Short Communication

Nitrogen-doped NiO prepared by magnetron sputtering and its electrochemical performance as an electrode material for supercapacitors

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NiO is a very promising electrode material for supercapacitors. However, its poor cycle stability and low conductivity hinder its application. Here, we report the fabrication of nitrogen-doped NiO thin films prepared by reactive radiofrequency magnetron sputtering in a N₂ and Ar gas mixture and further their applications for supercapacitors for the first time. SEM was used to analyze the morphology changes of the NiO films. XRD and XPS were performed to characterize the structure and elemental composition, respectively. The variation in supercapacitor performance with N₂ content was evaluated. With increasing N₂ percentage, the NiO conductivity was found to be improved, while the specific capacitance was increased. A NiO thin film prepared at 80% N₂ was analyzed; compared with the pure NiO film, the specific capacitance was increased by approximately 5 times (13.4 to 61.6 mF/cm²) at 1.0 mA cm⁻²; after 10000 cycles, the capacitance retention was higher than 100% (104%). As a consequence, nitrogen-doped NiO prepared by magnetron sputtering demonstrates great potential as a promising supercapacitor electrode material.

Keywords: NiO; Nitrogen doping; Magnetron sputtering; Supercapacitors

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