

**OPTIMIZATION OF Ni-Co-OH/rGO ELECTRODE AS
SUPERCAPACITOR USING RSM ANALYSIS VIA
DOE METHOD**

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AUTHOR'S DECLARATION

I declared that the work in the thesis was carried out in accordance with the regulation of Universiti Teknologi MARA. It is original and is the results of my own, unless otherwise indicated or acknowledge as reference work.

I, hereby acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

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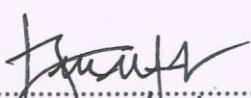
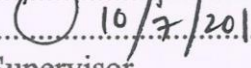
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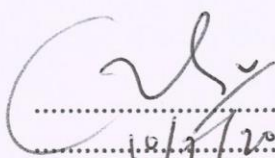
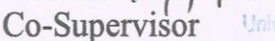
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ABSTRACT

Electrical devices nowadays have developed rapidly to ease human daily activities. These fast evolution making people to demand an electrical device that can last longer by having large storage capacity while maintaining its portability features. The purpose of this research studies is to study the effect of preparation parameters (ratio of metals oxides chosen and the temperature) via Response Surface Method (RSM) analysis and to investigate the optimum parameters via Design of Experiment (DOE) method. The final objective to characterize the supercapacitor electrode from the optimization between Ni-Co-OH/rGO electrode that has been produced. The range of synthesis temperature is between 180°C up to 200°C, the ratio of Ni(NO₃).6H₂O between 1.00% to 30.00% and the ratio of Co(NO₃).6H₂O from 1.00% up to 12.00%. The samples will be analyze and characterize by using Fourier Transform Infrared (FTIR), Scanning Electron Microscopy (SEM), Thermal Gravimetric Analysis (TGA) and Brunauer, Emmett and Teller (BET). From the optimization studies via Design Expert (DX7) Software, in order to get the highest capacitance value of 91.8515 F, the range of synthesis temperature should be between 193.12°C and 193.99 °C, the ratio of Ni(NO₃).6H₂O between 18.94% up to 20.92% and ratio of Co(NO₃).6H₂O at 1.26%. As the conclusion, the optimization studies has achieved its research objectives when the electrode of the highest capacitance has been identified along with a low standard deviation of 0.16 and high confidence value of 0.9971.