First and foremost, I thank my research supervisor Dr. Prasenjit Sen for being such a wonderful person and researcher. I get mesmerized by the way he thinks about problems and then figures out the possible solutions. He definitely has been a source of inspiration for me. One has a lot of scope to learn while working with him, by merely observing the approach he takes in each and every situation.

I owe to my collaborators for the kind support they have provided during the course of this research work. I am obliged to CIF, School of Environmental Sciences, JNU for providing the XRD facility. It is my privilege to thank Dr. S. M. Shivaprasad, NPL, New Delhi for his generous help extended to me during the XPS characterization. It is my great pleasure to thank Mr. Fouran Singh for his friendly cooperation during my visits to NSC, New Delhi for FTIR and PL characterization. I am thankful to Dr. S. Ghosh for allowing me to use the UV-Visible spectrophotometer. USIC, JNU and glass blowing section, SLS, JNU have been quite helpful for the various instrumentation related jobs. The discussions with Dr. Kamal have been fruitful for XRD studies.

I am thankful to Prof. H. B. Bohidar and Dr. D. K. Avasthi, NSC for providing their valuable suggestions as the members of doctoral committee. It delights me to thank Prof. A. K. Rastogi, Prof. S. Puri, Dr. S. S. N. Murthy and Dr. S. Patnaik and the entire SPS faculty for their caring attitude towards me.

The faculty, office staff and students in the SPS are very forthcoming whenever one requires any kind of help. I sincerely thank them all for being so helpful to me. I am highly indebted to the JNU, New Delhi for providing me the facilities and great environment which made my stay in this extremely beautiful campus a life long memorable experience.

I duly acknowledge the Council of Scientific and Industrial Research, India for providing me the financial assistance.
I thank my lab mates for their extraordinarily cooperative attitude to me especially during the writing of this thesis. I thank Lamichhane and Jamil for their caring behaviour towards me throughout my research. Life would have been definitely mundane without the company of Niladri, Shahin, Khurram, Vandana, Anjana, Kaushik, Gurpreet, Mohanty, Indrajit, Shekhar, Somak, Lokendra, Amitabh, Pramod, Amarnath, Jainendra and many other fellow students in the department. From outside SPS/JNU; Subodh, Dheeraj, Himani, Dr. Yatendra and Anjana (NSC) are few of the friends I remember at the moment. It has been an enjoyable exercise to work with the project trainees Vikas and Manoj.

I believe that I could face the variety of challenges during the research work only because of the blessings, love and support provided to me by my family. I take this opportunity to express my gratitude to all of my family members and relatives.

It is beyond my capacity to thank Jitendra jijaji, Rachana didi and my beloved brother Harshendu for their unflinching love and encouragement. My niece Shubhi has been a source of emotional strength for me. Her adorable smile, chat and acts have lifted my mood even in the toughest times. At last but most importantly I pay the best regards to my mother. Thankyou very much mother for each and every thing you do for me without ever caring about your own happiness.