

**STUDY ON PHYSICAL AND STRUCTURAL PROPERTIES OF  
YTTRIUM DOPED BARIUM BORATE GLASS**

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## ABSTRACT

### STUDY ON PHYSICAL AND STRUCTURAL PROPERTIES OF YTTRIUM DOPED BARIUM BORATE GLASSES

Six different glass samples have been prepared in this project by melt-quenching technique with composition  $(75-x) \text{H}_3\text{BO}_3\text{-}25\text{BaCO}_3\text{-}x\text{Y}_2\text{O}_3$  (where  $x=0.0, 0.2, 0.4, 0.6, 0.8$  and  $1.0$  mol%). By varying the proportion of  $\text{H}_3\text{BO}_3$  and  $\text{BaCO}_3$ , the effect of  $\text{Y}_2\text{O}_3$  to the barium borate glass can be investigated in term of physical properties such as density, molar volume and oxygen packing density. The structural properties were measured by X-Ray Diffraction (XRD) technique and Fourier Transform Infrared (FTIR) spectroscopy. Based on the result, it shows that the density and oxygen packing density increases while the molar volume decreases as the percent of  $\text{Y}_2\text{O}_3$  increases. The amorphous nature of this glass was proved from the XRD spectra. On the FTIR spectra result showed the present of B-O-B bending vibrations, Y-O molecule which originates from  $\text{Y}_2\text{O}_3$ , bending vibrations of various borate arrangement B-O-B, asymmetric vibrations of  $\text{BO}_4$ , B-O stretching vibrations of tetrahedral  $[\text{BO}_4]$ , modes of boron-oxygen triangular unit and B-O stretching vibrations of  $[\text{BO}_3]$ .

## TABLE OF CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENTS</b>	iii
<b>TABLE OF CONTENTS</b>	iv
<b>LIST OF TABLES</b>	vi
<b>LIST OF FIGURES</b>	vii
<b>LIST OF ABBREVIATIONS</b>	viii
<b>ABSTRACT</b>	ix
<b>ABSTRAK</b>	x
<b>CHAPTER I INTRODUCTION</b>	
1.1 Introduction	1
1.2 Background Study	2
1.3 Problem Statement	4
1.4 Objectives of Study	6
1.5 Significance of Study	6
<b>CHAPTER II LITERATURE REVIEW</b>	
2.1 Historical Background of Glass	7
2.1.1 Characteristic of Glass	8
2.2 Glass Composition	9
2.2.1 Glass Former	10
2.2.2 Glass Modifier	11
2.2.3 Dopant Glass	11
2.3 Glass Formation Process	12
2.4 Chemical Composition of Glass	13
2.4.1 Boric Acid ( $H_3BO_3$ )	13
2.4.2 Barium Carbonate ( $BaCO_3$ )	14
2.4.3 Yttrium Oxide ( $Y_2O_3$ )	15
<b>CHAPTER III METHODOLOGY</b>	
3.1 Introduction	16
3.2 Sample Preparation	16
3.2.1 Description for Sample Preparation	17
3.3 Sample Characterization	20
3.3.1 Density Measurement	20
3.3.2 Molar Volume	21
3.3.3 Oxygen Packing Density	21
3.3.4 X-Ray Diffraction (XRD) Spectroscopy	22
3.3.5 Fourier Transform Infrared Spectroscopy (FTIR)	23
<b>CHAPTER IV RESULTS AND DISCUSSION</b>	
4.1 Introduction	24
4.2 Glass Sample	24

4.3 Density, Molar Volume and Oxygen Packing Density	25
4.4 X-Ray Diffraction (XRD) Spectroscopy	29
4.5 Fourier Transform Infrared Spectroscopy (FTIR)	30

## **CHAPTER V CONCLUSION AND RECOMMENDATIONS**

5.1 Conclusion	33
5.2 Recommendations	34

<b>CITED REFERENCES</b>	35
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<b>APPENDICES</b>	39
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<b><i>CURRICULUM VITAE</i></b>	46
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## LIST OF FIGURES

Figure	Caption	Page
2.1	Structure of crystalline and amorphous	9
2.2	Structure of network former	10
2.3	Structure of network modifier	11
2.4	Volume-temperature diagram of glass formation	12
2.5	Chemical bond boric acid	13
2.6	Chemical bond barium carbonate	14
3.1	Analytical electronic balance	18
3.2	Flow chart of the sample characterization	19
3.3	Electronic densimeter MD-300S balance	20
3.4	PANalytical X'Pert PRO	22
3.5	Fourier transform infrared spectroscopy	23
4.1	Glass with difference mol% $Y_2O_3$	24
4.2	Graph of density and molar volume versus $Y_2O_3$ mol%	28
4.3	Oxygen packing density versus $Y_2O_3$ mol%	28
4.4	X-Ray diffraction of $(75-x) H_3BO_3-25BaCO_3-xY_2O_3$	29
4.5	FTIR spectra of the glass	30