

**MECHANICAL PROPERTIES AND THERMAL  
CONDUCTIVITY OF MULTI-WALLED  
CARBON NANOTUBES/ POLYMER  
COMPOSITES COATED ON  
COPPER AND ALUMINIUM**

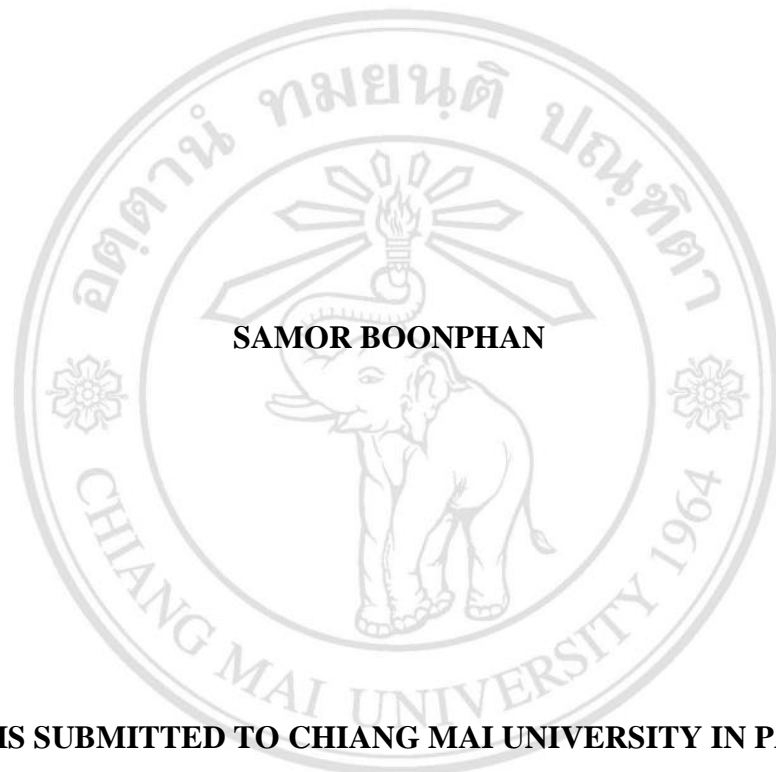
**SAMOR BOONPHAN**

**DOCTOR OF PHILOSOPHY  
IN MATERIALS SCIENCE**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
Copyright© by Chiang Mai University  
All rights reserved

**GRADUATE SCHOOL  
CHIANG MAI UNIVERSITY  
AUGUST 2017**

**MECHANICAL PROPERTIES AND THERMAL CONDUCTIVITY  
OF MULTI-WALLED CARBON NANOTUBES/POLYMER  
COMPOSITES COATED ON COPPER AND ALUMINIUM**



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

**GRADUATE SCHOOL, CHIANG MAI UNIVERSITY**

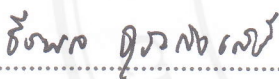
**AUGUST 2017**


**MECHANICAL PROPERTIES AND THERMAL CONDUCTIVITY  
OF MULTI-WALLED CARBON NANOTUBES/POLYMER  
COMPOSITES COATED ON COPPER AND ALUMINIUM**

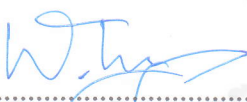
SAMOR BOONPHAN


THIS THESIS HAS BEEN APPROVED TO BE A PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY  
IN MATERIALS SCIENCE

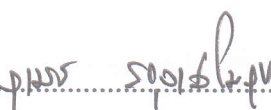
**Examination Committee:**

  
.....Chairman  
(Dr. Theerapol Thurakitserree)


  
.....Member  
(Assoc. Prof. Dr. Pisith Singjai)


  
.....Member  
(Asst. Prof. Dr. Wiradej Thongsuwan)

  
.....Member  
(Dr. Orawan Wiranwetchayan)

  
.....Member  
(Dr. Sumet Sakulsermsuk)

**Advisory Committee:**

  
.....Advisor  
(Assoc. Prof. Dr. Pisith Singjai)

  
.....Co-advisor  
(Asst. Prof. Dr. Wiradej Thongsuwan)

  
.....Co-advisor  
(Dr. Orawan Wiranwetchayan)

1 August 2017

Copyright © by Chiang Mai University

## ACKNOWLEDGEMENT

I would like to express my deep and sincere thanks for my supervisor, Assoc. Prof. Dr. Pisith Singjai for giving me opportunity to work on this research group and for his extremely helpful guidance and strong support in all aspects.

I would like to thank my committee member Dr. Theerapol Thurakitseree, Asst. Prof. Dr. Wiradej Thongsuwan, Dr. Orawan Wiranwetchayan and Dr. Sumet Sakulsermsuk, especially, the external committee member, for thesis helpful encouragement, advices and suggestions.

I would like to thank all helps and supports from officers and technical staff, Miss. Yaowamarn Chuminjak, Dr. Gregory Seth Roberts, Mr. Aekapong Kuntarug, and Mr. Wattikon Sroila, for my good partner in experimentation.

Furthermore, I would like to thank my wife, Mrs. Orratai Boonphan, and my parent, Mr. Mote and Mrs. Amphai Boonphan, for thesis love, kindness, hopeness support and encourage me all time to thank for “BOONPHAN”

Samor Boonphan

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
Copyright© by Chiang Mai University  
All rights reserved