Acknowledgements

Several people have contributed in this research work, and it gives me an immense pleasure to use this opportunity to extend my gratitude to them. This research work would have never been fruitful without their constant encouragement and support. I am fortunate enough to learn something from every one of them and I am really grateful for all the time each one of them has shared with me.

I would use this moment to thank my supervisor, Dr. Ambesh Dixit, for his valuable guidance and supervision and perseverance throughout my Ph.D. He always provided me freedom in research work and encouraged me when I felt frustrated. He provided many opportunities with other research groups in collaboration. His optimism and enthusiasm have shaped me to handle difficult situation in my professional and personal life. This dissertation would never have been completed without his help and guidance.

I would extend my gratitude to our excellent collaborators: Mr. Akhilesh Pandey for letting us use various material characterization facilities at solid state physics laboratory Delhi; Dr. Shree Prakash Tiwari for allowing us to use his laboratory for RRAM device characterization. I would also like to thank Dr. Mau Pal and Dr. Francisco Javier Flores Ruiz form IFUAP, BUAP, Mexico for their help in characterization of my samples during my visit to Mexico.

I am also thankful to my thesis committee members Dr. Ashutosh Kumar Alok, Dr. Laltu Chandra and Dr. Shree Prakash Tiwari for their valuable discussions on the topic, their positive criticism and constant encouragement which motivated me to complete this work.

I would also like to thank my colleagues in our laboratory, Dr. Anurag Sahu, Dr. Belal Usmani, Dr. Goutam Kumar Gupta, Dr. Lokesh Saini, Dr. Rohitash Kumar, Mr. Rajesh Kumar and Mr. Rajneesh Chaurasiya for maintaining such a friendly environment in the lab. I would also extend my acknowledgement towards Mr. Ishan Varun, my friends and juniors in IIT Jodhpur who has made this journey wonderful.

I, further, thank all the people who have directly or indirectly guided and supported me with their valuable suggestions and inputs which have been proven to be an important step towards completion of my Ph.D.

Further, I thank Ministry of Human Resource Development (MHRD), Government of India for M.Tech and Ph.D fellowship during my journey in IIT Jodhpur. I offer my humble gratitude to Department of Science and Technology (DST) for providing funding during my visit to Mexico through project DST/INT/Mexico/P-02/2016 and IIT Jodhpur for making me a part of its wonderful legacy.

Finally I would offer my prayers to god who has blessed me on every step of my life. I thank my paternal family and my in-laws for their love and support and encouraging me to dare and dream. This section will be incomplete without thanking my husband, Mr. Sheetanshu Tiwari, whose love and trust in me acted as pillar of strength and motivated me to achieve more. I hope that I would continue making you all proud.

Chandni Kumari