Acknowledgement

The work presented in this thesis would not have been possible without my close association with many people who were always there when I needed them the most. I take this opportunity to acknowledge them and extend my sincere gratitude for helping me make this Ph.D. thesis a possibility.

I would like to start with the person who made the biggest difference in my life, my mentor, Dr. Murali Sastry. He has been there, in front of my eyes for last three and a half years, motivating and inspiring every bit of me towards new possibilities in life. He has been a living role model to me, taking up new challenges every day, tackling them with all his grit and determination and always thriving to come out victorious. It’s his vigor and hunger to perform in adverse situation, which has inspired me to thrive for excellence and nothing less. During my initial days with the group, I was apprehensive about my decision to join an alien field, where things were new to me. Dr. Sastry came to my rescue with his intelligent ideas, thought provoking discussions and comprehensive understanding to help me sail through the initial fumbling. His attitude of living every moment as it comes, making serendipitous observation and converting them to new possibilities, correlating ideas and understanding the obvious has helped me come a long way and will always guide me in future. He made me realized what I had only heard, “When the going gets tough, the tough get going”. I will never find words to tell what I owe to him, and if I start doing it, I would not know where to stop...thanks for everything Sir...to me, professionally, you are “perfection personified”.

My special words of thanks should also go to my research guide, Dr. Mala Rao, for always being so kind, helpful and motivating. She has taught me another aspect of life, that, “goodness can never be defied and good human beings can never be denied”. She has always been there for me with her motherly hand whenever I needed it the most. Her constant guidance, cooperation and support has always kept me going ahead. I owe a lot of gratitude to her for always being there for me and I feel privileged to be associated with a person like her during my life.

I express my heart-felt gratitude to Dr. Absar Ahmad for his constant motivation and support during the course of my thesis. I enjoyed the personal discussion with him and the time I spent with him during festive seasons. My sincere thanks to Dr. B.L.V. Prasad for being with me as an elderly figure through out. His scientific inputs, personal helps and friendly nature has always made me feel at ease with him and I could always look back on him for any support during my course of Ph.D. I also gratefully acknowledge Dr. Satish Ogale for his constant advises, friendly nature and elderly support, which made a lot of difference to me. The constant motivation and support from Mrs. Suguna Adhyanthaya and Dr. Pankaj Poddar is also gratefully acknowledged.

I would like to acknowledge all the teachers I learnt from since my childhood, I would not have been here without their guidance, blessing and support. My special thanks to Dr. Sitaramam, Department of Biotechnology, University of Pune, for being another role model for me. I feel privileged to be his student once, a feeling that every student of his will second.
I extend my sincere word of thanks to Mrs. Renu Pasricha, who has always been there, more as a friend than a scientist. I would never be able to pay back the love and affection showered upon her. The work done with her as a co-worker has taught me how a person can succeed in achieving what seems impossible to begin with...thanks you Mam for everything. I would also like to extend my love to Kanika and Aneesh, her kids, who have been so close to me and have helped me revive the child hidden in me.

My acknowledgement will never be complete without the special mention of my lab seniors who have taught me the lab culture and have lived by example to make me understand the hard facts of life. I would like to acknowledge Dr. Anand Gole, Dr. Ashvani Kumar, Dr. Debabrata, Dr. Sumant, Dr. Anita Dr. Senthil, Dr. Ankamwar, Kannan and Shankar for all their support and motivation during the initial days of my stay in the lab. My special words of gratitude to Kannan and Shankar for all their personal and professional help that they have extended to me throughout.

My heartfelt thanks to my fellow labmates, Hrushikesh, Ambarish, Tanushree, Atul, Vipul, Sourabh, Minakshi, Prathap, Deepti, Sanjiv, Imran, Anil, Priyanka, Virginia, Umesh, Sudarshan, Baisakhi and Ramaya for always being there and bearing with me the good and bad times during my wonderful days of Ph.D. If I have missed out a name from the bunch of guys that we were together during all these days, it is on purpose. I would like to acknowledge Akhilesh and Vinod separately for being a friend before a labmate. Our association goes a long way since days of post graduation and they have been with me ever since then as a friend, a companion, a roommate and lab mate. Thank you dear for being with me in ups and downs of life during last 6 years. I also acknowledge my roommate of 2 years and friend, Rasesh Parikh, for keeping a healthy atmosphere and bearing with me all these days. The discussion and suggestions from him were always valuable to me. My special thanks to Sourabh, Manasi, Prathap and Deepti for correcting my thesis chapters on short notices. I would like to thank my other friends from NCL who have been a source of moral support to me and have extended their helping hands without fail. I would also like to thank all my seniors and juniors from Department of biotechnology, University of Pune, for all the love that they have showered upon me. I could not have asked for more than what I got from them.

I would like to acknowledge my other friends for their moral support and motivation, which drives me to give my best. Rajendra, Raghvendra, Awadesh, Vijay, Pradeep, Sanjay, Umesh, Kishore, Sanjeev, Manish, Himanshu, Nitin...the list is endless...thanks to one and all. My special gratitude to Ankur and Sushanth for being with me in thicks and thins of life, I find myself lucky to have friends like them in my life.

I would like to thank Ravi Shukla and Dr. R.R. Bhonde for their valuable support and collaboration in shaping up this thesis in its present form. I don't imagine any better collaboration than what I had with them. My special thanks to Ravi for his constant support and brotherly affection during this course of time.
I am grateful to many people in the Center for Materials Characterization, NCL who have assisted me in the course of this work. My sincere thanks to Dr. S. R. Sainkar, Dr. M. Bhadbhade, Mrs. R. Pasricha, Mr. A. B. Gaikwad, Dr. Patil and Dr. A. B. Mandale for making the facilities available during the research work. I would also like to acknowledge Minakshi, Manasi and Sanjay for their assistance with AFM measurements.

During the course of my work, I had the pleasure of working with several project students, Vijay, Kapil, Anubhav, Abhijeet and Shantesh. Their assistance during the presented work is gratefully acknowledged.

My thanks to the staff of Physical Chemistry division for their innumerable help. A special word of gratefulness to Mr. Deepak and Mr. Punekar who have gone out of way to help me with several official matters.

I am grateful to Dr. S. Sivaram, Director NCL, and Dr. S. Pal, Head, Physical Chemistry Division, NCL for giving me an opportunity to work in this institute and making the facilities available for carrying out research.

I acknowledge the Council of Scientific and Industrial Research (CSIR), Government of India for providing me with the necessary funding and fellowship to pursue research at NCL.

I thank the Almighty for giving me the strength and patience to work through all these years so that today I can stand proud with my head held high.

Finally, I would like to acknowledge the people who mean world to me, my parents, uncle-aunty, my brothers and sisters. I extend my respect to my parents, my paternal and maternal grand parents and all elders to me in the family. I don’t imagine a life without their love and blessings. Thank you mom, dad, uncle and aunty for showing faith in me and giving me liberty to choose what I desired. I consider myself the luckiest in the world to have such a supportive family, standing behind me with their love and support.

Amit Singh.