Dedicated to my grandmother

Mrs. Manyuan Li

and my parents

Mr. Kuanshen Huang and Mrs. Xinhua Li

for endless love
Acknowledgements

I will be forever grateful to my advisor, Professor Harry W. Gibson for his patience, understanding, encouragements, inspiration, and guidance through this work, and for the opportunity to work in his research group. His profound knowledge, enormous enthusiasm, and keen insight in organic and polymer chemistry gave me a deep impression and have been a great treasure to me. I have utmost respect for his professionalism and kindness.

I would like to thank my committee members: Professors Richard D. Gandour and James M. Tanko for their comments, suggestions and constant support.

A sincere and immense debt of gratitude is owed to the following colleagues and mentors for kind assistances during my graduate career at Virginia Tech: William Bebout, Michael Berg, Anne Campbell, Wilson Chau, Prof. Paul Deck, Dr. Aurica A. Farcas, Amy Fletcher, Dr. Frank R. Fronczek (LSU), Dr. Zhongxin Ge, Tom Glass, Prof. James A. Golen (UMASS), Dr. Ilia Guzei (UWISC-Madison), Bradley Habenicht, Kim C. Harich, Jason W. Jones, Prof. Arnold L. Rheingold (UCSD), Dr. Carla Slebodnick, Dr. Hong Wang, Dr. Lev N. Zakharov (UCSD), Dr. Jin Zhao, and Dr. Liang Zhou.