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ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย



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NAPHTHYRIDYL PYRIDINE DERIVATIVES AND THEIR PHOTOPHYSICAL PROPERTIES

Miss Kobkun Sae Pang



A Thesis Submitted in Partial Fulfillment of the Requirements  
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By Miss Kobkun Sae Pang  
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Thesis Advisor Assistant Professor Rojrit Rojanathanes, Ph.D.  
Thesis Co-Advisor Assistant Professor Patchanita Thamyongkit,  
Dr.rer.nat.

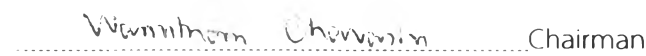
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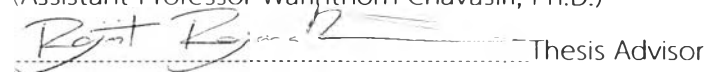


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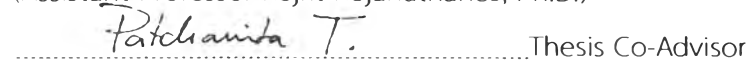
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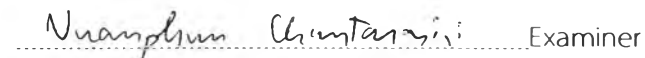
(Assistant Professor Warinthorn Chavasiri, Ph.D.)

..... Thesis Advisor

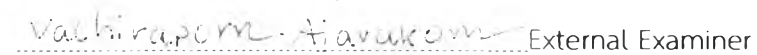
(Assistant Professor Rojrit Rojanathanes, Ph.D.)

..... Thesis Co-Advisor

(Assistant Professor Patchanita Thamyongkit, Dr.rer.nat.)

..... Examiner

(Associate Professor Nuanphun Chantarasiri, Ph.D.)

..... External Examiner

(Vachiraporn Ajavakom, Ph.D.)



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ได้สังเคราะห์ลิแกนด์ bis-naphthyridyl pyridines ชนิดใหม่ และสารเชิงซ้อนกับ Ru  
ชั้นในงานวิจัยนี้โดยลิแกนด์มี 2 หน่วยฟังก์ชันหลักคือ หมู่คาร์บอกซิลิก สำหรับยึดต่อกับผิว  
ออกไซด์ในเซลล์สุริยะ และ ช่องที่มีไนโตรเจนอยู่มากเพื่อสร้างสารเชิงซ้อนกับไอออนของโลหะ ทั้ง  
ลิแกนด์และสารเชิงซ้อนของ Ru(III) ได้รับการพิสูจน์เอกลักษณ์โดยสมบูรณ์ การทดสอบทาง  
กายภาพเชิงแสงชี้ให้เห็นว่า การดูดกลืนและการคายแสงสูงสุดของสารเชิงซ้อนเคลื่อนไปทางด้านสี  
แดง เนื่องจากความสามารถในการละลายในตัวทำละลายทั่วไปต่ำ จึงจำเป็นต้องปรับปรุง  
โครงสร้างของทั้งลิแกนด์และสารเชิงซ้อนนี้ต่อไป

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ลายมือชื่อนิสิต กอบกุล แซ่ปึง

ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก *R+B.2*

ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์ร่วม *Patchanita T.*



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ROJANATHANES, Ph.D., CO-ADVISOR: ASST. PROF. PATCHANITA  
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In this research a novel bis-naphthyridine ligand and its Ruthenium complex were synthesized. The ligand contains two majors functionalities; carboxylic group for attaching with an oxide surface in solar cell and nitrogen – rich pocket for complexing with metal ion. Both ligand and its Ruthenium complex were fully characterized. The investigation of the photophysical properties indicated that their absorption and emission maxima of Ru(III) complex red shifted with its ligand. Due to their poor solubility in common solvents, further structural modification of both ligand and its complex is required.

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Student's Signature Kobkun Sae Pang  
Advisor's Signature Rojrit R. J.  
Co-Advisor's Signature Patchanita T.

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## CONTENTS

	Page
THAI ABSTRACT .....	iv
ENGLISH ABSTRACT .....	v
ACKNOWLEDGEMENTS .....	vi
CONTENTS .....	vii
LIST OF FIGURES .....	x
LIST OF SCHEMES .....	xi
LIST OF ABBREVIATIONS .....	xii
CHAPTER I INTRODUCTION.....	1
1.1 Objectives of this research.....	3
1.2 Scope of this research .....	3
CHAPTER II THEORY AND LITERATURE REVIEWS .....	4
2.1 Organic solar cells.....	4
2.1.1 Background.....	4
2.1.2 Dye sensitized solar cell.....	4
2.1.2.1 Operating principles of dye-sensitized solar cell.....	5
2.1.2.2 Criterion for designing of organic photosensitizers .....	6
2.1.3 Bulk heterojunction solar cells .....	6
2.1.3.1 Operating principles of the bulk heterojunction solar cells.....	7
2.1.3.2 Desirable properties of the active layer .....	9
2.2 Ligand to Metal and Metal to Ligand Charge Transfer.....	9
2.3 Literature reviews .....	10
CHAPTER III EXPERIMENTAL.....	14
3.1 Chemicals .....	14
3.2 Analytical instruments .....	15



