

**ELECTROCHEMICAL PROPERTIES OF
MWCNTs-POLYPYRROLE NANOCOMPOSITE
FILMS PREPARED BY AC-EPD TECHNIQUE**

SITI NORAZLIN BINTI NORDIN

**BACHELOR OF CHEMICAL ENGINEERING
(ENVIRONMENT) WITH HONOURS**

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.

Signed : 


Date : 10/7/2017

Siti Norazlin Binti Nordin


Student ID : 2014647064

SUPERVISOR'S CERTIFICATION

We declared that we read this thesis and in our point of view this thesis is qualified in terms of scope and quality for the purpose of awarding the Bachelor of Chemical Engineering (Environment) with Honours.

Signed : 
Date : 10/3/2017

Main Supervisor
Intan Syuffinazilla Zaine
Faculty of Applied Sciences
Universiti Teknologi MARA
Cawangan Pulau Pinang
13500 Permatang Pauh
Pulau Pinang

Signed : 
Date : 10/3/17

Co-Supervisor
Nor Aimi Abdul Wahab
Faculty of Applied Sciences
Universiti Teknologi MARA
Cawangan Pulau Pinang
13500 Permatang Pauh
Pulau Pinang

SUPERVISOR'S CERTIFICATION

ACKNOWLEDGEMENT

I would like to express my gratitude and appreciation to all those who gave me responsibility the possibility to complete this report. A special thanks to the my supervisors of the project Mrs Intan Syaffinazzila Zaine whose have given her full effort in guiding me in achieving the goal as well as her encouragement to maintain my final year project in track. I would like to thanks and appreciate the guidance given by my co-supervisor in manage my final year project.

I might also like to acknowledge with much appreciation the crucial role of the final year project head centre, Mrs. Rasyidah Alrozi, whose help, stimulating suggestions and encouragement helped me to coordinate my project.

Last but not least, I would like to thanks to my family and my friends for the continues support and sharing valuable knowledge in writing this report.

ABSTRACT

The deposition of MWCNTs-PPy film on nickel foil was carried out using AC-EPD technique. The film deposition without formation of bubbles and less microcracking were successfully prepared by optimizing parameter such as frequency, waveforms, deposition times, peak to peak voltages and duty cycles. The MWCNTs-PPy nanocomposite film was characterized via Field Emission Scanning Electron Microscope (FESEM), Fourier Transform Infrared Spectroscopy (FTIR) and cyclic voltammetric and galvanometric charge-discharge (CV-CD). The FESEM images shows nanotubes enwrapped uniformly with PPy. FTIR spectra were study the functional group of deposited film . The N-H stretching vibration at 3522 cm^{-1} prove the presence of PPy in MWCNTs films. CV-CD analysis showed highest redox peaks is belonging to the MWCNTs-PPy electrodes. The value of specific capacitance for MWCNTs-PPy, MWCNTs and PPy films which are 64.92 Fg^{-1} , 7.04 Fg^{-1} and 31.16 Fg^{-1} , respectively. The MWCNTs-PPy has highest energy density compare to MWCNTs and PPy which are 6.57 Wh kg^{-1} , 0.71 Wh kg^{-1} and 3.15 Wh kg^{-1} respectively. The power density for MWCNTs-PPy, MWCNTs and PPy films are 472.66 Wkg^{-1} , 195.05 Wkg^{-1} and 111.31 Wkg^{-1} , respectively. MWCNTs-PPy gives highest energy efficiency which is 91.7 %. It has demonstrated that, AC-EPD allows the electrophoretic deposition in aqueous suspension without structural damage.