CONTENTS

Acknowledgments  I

Abstract  II

Abtrak  III

Contents  IV

CHAPTER 1: INTRODUCTION

1.1 Introduction to dye lasers  1

1.2 Polymeric host solid dye laser  2

1.3 β-Diketoborionate derivatives  3

1.4 Purpose of study  4

CHAPTER 2: FUNDAMENTAL BASIS OF DYE LASERS

2.1 Basic principles of dye lasers  5

2.2 Characteristics of efficient dye lasers  7

CHAPTER 3: EXPERIMENTAL

3.1 Synthesis of β-diketoborionate derivatives  9

3.2 Preparation of solid-state dye lasers

3.2.1 Liquid dye lasers  11

3.2.2 Preparation of thin film solid-state dye lasers  11

3.2.3 Preparation of dye doped PMMA slab by low pressure compression mold method  13

3.3 Absorption spectra  14

3.4 Pulsed Nd:YAG laser excitation  14

3.5 Energy measurements  17

3.6 Laser spectra  17
CHAPTER 4: RESULTS AND DISCUSSION

4.1 UV absorption spectra analysis 18
4.2 Environment and concentration effect on laser wavelength 27
4.3 Environment and concentration effect on laser efficiency 39
4.4 Photostability 45
4.5 Conclusions 49

APPENDIX A: RESULTS AND DISCUSSION: MOLECULAR STRUCTURES OF β - DIKETOBORONATES

A.1 Theoretical study of molecular structures 50
A.2 Mulliken partial charges 50
A.3 Molecular structures: Equilibrium geometries 52
A.4 Vibrational spectra: General discussion 55
A.5 Conclusions 56

REFERENCES 68