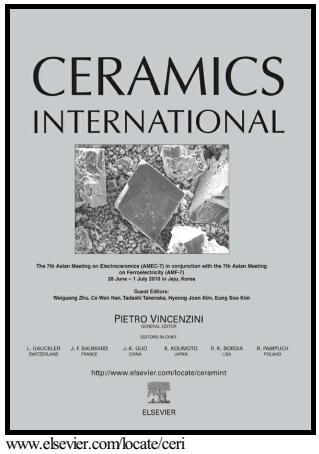

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Honeycomb-like $NiCo_2O_4$@$Ni(OH)_2$ Supported on 3D N−Doped Graphene/Carbon Nanotubes Sponge as an High Performance Electrode for Supercapacitor

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Abstract:

In order to increase the energy density of supercapacitor, a new kind electrode material with excellent structure and outstanding electrochemical performance is highly desired. In this article, a new type of three-dimensional (3D) nitrogen-doped single-wall carbon nanotubes (SWNTs)/graphene elastic sponge (TRGN−CNTs−S) with low density of 0.8 mg cm^{-3} has been successfully prepared by pyrolyzing SWNTs and GO coated commercial polyurethane (PU) sponge. In addition, high performance electrode of the honeycomb-like $NiCo_2O_4$@$Ni(OH)_2$/TRGN-CNTs-S with core-shell structure has been successfully fabricated through hydrothermal method and then by annealing treatment and electrochemical deposition method, respectively. Benefited from 3D structural feature, the compressed $NiCo_2O_4$@$Ni(OH)_2$/TRGN-CNTs-S electrode exhibits high gravimetric and volumetric capacitance of 1810 F g^{-1}, 847.7 F cm^{-3} at 1 A g^{-1}. The high rate performance and long-term stability was also obtained. Furthermore, an asymmetric supercapacitor using $NiCo_2O_4$@$Ni(OH)_2$/TRGN-CNTs-S cathode and NGN/CNTs anode delivered high gravimetric

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