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## Abstract

Electrochemical energy storage using pseudocapacitive mode is under intense research owing to their potential in fabricating high performance renewable energy devices at a lower cost. In this paper we characterize nickel oxide (NiO) nanowires developed by electrospinning an aqueous polymeric solution containing nickel precursor for its application as a pseudocapacitors electrode. The wires are of diameter ~50 – 70 nm containing densely packed cuboidal grains (~10 – 20 nm) with less degree of crystal defects. Electrochemical properties of the electrodes fabricated on a nickel foam substrates are evaluated by cyclic voltammetry (CV) and charge – discharge cycling (CDC), and electrochemical impedance spectroscopy (EIS) techniques. The best performing devices showed a specific capacitance ($C_S$) of ~ 670 $Fg^{-1}$ with high cycling stability (~100%) for over 1000 cycles and Coulombic efficiency ~98%. Lower electrochemical equivalent resistance (~0.76 Ω), charge transfer resistance (~0.45 Ω), and charge relaxation time (43 ms) are observed which are attributed to the defect free nanowire morphology that give rise to the superior performance.

**Keywords**: Renewable energy; electrochemical energy storage; batteries; nanofabrication; ceramic nanostructures