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Electrochemical Capacitive Behaviour of Carbon based and /or NT-CoFe₂O₄ Nanocomposites

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Cobalt ferrite nanoparticles CoFe₂O₄ and their carbon based and /or NT nanocomposites : CoFe₂O₄-CoCO₃ , CoFe₂O₄-CoCO₃/NT have been successfully synthesized by a simple one step hydrothermal method, using NaOH, and urea surfactants. The X-ray diffraction confirms the presence of cobalt ferrite and cobalt ferrite-carbonate phases, the SEM and TEM analyzes reveals the nanosized particles. The electrochemical performances of these products were investigated by cyclic voltammetry, charge-discharge and electrochemical impedance spectroscopy in 6M KOH aqueous electrolyte, in a three-electrode system. A maximum specific capacitances (capacities) of 246 F.g⁻¹ (27 mAh.g⁻¹), 285 F.g⁻¹ (31 mAh.g⁻¹) and 277 F.g⁻¹ (30 mAh.g⁻¹) were obtained respectively for CoFe₂O₄ , CoFe₂O₄-CO₃ and CoFe₂O₄-CoCO₃/NT at a current density of 0,5 A/g. The Cobalt ferrite-carbonate shows an excellent capacitance retention of 97,8% after 1000 cycles at a current density of 5A/g.

Recent Publications

1. O. Guellati, A. Harat, D. Momodu, J. Dangbegnon, T. Romero, D. Begin, C. Pham-Huu, N. Manyala, M. Guerioune (Electrochemical measurements of 1D/2D/3D Ni-Co bi-phase mesoporous nanohybrids synthesized using free-template hydrothermal method) *Electrochimica Acta* 275 (2018) 155-171, doi: 10.1016/j.electacta.2018.04.112.
2. H. Kennaz, A. Harat, O. Guellati, D. Y. Momodu, F. Barzegar, J. K. Dangbegnon, N. Manyala and M. Guerioune (Synthesis and electrochemical investigation of spinel Cobalt ferrite magnetic nanoparticles for supercapacitor application) *Journal of Solid State Electrochemistry* 22

(3) (2018), 835-847, <https://doi.org/10.1007/s10008-017-3813-y>

3. T. M. Masikhwa, M. J Madito, D. Y Momodu, J. K. Dangbegnon, O. Guellati, A. Harat, M. Guerioune, F. Barzegar, N. Manyala (High performance asymmetric supercapacitor based on CoAl-LDH/GF and activated carbon from expanded graphite) *RSC Advances* 6 (52), (2016), 46723-46732.
4. Farshad Barzegar, Abdulhakeem Bello, Ouanassa Guellati, Damilola Y. Momodu, Aicha Harat, Julien K. Dangbegnon, Mohamed Guerioune, Ncholu Manyala, (Effect of addition of different carbon materials on hydrogel derived carbon material for high performance electrochemical capacitors) *Electrochimica Acta* 186 (2015), 277-284.
5. F Chouit, O Guellati, S Boukhezar, A Harat, M Guerioune, N Badi (Synthesis and characterization of HDPE/N-MWNT nanocomposite films) *Nanoscale research letters* 9 (1), (2014) 1.

Biography

Dr. Aicha Harat is a teacher-researcher and head of a team research on LEREC laboratory (University of Annaba, Algeria). Her principal research topic is magnetic and high T_c superconducting materials. Now she deals with magnetic nanoparticles and their carbon based nanocomposites synthesized by various methods (co-precipitation, hydrothermal, combustion...) and their application in supercapacitors for energy storage. (orcid.org/0000-0002-1748-9290)

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