Acknowledgement

In the over five years of my Ph.D career I have been supported and assisted by a large number of people. Foremost, I owe my heart full thanks to my supervisor, Prof. Nandiraju V.S Rao, for prodigious support and guidance, his enthusiasm and wealth of fascinating problem is inspiring. His creativity and ideas has motivated me for all of the work in this thesis. I always enjoy finding his door open for our result and discussion. His curiosity and kindness inspire a lab environment that encourages creativity and cooperation. He is an invaluable teacher and researchers.

I benefited greatly from my interaction with Dr. C.R Bhattacharjee, from him I learned a great deal about inorganic and coordination properties of the metals, which helped me in an immense way to understand the bonding nature of some of my target compounds. I am also thankful to Prof. M.R Islam for his valuable suggestions and advice. I am indebted to Dr. S.B Paul for his suggestions in the communication of chemistry to general people. I am indebted to Dr. Poritosh Mondal, Dr. Debasish Sengupta and Dr. Sk. Jasimuddin for sharing their ideas and experience with me. I am also grateful to Prof. T.R Rao, BHU for providing the NMR spectra. I like to acknowledge prof. N.A Clark, Prof. I.I Smalyukh and Yongqiang Shen, University of Colorado, U.S.A for providing me X-ray, FCPM, and AFM facilities.

Very little liquid crystal research would be accomplished without the expertise idea and support of my seniors. I express my sincere gratitude to Dr. Manoj Kr. Paul, who had introduced me to different type liquid crystalline phases and taught me how to identify them by looking through the polarizing microscope. I am thankful to Dr. Sudip Choudhury, Dr. Zia Uddin Mazumdar and Dr. Subhas Debnath for their help at different stages of the work.

Of course nothing will function properly in our lab without our cooperative and supportive technical staff and lab attendant, I specially acknowledge to Mr. P. R Ramesh, Mr. S. Bhattacharjee, and Mr. B. Nath, Md. J. A. Borbhuiya for their help and support, when it needed most. I am also thankful to office staff Md. Jamil Borghuiya for his cooperation.
Certainly this work would not be accomplished without the support and collaboration of my friends R. Deb, R.K. Nath, and G. Das. We formed a tight-knit community during and beyond the lab hours. Their companionship and enthusiasm for chemistry not only gave me motivation to do quality work but also made working in the laboratory much more pleasant. I also like to thank Mr. R. Deb, Mr. N. Chakraborty, Mr. A. R. Laskar, Mr. V. Gude, Miss D. D. Sarkar, Mrs. L. Chakraborty, Miss. G. Kalita, and Miss. K. Upadhyay, for their help and respect. Apart from the academic support there has been lots of emotional support behind the successfully completion of the thesis. I obliged to Mrs. Anantha Lakhmi for her motherly attitude, care and affection towards me. I have been gifted by four sisters, Miss. Shilpi Das, Mrs. Tupshi Choudhury, Miss. Sonali Dutta, and Miss. Rupali Dutta. The love and emotional attachment with them helped me to fight against any odd in my life during the Ph. D course. I am also thankful to my brothers Mr. Tridip Dutta Choudhury, Mr. Trithankar Dutta Choudhury and Mr. Subhashis Das for their help and support.

God creates parents because he can’t reply to everyone’s request every time. My parents make me what I am with their endless sacrifices. I owe my deep sense of love and respect to my father Mr. Trailokya Dutta Choudhury and mother Mrs. Chhanda Dutta Choudhury for supportive role at each and every stage of my life. Last but not the least I would like to acknowledge those who are directly or indirectly involved in the completion of thesis.

I also like to acknowledge the funding agency DRDO, DAE (India) and I2CAM, NSF (U.S.A) for the financial support during my Ph.D. work in India and U.S.A.