Acknowledgements

In the journey of last five years many people have contributed significantly and helped me to reach this level. This thesis will be incomplete without acknowledging them. First of all, I would like to thank my thesis supervisor and co-guide, Dr. B. L. V. Prasad and Dr. Sayam Sen Gupta, Scientists, National Chemical Laboratory, Pune respectively. Their dedication to do noble science, logical way of thinking has gained my immense respect. Numerous discussions with them helped me understand science in a better way. During the course of this thesis, I gained constant support and constructive criticism. I will be highly benefitted by their scientific and non-scientific lessons. Their high degree of collaborative work helped me to understand different lab ethics and work in different lab environments. I salute them for their ethics and desire to perform high quality research. I will be highly thankful to the Almighty if I gained some of their qualities in me to do science for my entire life. Last but not least, the freedom to do science I got from them for the last five years really helped me to prepare this thesis works. I believe that the essential habits they cultivated in me such as attending seminars, group meetings, yearly resolutions and planning will give me the confidence to start an independent scientific career.

I would also like to thank my collaborator Dr. Guruswamy Kumaraswamy, Scientist, National chemical Laboratory, Pune for his valuable comments and suggestions. I learned worthy scientific lessons after discussing many times with him. I like to take opportunity to thank Dr. Srinivas Hotha, Scientist, IISEER-Pune to support me with some of my experiments during initial days of my Ph.D. He was ever ready to clear doubts, however trivial they were. Special thanks go to Dr. C. S. Gopinath for his help and scientific discussions regarding XPS. It was my pleasure to work with people of such high quality with better scientific knowledge.

I would like to thank the Council of Scientific and Industrial Research (CSIR) for the award of research fellowship. I thank DST, New Delhi for giving me financial support for attending international conference. I am thankful to Dr. S. Pal, Director and Ex-Head of the Physical and Material Chemistry Department, Dr. S. Sivaram, Ex-Director, Dr. V. V.Ranade, Deputy Director, Head of the Department, Chemical Engineering and Processing Division and Dr. B. D. Kulkarni, Ex-Deputy Director, National Chemical Laboratory to carry out my research work and extending all possible infrastructural facilities for completion of my research work. I take this opportunity to thank Dr. Anil Kumar, Chairman, Physical and Material Chemistry Division for always being supportive. I thank all scientists of the physical and material chemistry division for being very supportive. I also acknowledge Mr. R. Gholap, Mr. Ketan, Mr. Naren, Mr.
Anal, Mr. Pandiraj and Mr. Pankaj from Centre for Materials Characterization for their help in characterizations with NMR, SEM and TEM.

It was my pleasure to work with Dr. Kamendra Sharma and Dr. Pratap S Chandran during my Ph.D. I learned many experimental techniques and scientific skills which helped me to construct my work. Numerous discussions with them provided me to learn many aspects of life. I thank all my colleagues and lab-mates (past and present) for their helpful and cheerful attitude that had made my working atmosphere very easy and enjoyable. I thank all of my senior lab-mates in Dr. Prasad’s Group; Dr. Vijay, Dr. Pratap Chandran, Dr. Sanjay Singh, Dr. Deepthi, Dr. Manasi, Dr. Virginia, Dr. Priyanka, Dr. Satabdi for being very supportive during my work, I enjoyed a lot to work with other labmates, Vilas, Ravi, Balanagulu, Pushpanjali, Jhumur, Prabhu, Pravin, Arun, Poulomi for their presence in lab and make healthy fun and support during work. It was my pleasure to work with all of my labmates in Sayam Sir’s Lab, Dr. Malvi, Dr. Mrityunjoy, Debasis, Dr. Basab, Chaka, Sushma, Munmun, Soumen, Neha, Vinita, Kundan, Santanu and Hasan for their support during my stay in the lab. My special heartful thanks and best wishes goes to Sushma and Pravin for helping me during my research work. I would also like to thank some of my senior lab-mates Dr. Manasi Kasture, Dr. Bharmana Malvi, Dr. Bibhas Ranjan Sarkar, Dr. Satabdi Porel Mukherjee for being affectionate about me. Here I would like to mention one name who was my labmate and my dear brother, Late Agnimitra Banerjee. I learned lots about life from him and spending time together was really enjoyable. There is lots of empty space for you in my heart. Agni, I miss you dear, stay well wherever you are. I would like to acknowledge the friendship of Debasis (DD), Sujitda, Pati, Anupam, Subhodeep (dosu), Prithvi, Arijit, Saikat, Roopadevi, and many more in NCL, who made my stay enjoyable. It was my great pleasure to know and communicate with such many persons of high dignity. I hope the lessons will help me to construct my personal, professional and political life in a better way. I would also like to acknowledge the financial support of Prof. Enoki and his group in Tokyo Institute of Technology during my visit in Tokyo.

This thesis will be incomplete without the blessings of my loving parents. They have always been there for me. Without their support and encouragement I could not come across a long distance. They showed me a dream from my childhood days and I hope to fulfill little bit of that. I wish I will get such parents in each of my rebirths, if there is any. I am grateful to my grandmother for giving me enormous blessings. Finally, I will like to thank Google and Microsoft Word for helping me to search literature and correcting my English during paper and thesis writing.

Anal