

**DEVELOPMENT OF POTASSIUM SODIUM NIOBATE  
BASED GLASS AND GLASS-CERAMIC SUBSTRATES  
FOR SOLAR CELL APPLICATIONS**

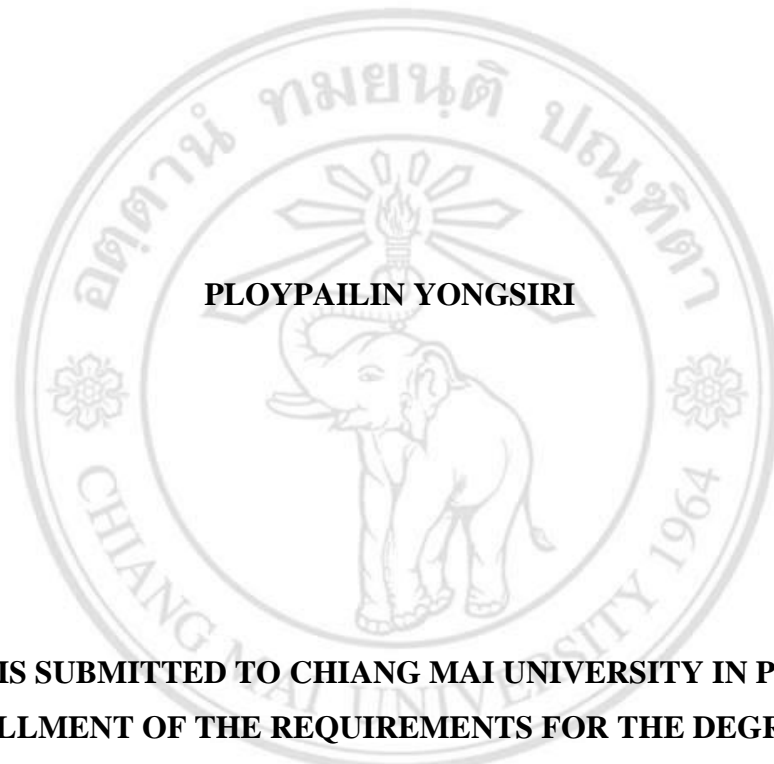
**PLOYPAILIN YONGSIRI**

**DOCTOR OF PHILOSOPHY  
IN MATERIALS SCIENCE**

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**GRADUATE SCHOOL  
CHIANG MAI UNIVERSITY  
OCTOBER 2014**

**DEVELOPMENT OF POTASSIUM SODIUM NIOBATE BASED  
GLASS AND GLASS-CERAMIC SUBSTRATES FOR  
SOLAR CELL APPLICATIONS**



**PLOYPAILIN YONGSIRI**

**A THESIS SUBMITTED TO CHIANG MAI UNIVERSITY IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY  
IN MATERIALS SCIENCE**

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THIS THESIS HAS BEEN APPROVED TO BE A PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF  
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10 October 2014

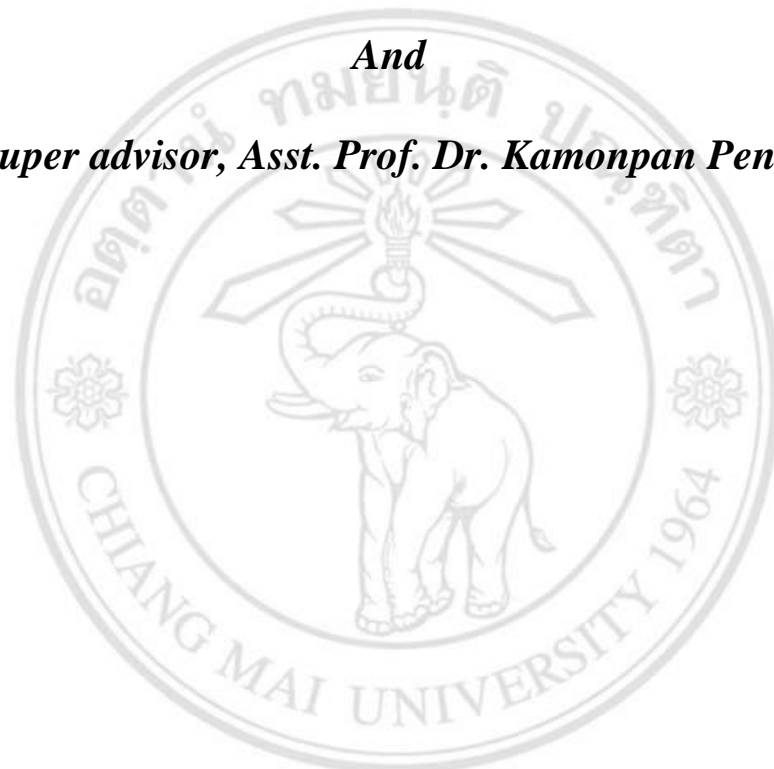
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*To*

*My beloved family, Mom, Dad and Pu,*

*And*

*My super advisor, Asst. Prof. Dr. Kamonpan Pengpat,*



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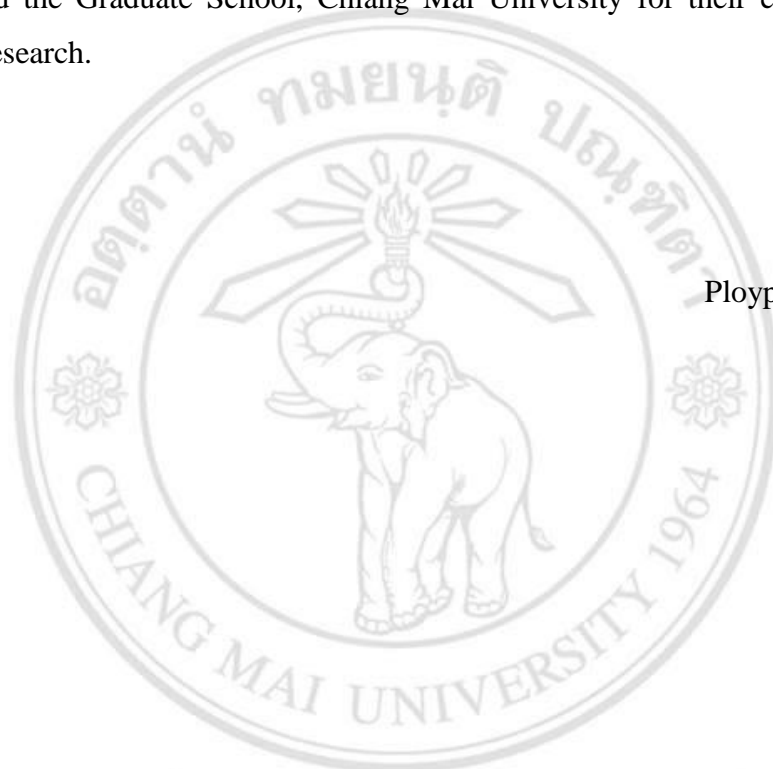
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