## **ACKNOWLEDGEMENTS**

The greater the difficulty, the more the glory in surmounting it

## - Epicurus

When we work to overcome the obstacles, life puts in our way, we make ourselves stronger. Obstacles don't have to stop you. This is what I have learned through my research journey. First and above all, I am thankful to God, the Almighty for providing me this opportunity and granting me the capability to proceed successfully.

The accomplishment of this thesis was possible only due to the support of many wonderful people. It is humbling as well as emotional experience to owe them my sincere thanks to those who have helped along the journey of my Ph.D. I would first like to express deepest gratitude to my research supervisor **Dr. Sonal Thakore**, Associate Professor at the Department of Chemistry, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara for her continuous support. This endeavor would not have been possible without a constant source of motivation and her guidance. She inspired me to become an independent researcher and help me realize the power of critical thinking. She generously gave her time to provide me valuable comments towards improving my work. She advised me with her immense knowledge in the related research area. Her amazing time management skills and sorted working style have helped me achieve my goals in stipulated timeline. I will always be grateful to her for research training and counselling me during all these years of my Ph.D. There is no way to express how much it meant to me to be member of her research group. The outcome of this thesis is a small dedication to her.

I owe my sincere gratitude to the Head, **Prof. Ashutosh Bedekar** and former Heads, **Prof. S. R. Shah** and **Prof. Anjali Patel**, Department of Chemistry, Faculty of Science, The Maharaja Sayajirao University of Baroda for providing the infrastructural and research facilities and support throughout my research work.

I am extremely thankful to **Alumini Association of Chemistry**, Department of Chemistry and **University Research Fellowship**, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India for financial assistance throughout the course of this Ph.D. work. I would like to thanks **GUJCOST**, **GSBTM**, **UGC-DAE** and **DST-SERB** research projects for financial supports for analysis.

I am indebted to **Prof. Dinesh Kumar**, V.C. Nominee, Subject Expert, Central University of Gujarat, India, for his valuable technical suggestions, motivation and assistance in keeping my progress on schedule. Other Members from my Doctoral Research Committee, **Prof. H.R Kataria** (Chairperson), **Prof. A.V. Bedekar** (Co-Chairperson), **Dr. Sonal Thakore** (Convener), **Prof. A. K Prajapati** (Member), **Dr. Amar Ballabh** (Member) and **Dr. Arpita Desai** (Member) are thanked for their interest and valuable insightful comments on my research.

The editors and reviewers of the journals in which my three research articles are published are thanked for the constructive comments improving the quality of the manuscripts and this thesis.

I am very grateful to DST-FIST, Department of Chemistry, Faculty of Science, The Maharaja Sayajirao University of Baroda for NMR instrumentation facility. I am grateful to the research scholars of departmental instrumentation committee who extended their help and carrying out various analytical characterization NMR, FTIR, Florescence spectroscopy and TGA analysis.

I would like to extend my sincere thanks to Sophisticated Analytical Instrument Facility, IIT Bombay and IIT Madras for HR-TEM, FE-SEM, EDAX, ICP and VSM analysis respectively. I am also thankful to the Sophisticated Analytical Instrument Facility, Central University of Punjab for 2D-NMR analysis and Central Instrumentation Facility, IIT Gandhinagar FE-SEM, PXRD and Circular Dichroism analysis. I thank CSIR-CLRI, Chennai for AFM analysis. I am thankful to MNIT-Jaipur and UGC-DAE, Indore, for XPS, DLS, Zeta potential and XPS analysis, respectively.

I am thankful to **Mrs. Revati Ganeshnan**, Department of Chemistry, The Maharaja Sayajirao University of Baroda, Vadodara, for her constant help throughout this tenure. I am sincerely thankful to all teaching and non-teaching staff of the department.

Many thanks and appreciation to my former and present labmates for their friendship, valuable support, technical discussions and cooperation throughout my Ph.D. journey.

I would like to extend my sincere thanks to **Dr. Manita Das,** for her endless support, wisest advices, and most memorable times from the initial days of my Ph.D. Special thanks also go to **Dr. Pratik Nariya** and **Dr. Monika Yadav.** Thanks to all of them from the bottom of my heart for taking care, not like junior, but as little sister. I am grateful to my juniors **Mr. Harshil Thakkar, Mr. Monark Bhatt, Ms. Twara Kikani, Mr. Miraj Patel** and **Ms. Shraddhanjali Samal,** to make me feel so significant. I realized that we are not only bounded professionally, but we have a good friendship relation. I am blessed to have received such amazing people as my seniors and juniors, who are responsible for the healthy and fun-filled lab environment. Much regards from my side to each one of them for always being my side in my Ups and downs. The fun and picnics arranged by juniors and the lab celebrations will be missed.

I would like to acknowledge the dissertation students **Ms. Anisha**, **Mr. Nabi**, **Mr. Dilraj**, Department of Chemistry, and **Mr. Manoj**, Department of Biotechnology, The Maharaja Sayajirao University of Baroda, Vadodara, for their help in experimental work during my different ongoing research works in Ph.D.

I want to sincerely thank, **Dr. Rajesh Singh**, Department of Biochemistry, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara, for helping with fluorescence microscopy at their instrumental facility.

The contribution of my family their support and encouragement in my journey was worth more than I can express in words on paper. I will forever be indebted to my beloved grandfather Flying Officer Lt. Rajnarayan Shukla and Grandmother Kamla devi for their belief in me and whatever they did for the whole family because of them we achieved our dreams. Their wisdom has enriched my world.

I would like to express my deepest gratitude towards my wonderful parents who are pillars of my strength. I would like to thank, my father, **Mr. Shyambabu Shukla** for helping me understand what I was and am capable of. For giving me the strength required to follow my dreams and potential to achieve my goals. There were moments when I gave up, thanks for cheering me up, helping in taking crucial decisions and supporting me in every possible way, be it mental, emotional, or financial.

Next, I would like to thank my mother, Mrs. Poonam Shukla, without her contribution nothing could be possible. She has always been committed and helpful in every possible way. Her warm words and belief in me gave me immense courage and confidence to go ahead in my journey. I am thankful to all my family members, especially Mr. Rambabu Shukla and Mrs. Chhaya Shukla, Mrs. Archana Tripathi for being supportive and taking pride and celebrating smallest of my achievements.

Siblings, together as friends, ready to face whatever life sends, holding hands tightly. I am blessed to have so many wonderful siblings in my life. I thank **Rinky**, **Sahil**, **Shreya**, **Jitesh**, **Yuvraj**, **Abhiraj**, **Shlok**, **and Saumya** who have always been there in my thick and thin.

I am really grateful to my school teachers who for their valuable contribution in my achievements.

I am grateful to everyone who knowingly or unknowingly helped and supported me during the journey of research work. I don't think it would have been possible to achieve the goals and make this journey a lifetime achievement without each and every one of your efforts.

## <u>Falguni Shukla</u>