Acknowledgements

At first, I would like to express my heartfelt gratitude to my revered supervisor Dr. Akhilesh Kumar Singh for his invaluable guidance, suggestions and motivations during my Ph.D. work. He provided me the freedom for working independently and choosing problems of my interest which made me confident as a researcher. His enthusiasm, patience, encouragement and noble behaviour made me able to continue my research work in the difficult moments of my life.

I would like express my gratitude to the faculty members of the school, Prof. Dhananjai Pandey, Prof. Rajiv Prakash (Coordinator, School of Materials Science and Technolgy, IIT (BHU)), Prof. Pralay Maiti, Dr. (Mrs.) Chandana Rath, Dr. Chandan Upadhyay and Dr. Bhola Nath Pal for their encouragement, suggestions and support during my Ph.D. work.

I heartily acknowledge Dr. S. K. Mishra (BARC), Dr. P. S. R. Krishna (BARC), Mr. Sher Singh Meena (BARC), Dr. Satyendra Singh (JNU) and Mr. Neeraj Piplani (Marine India) for their unconditional help and valuable experimental facility extended during my research work.

I would also like to acknowledge my seniors, Dr. S. P. Singh, Dr. S. Tripathi, Dr. A. Singh, Dr. S. Bhattacharjee, Mr. J. P. Patel, Dr. V. K. Tiwari, Dr. J. P. Yadav, Dr. S. Mohan, Dr. L. Joshi and Dr. B. Gupta for their decent support and suggestions.

I am also thankful to my friends and colleagues Dr. R. S. Solanki, Dr. A. Kumar, Mr. Pankaj Mohanty, Mr. Vinay Pratap Singh, Dr. R. Pandey, Mr. Karun Jana, Mr. Uma Shankar, Mr. Dinesh Patel, Mr. Pappu Kumar, Mr. Ashutosh Upadhyay, Mr. Gopal Ji, Mr. Sandeep Gupta, Mr. Arun Kumar, Mr. Ashish Tiwari and Ms. Jyoti Sharma. I would like to thank my juniors

Narendra, Chandrabhal, Dinesh, Durgesh, Jagadish, Arun, Sukdev, Shushil, Keshav, Pramod, Senapati, Arpan, Bharati, Priyanka, Madhu, Preeti and Pinky for their support and cooperation during experimental work.

I specially thank to my beloved mother for her patience to bear my long absence from home during my study. I had lost my beloved father during my Ph.D. course. He always motivated me for higher education. I would like to express my sincere gratitude to my revered father for his efficient guidance and blessings. I am thankful to my wife Sangeeta for her patience and invaluable support. I would like to salute Mahamana Pandit Mohan Malviya Ji for establishing this capital of knowledge (BHU). I would like to express my heartfelt gratitude to all the technical and non-technical staff of the school for their support and help in experimental and official works.

I acknowledge to University Grants commission (UGC), India for financial assistance as Junior Research Fellow (JRF) and Senior Research Fellow (SRF). IIT (BHU) is also acknowledged for financial assistance. I am also thankful to ICDD (USA) for the financial support as Ludo Frevel Scholarship Award to persue crystallography oriented research.

Finally, I am grateful to lord Shiva and Maa Annapurna for providing me potential to face all the challenges in life.

(Rishikesh Pandey)