

**EFFECTS OF PLATINUM DOPING ON GAS SENSING BY ZINC
OXIDE NANOPARTICLES SYNTHESIZED BY FLAME SPRAY
PYROLYSIS**

NITTAYA TAMA EKONG

**DOCTOR OF PHILOSOPHY
IN CHEMISTRY**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

Copyright© by Chiang Mai University

All rights reserved
**THE GRADUATE SCHOOL
CHIANG MAI UNIVERSITY**

SEPTEMBER 2011

**EFFECTS OF PLATINUM DOPING ON GAS SENSING BY ZINC
OXIDE NANOPARTICLES SYNTHESIZED BY FLAME SPRAY
PYROLYSIS**

NITTAYA TAMAEEKONG

**A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN CHEMISTRY**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

Copyright© by Chiang Mai University

All rights reserved
**THE GRADUATE SCHOOL
CHIANG MAI UNIVERSITY**

SEPTEMBER 2011

**EFFECTS OF PLATINUM DOPING ON GAS SENSING BY ZINC OXIDE
NANOPARTICLES SYNTHESIZED BY FLAME SPRAY PYROLYSIS**

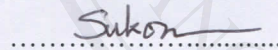
NITTAYA TAMAEEKONG

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

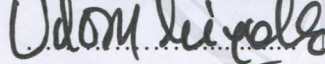
EXAMINING COMMITTEE

 CHAIRPERSON

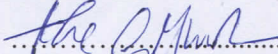
Dr. Pichai Pirakitikulr

 MEMBER

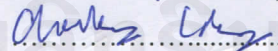
Assoc. Prof. Dr. Sukon Phanichphant

 MEMBER

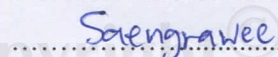
Assoc. Prof. Dr. Udom Sriyotha

 MEMBER

Assist. Prof. Dr. Teerapol Wongchanapiboon

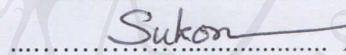
 MEMBER

Dr. Chaikarn Liewhiran

 MEMBER

Dr. Saengrawee Sriwichai

THESIS ADVISORY COMMITTEE

 ADVISOR

Assoc. Prof. Dr. Sukon Phanichphant

 CO-ADVISOR

Assoc. Prof. Dr. Udom Sriyotha

 CO-ADVISOR

Assist. Prof. Dr. Teerapol Wongchanapiboon

19 September 2011

© Copyright by Chiang Mai University

ACKNOWLEDGEMENTS

I would like to express my sincere thanks and appreciations to my major advisor, Assoc. Prof. Dr. Sukon Phanichphant for her kindness, valuable guidances, and encouragements throughout my study.

Special thanks to Dr. Pichai Pirakitikulr, Assoc. Prof. Dr. Udom Sriyotha, Assist. Prof. Dr. Teerapol Wongchanapiboon, Dr. Chaikarn Liewhiran and Dr. Saengrawee Sriwichai for their strong constructive valuable comments and also serve in the examination committee.

I would like to thank Department of Chemistry, Faculty of Science, Chiang Mai University, Thailand for input knowledge and gaining valuable experiences. The Office of Higher Education Commission Ministry of Education, Thailand under the Strategic Scholarships for Frontier Research Network, for the Ph.D. scholarship and the financial support throughout my study.

I would like to thank, Dr. Chaikarn Liewhiran, Dr. Anurat Wisitsoraat and all members of the Nanoscience Research Laboratory (NRL), Chiang Mai University for their assistances, supports and cordially friendship.

I would like to thanks my mother, and all my family members for their forever love, care, and support. I also would like to credit my success to them.

Nittaya Tamaekong