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Hydrothermal synthesis of $ZnCo_2O_4$ electrode material for supercapacitor applications

Fatma Nur Tuzluca[a,d*], Yasar Ozkan Yesilbag[a,d] and Mehmet Ertugrul[b,c,d]

[a] *Department of Physics, Erzincan University, Erzincan 24100, Turkey*
[b] *Department of Electrical and Electronics Engineering, Ataturk University, Erzurum 25240, Turkey*
[c] *Department of Nanoscience and Nanoengineering, Ataturk University, Erzurum 25240, Turkey*
[d] *Nanoscience and Nanoengineering Application and Research Center, Ataturk University, Erzurum 25240, Turkey*

[*]Corresponding author
E-mail address: ftuzluca@erzincan.edu.tr
Phone: +90-446-2243032, Fax: +90-446-2243016

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In order to meet the increasing demand for energy in our daily lives, the need for energy storage devices is increasing day by day. Supercapacitors are capable of meeting these requirements owing to their high power density, long-term cycling stability, fast charge rate and safe operating mode [1–5]. Recently, transition metal oxides (two different transition metals A and B; Co, Mn, Ni, and Zn) have been widely explored due to the synergistic effect between the two metal elements with different chemical valence. For instance, spinel-type $ZnCo_2O_4$ nanostructures has been researched for not only Li-ion batteries, electrocatalysts and sensors but also supercapacitors applications [6–9]. Therefore, in this work, we were investigated the supercapacitor properties of $ZnCo_2O_4$ nanowires synthesized on 3D-nickel foam by hydrothermal method. Structure, morphology and elemental analysis of the $ZnCo_2O_4$ nanowires were carried out using the X-ray diffractometer technique (PANalytical Empyrean, Cu-Kα, λ=1.54060 Å), a field-emission scanning electron microscope (FESEM: FEI Quanta 450 FEG) and an EDS analyzer in the FESEM system (EDAX, AMETEK Materials Analysis Division) respectively. Cyclic voltammetry (CV), galvanostatic charge discharge (GCD) and electrochemical impedance spectroscopy (EIS) analysis of the $ZnCo_2O_4$ nanowires were performed via Gamry Reference 3000 potentiostat in 1 M of a KOH aqueous electrolyte solution.

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