	Page
3.3 Experimental procedures .....	16
3.3.1 4-Oxo-4H-pyran-2,6-dicarboxylic acid (chelidonic acid) (1) .....	16
3.3.2 4-Oxo-1,4-dihydropyridine-2,6-dicarboxylic acid (Chelidamic acid) (2) .....	17
3.3.3 4-Chloropyridine-2,6-dicarboxylate (3) .....	18
3.3.4 Diethyl 4-methylpyridine-2,6-dicarboxylate (4) .....	19
3.3.5 1,1'-(4-Methylpyridine-2,6-diyl)diethanone (5) .....	20
3.3.6 2,2'-(4-Methylpyridine-2,6-diyl-bis-naphthyridine) (6) .....	21
3.3.7 2,6-Di(1,8-naphthyridine-2-yl)isonicotinic acid (7) .....	22
3.3.8 Ruthenium complex of 2,6-di(1,8-naphthyridine-yl)isonicotinic acid (8) ...	24
CHAPTER IV RESULTS AND DISCUSSION .....	25
4.1 Synthesis .....	26
4.1.1 Oxo-4H-pyran-2,6-dicarboxylic acid (1) .....	26
4.1.2 Oxo-1,4-dihydropyridine-2,6-dicarboxylic acid (Chelidamic acid) (2) .....	27
4.1.3 Diethyl 4-chloropyridine-2,6-dicarboxylate (3) .....	28
4.1.4 Diethyl 4-methylpyridine-2,6-dicarboxylate (4) .....	29
4.1.5 1,1'-(4-methylpyridine-2,6-diyl)diethanone (5) .....	31
4.1.6 2,2'-(4-methylpyridine-2,6-diyl-bis-naphthyridine) (6) .....	33
4.1.7 2,6-Di(1,8-naphthyridine-2-yl)isonicotinic acid (7) .....	34
4.1.8 Ruthenium complex of 2,6-di(1,8-naphthyridine-2-yl)isonicotinic acid (8)	39
4.2 Investigation of photophysical properties .....	42
4.2.1 Absorption .....	43
4.2.2 Emission .....	44
CHAPTER V CONCLUSION .....	45
REFERENCES .....	46





	Page
APPENDIX A.....	50
APPENDIX B.....	65
VITA.....	71



## LIST OF FIGURES

	Page
Figure 1.1 Structures of (a) the 1,8-naphthyridyl and (b) bis-naphthyridyl pyridine ligands	2
Figure 1.2 Structures of the target molecules	3
Figure 2.1 Operation of the dye-sensitized solar cell	5
Figure 2.2 Schematic setup of the bulk heterojunction solar cell	6
Figure 2.3 Examples for (a) donor and (b) acceptor materials used in the bulk heterojunction solar cells	7
Figure 2.4 The simplified four basic steps of photocurrent generation in the bulk heterojunction solar cell	8
Figure 2.5 The LMCT process involving an octahedral $d^6$ complex	9
Figure 2.6 The MLCT process involving an octahedral $d^5$ complex.	10
Figure 2.7 Polyamide ruthenium complexes (top) and polyester ruthenium complexes (bottom)	11
Figure 4.1 MALDI-TOF mass spectrum of the crude product (a) before and (b) after demetallation. (c) Possible structures of the crude product	36
Figure 4.2 $^1\text{H-NMR}$ spectra of compounds <b>6</b> and <b>7</b>	38
Figure 4.3 IR spectra of compounds <b>6</b> and <b>7</b>	39
Figure 4.4 Mass spectra and structure compound <b>8</b> (a) MALDI-TOF MS and (b) HR-ESI MS	40
Figure 4.5 (a) Calculated and (b) Observed isotopic distributions of peak A	41
Figure 4.6 IR spectra of compounds <b>7</b> and <b>8</b>	42
Figure 4.7 Normalized UV-Vis spectra of compounds <b>6</b> (black line), <b>7</b> (red line) and <b>8</b> (blue line)	43
Figure 4.8 Emission spectra of compounds <b>6</b> (black line), <b>7</b> (red line) and <b>8</b> (blue line)	44



## LIST OF SCHEMES

	Page
Scheme 4.1 Synthesis pathway of target compounds 7 and 8	25
Scheme 4.2 Mechanism of the synthesis of compound 1	26
Scheme 4.3 Mechanism of the synthesis of compound 2	27
Scheme 4.4 Mechanism of the synthesis of compound 3	28
Scheme 4.5 Mechanism of the synthesis of compound 4	31
Scheme 4.6 Mechanism of the synthesis of compound 5	32
Scheme 4.7 Mechanism of the synthesis of compound 6	33
Scheme 4.8 Synthetic pathway of compound 7	35



## LIST OF ABBREVIATIONS

$^{\circ}\text{C}$	: degree Celcius
calcd	: calculated
$\text{CDCl}_3$	: deuterated chloroform
$^{13}\text{C-NMR}$	: carbon-13 nuclear magnetic resonance spectroscopy
d	: day(s)
d	: doublet (NMR)
dd	: doublet of doublet (NMR)
DSSCs	: dye sensitized solar cells
$\text{DMSO-}d_6$	: hexadeuterated dimethylsulfoxide
equiv	: equivalent(s)
g	: grams(s)
h	: hours(s)
$^1\text{H-NMR}$	: proton nuclear magnetic resonance spectroscopy
HOMO	: highest occupied molecule orbital
IR	: Infrared spectroscopy
$J$	: coupling constant
LMCT	: ligand to metal charge transfer
LUMO	: lowest unoccupied molecular orbital
m	: multiplet (NMR)
mmol	: millimole(s)
mg	: milligram(s)



MHz	: megahertz (million Hertz)
ml	: millilitre(s)
MLCT	: metal to ligand charge transfer
m/z	: mass per charge ratio
obsd	: observed
rt	: room temperature
s	: singlet (NMR)
t	: triplet (NMR)
TCO	: transparent conductive oxide
$\delta$	: chemical shift
$\lambda$	: wavelength
$\lambda_{\text{ex}}$	: excitation wavelength
$\lambda_{\text{abs}}$	: absorption wavelength
$\lambda_{\text{em}}$	: emission wavelength
$\epsilon$	: molar absorptivity

