

**EFFECT OF POLYPYRROLE ON
ELECTROCHEMICAL PROPERTIES OF MWCNTs
FILMS PREPARED BY DC-EPD TECHNIQUE**

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UNIVERSITI TEKNOLOGI MARA

2017

AUTHOR'S DECLARATION

I declare 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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ACKNOWLEDGEMENT

First, I am very grateful to Allah who give the good health to accomplish my report. The completions of the task give much pleasure to me. Then, I would like to thank to my lecturer of this subject, Madam Noorzalila for the valuable guidance and advice. I also would like my teammate for showing me some example and technics that related to the topic of research.

Besides that, I would like to appreciate my co-supervisor, Madam Aimi for her guidance and time to help me to complete my research for this semester. Next, the most important person, I also want to thanks to Madam Intan who help me a lot in order to complete this work. Other than that, she inspired me greatly to work, commit in this research. Her willingness to motivate really helps me to contribute tremendously to my research work.

Finally, this thesis is dedicated to my loving family for the vision and determination to educate me. This piece of victory is dedicated to them.

ABSTRACT

Supercapacitors have emerged with the potential to enable major advance for energy storage. It is attractive applications where it has high energy density, fast charge-discharge time and high specific capacitance. Multi-walled carbon nanotubes (MWCNTs) usually used as electrode materials for supercapacitors. However, specific capacitance, energy density and charge-discharge time of MWCNTs itself cannot achieve the needs of supercapacitors. So, in order to overcome this situation conducting polymers was introduced. The type of conducting polymer used was polypyrrole (PPy). The colloid were prepared into two portion which is with PPy and without PPy. From the morphology characterization by FESEM, the addition of PPy has show successfully deposited on MWCNTs film. In order to prove it, the characterization of functional group by FTIR shows the wavenumbers of PPy on MWCNTs were 1624 cm^{-1} , 1270 cm^{-1} , 1000 cm^{-1} and 988 cm^{-1} . FESEM image reveal PPy were deposited on the surface of MWCNTs. The addition of PPy have enhance the specific capacitance, energy density, power density and energy efficiency of MWCNTs. This can be observed from CV-CD measurements where nanocomposites film has the highest specific capacitance which is 25.867 Fg^{-1} , energy density 2.6190 Whkg^{-1} , power density 1407.22 Wkg^{-1} and energy efficiency 69.9 % compared to PPy film and MWCNTs film.