Nickel oxide Nano-Rods/Plates as a High Performance Electrode Materials for Supercapacitors; Electrosynthesis and Evolution of Charge Storage Ability

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The nano-rods/plates nickel oxide were prepared by pulse electrodeposition followed by calcination of nickel hydroxide. The formation mechanism of the nickel oxide through this route was explained. The prepared nickel oxide was characterized using XRD, SEM, IR and DSC-TG analyses. The supercapacitive behavior of the NiO nano-rods/plates was evaluated through cyclic voltammetry and charge-discharge measurements. The obtained data showed that the prepared oxide is able to deliver the SC values as high as 1445 F g⁻¹, 1307 F g⁻¹, 1147 F g⁻¹, 1006 F g⁻¹, 892 F g⁻¹ and 772 F g⁻¹ at the applied current load of 1, 2, 3, 5, 7 and 10 A g⁻¹, respectively. The values approved the remarkable supercapacitive performance of the NiO nano-rods/plates. The fabricated electrode is also exhibits the capacity retentions of 91.8% and 75.9% after 3000 cycling at the current loads of 2 and 10 A g⁻¹ A/g, revealing. Based on the obtained results, it can be concluded that the fabricated oxide can be a proper material for high performance supercapacitors.

Keywords: Nickel oxide; Nanorods/plates; Pulse base generation; Heat treatment; Supercapacitors

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