

ACKNOWLEDGEMENT

I sincerely appreciate the almighty God for His graces, strength, sustenance and above all, His faithfulness and love from the beginning of my academic life up to this doctoral level. His benevolence has made me excel and successful in all my academic pursuits.

My unalloyed appreciation goes to my amiable, ever supportive and humble supervisor, Professor Dr. Wan Mohd Ashri Wan Daud for his voluminous and invaluable contributions and instructions throughout my studies. Prof., I hold your comments and encouraging words close to my heart, they are more than light to my path. Your encouragement and high degree of freedom to me in the course of this study is highly appreciated. I cannot quantify the contributions and supports of my agile, nimble and friendly co-supervisor, Dr. Hazzim F. Abbas. Even though you are no longer in University of Malaya, your supervision by correspondence has left no vacuum. Your words of hope and encouragements were extremely invaluable, especially during the seemingly challenging times. I am most grateful to you.

To Head of Department, Chemical Engineering, Assoc. Professor Rozita Yusoff, I am grateful to your supports especially on those occasions that I need to urgently sign certain documents. To all other faculty, technical office staff of the department, I register my appreciations.

I must not fail to sincerely appreciate and acknowledge the financial support from Higher Impact Research – Ministry of Higher Education Project No D000011-16001 of the Faculty of Engineering, University of Malaya, under which I carried out all my research.

I also sincerely appreciate the support and contribution of the following people who at different time allowed me access to their facilities, peruse my manuscripts, made

constructive criticism and invaluable contributions to my research especially during the catalyst synthesis and testing; Professor Sugeng T., University of Technology Malaysia, Johor; Professor Yoshimitsu Uemura, Mitsubishi Corporation Centre for Biofuel and Biochemical Research, Universiti Teknologi Petronas; Dr P. Balasubramanian, Universiti Teknologi Petronas. I am also grateful to the Krishnaveny Subramaniam and other technician at the department of Chemistry for their support in analyzing my samples/products. I also thank Olayinka Togunwa, department of Geology for her contributions in course of this research work.

Finally, I sincerely and genuinely thank my dear parents, Mr. and Mrs. Moses Foluso Ayodele for their supports and the roles they played on my behalf. My appreciation also goes to my siblings Abimbola, Temitope, Kayode, Olufisayo and my baby Ayomiposi.