

UNIVERSITI TEKNOLOGI MARA

**THE EFFECT OF VARIOUS TITANIUM DIOXIDE
(TiO₂) LOADING ON POLYMORPHISM OF
STRETCHED POLYVINYLIDENE FLUORIDE
(PVDF) /TiO₂ THIN FILM**

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Thesis submitted in fulfillment
of the requirements for the degree of
Bachelor's Degree of Science
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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

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ABSTRACT

The composite of Polyvinylidene Fluoride/ Titanium dioxide (PVDF/TiO₂) thin film were prepared with various loading of TiO₂ using solvent casting method. The solution was stirred for 48 hours using magnetic stirrer at 600rpm. The mixture was casted into glass petri dish before being dried in the oven for 1 hour at 115 °C until the thin film sample formed. Then, the sample was transformed into dumbbell shape and stretched in 3 minutes. The necking area or the stretching area were studied using micrometer screw gauge, inverted microscopy, differential scanning calorimetry (DSC) and ATR-FTIR. The thickness of the thin film was increasing significantly with the addition of TiO₂. Same goes to the Tensile strength, Incorporated TiO₂ in the PVDF able to enhance the mechanical properties significantly. As for the surface morphology, whitening oval occurs at the control which indicates the lamella while crystal nuclide of TiO₂ was formed and tend to increase with the amount TiO₂ used. Next, on the DSC, the melting temperature (T_m) increased with addition of TiO₂ and PVDF10 shows the highest degree of crystallinity. Lastly, on the ATR-FTIR, PVDF10 has been identified to have highest β -phase due increase the β and γ phase to the second highest peak at 1168cm⁻¹ region, able to increase the β -phase at 1401 cm⁻¹ and most importantly it has the highest peak on 834 cm⁻¹ regions which indicate also the β -phase. Overall, the incorporation of PVDF10 shows the best because it able to produce highest degree of crystallinity and the β -phase.

TABLE OF CONTENTS

	Page
AUTHOR'S DECLARATION	iii
ABSTRACT	v
ABSTRAK	vi
ACKNOWLEDGEMENT	vii
TABLE OF CONTENTS	viii
LIST OF FIGURES	xi
LIST OF TABLES	xiii
LIST OF ABBREVIATIONS	xiv
CHAPTER ONE INTRODUCTION	1
1.1 Background of Study	1
1.2 Problem Statement	2
1.3 Significant of Study	3
1.4 Objectives	3
CHAPTER TWO LITERATURE REVIEW	5
2.1 Polyvinylidene fluoride (PVDF)	5
2.2 Polymorphism	6
2.3 Piezoelectric	7
2.4 Phase transition methods	8
2.5 N, N-Dimethylformamide (DMF)	9
2.6 Composite	10
2.7 Titanium dioxide (TiO ₂)	11
2.8 Solvent Casting	12
2.9 FTIR analysis of PVDF thin film	12
2.10 Scanning electron microscopy (SEM) of PVDF and PVDF/ meso- TiO ₂	14
2.11 Surface morphological studies using SEM	15
2.12 Differential scanning calorimeter (DSC) study on PVDF and PVDF-	

TiO ₂ thin film.	15
CHAPTER THREE RESEARCH METHODOLOGY	17
3.1 Materials	17
3.1.1 PVDF	17
3.1.2 DMF	17
3.1.3 TiO ₂	17
3.2 Method	17
3.2.1 Preparation of PVDF solution	17
3.2.2 Preparation PVDF/TiO ₂ mixture	18
3.2.3 Solution casting	18
3.2.4 Thin film formation	19
3.2.5 Mechanical stretching via Tensile	19
3.2 Testing	20
3.2.1 DSC	20
3.2.2 ATR-FTIR	20
3.2.3 Inverted Optical Microscope	20
3.2.4 Micrometre screw gauge	21
3.3 Flow chart	22
CHAPTER FOUR RESULT AND DISCUSSIONS	23
4.1 Thickness of PVDF/TiO ₂ thin-film	23
4.2 Tensile strength of PVDF/TiO ₂ thin-film	25
4.3 Surface morphology of PVDF thin-film.	28
4.4 Differential scanning calorimetry for PVDF/TiO ₂ thin-film	30
4.5 ATR-FTIR result	32
CHAPTER FIVE CONCLUSION AND RECOMMENDATION	41
5.1 Conclusion	41
5.2 Recommendations	42
REFERENCES	43