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Ex-situ Ni-Al Double Hydroxide Microspheres on a Nickel foam-Graphene Template as Electrode Material for High Performance Supercapacitors

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Abstract :

Nickel-Aluminum double hydroxide microspheres (NiAl-DHMs) are a promising electrode material for supercapacitor applications. In this paper, we demonstrate an ex-situ coating method of the active material on Nickel foam-Graphene (NF-G) template serving as a current collector. The structure and surface morphology are studied by scanning and transmission electron microscopies, Raman Spectroscopy and X-ray diffraction analysis. The supercapacitive performance of the microspheres is investigated by cyclic voltammetry (CV), constant charge-discharge (CD) and electrochemical impedance spectroscopy (EIS) measurements. Results show a better surface interaction of the Ni-Al DHM material with the surface of the NF-G template compared with bare Nickel foam (NF) due to an increased contact area. The composite electrode with graphene gives a specific capacitance of 1252 F g⁻¹ at a current density of 1 A g⁻¹. The capacitance retention is about 97 % after 1000 charge-discharge cycles which provides a promising electrode material applicable in the design of energy storage devices.

Award :

Yes

Level :

PhD

Supervisor :

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Paper :

Yes

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