APPROVAL PAGE

Doctor of Philosophy Dissertation

Layered Rare Earth and Transition Metal Materials: Synthesis, Modification and Catalytic Application

Presented by

Yashan Zhang, B.E. & B.A.

Major Advisor ____

Steven L. Suib

Associate Advisor ____

Prabhakar Singh

Associate Advisor ____

Alfredo Angeles-Boza

University of Connecticut

2013

Dedicated to April and Le Petit Pipiniu

// ACKNOWLEDGEMENTS

First, I would like to acknowledge my advisor, Dr. Steven L. Suib, whose encourangement, guidance, support and trust were essential to accomplish my Ph.D degree at UConn. His research enthusiasm, diversity, philosophy, and academic discipline have significantly affected me throughout my graduate study. I am also extremely grateful to Dr. Francis Galasso and Mrs. Lois Galasso, for their hospitality, generous help and encouragement on my research and graduate life in U.S. Many thanks as well to my committee: Drs. Prabhakar Singh, Alfredo Angeles-Boza, and Ray Joesten for their effort and help on my research.

I would also like to thank my teaching advisors: Drs. Fatma Selampinar and Edward Neth, whose enthusiastic attitude and philosophy toward teaching have really inspired me and also have strengthened my belief in future career as a teacher. I also want to thank the other UConn faculty and staff members: Dr. Lichun Zhang, Dr. Abhay Vaze, Dr. James Rusling, Emilie Hogrebe, Charlene Fuller, Osker Dahabsu, Ashely Butler, Adam Pangilinan, Brain Cardinal, and Daniel Daleb for their tireless support.

Special thanks to our former and current group members: Lei, Linping, Saminda, Guohong, Treese, Hui, Cecil, Fabian, Naftali, Anais, Aparna, Zhu, Chung-Hao, Yongtao, Altug, Curt, Nashaat, Gavin, Madhavi, Lakshitha, Sheng-Yu, Justin, Becca, Homer, Ting, Wenqiao, Jing, Mia, Wei, Junkai, Tehereh, and El-Sawy, who have shared valuable research experiences, provided lots of help and have also been so friendly to me during my graduate life.

Finally, my deepest gratitude goes to my family, my parents, my grandpa, who have cheered me on all the way through, especially my husband, Le, for his love and help during my graduate life. I could not have done this without their support.

TABLE OF CONTECTS

PART 1

Synthesis of Layered $Ln_2O_2CO_3$ (Ln: La, Nd, Sm, Eu) materials and Their Application as New series efficient and stable heterogeneous catalysts for biodiesel production

PART 3

Ongoing Work

Preliminary Study of the Hybrids of Nickel - Cobalt and Nickel - Zinc Layered Hydroxide Materials and their Electrochemical Properties

LIST OF FIGURES

LIST OF TABLES

LIST OF SCHEME