

## *Acknowledgments*

*The journey of a Ph.D. is an aspiration, admirable and enduring one. It is an integrating experience with myriad learnings and ambitious responsibilities. The milestone of life is achieved. This is a gratification moment to express my thanks to special persons whose loyal support, concern, love, and blessings helped me throughout or in some phases of the journey.*

*I am grateful to the Almighty of God for good prosperity and strength throughout this time-span so that I can nobly accomplish the work.*

*First and foremost, I would like to express my deep and sincere gratitude to my Ph.D. guide **Prof. N. L. Singh**, Department of Physics, The M. S. University of Baroda, Vadodara. His consistent, intellectual and well-experienced supervision is irreplaceable. This achievement is adorable only because of his pioneer and sole inspiration, meticulous scrutiny, and scientific approach. His indelible conviction will eternally illuminate the path of my life. Many thanks.*

*I also extend my sincere thanks to Prof. H. R. Kataria, Dean, Faculty of Science, The M. S. University of Baroda, Vadodara for his cooperation and support. I am also obliged to The Maharaja Sayajirao University of Baroda, Vadodara for providing me infrastructure and research facilities. I am thankful to DST-PURSE program for providing fellowship.*

*I also convey my thanks with equal respect to Prof. S. Mukherjee, Head of the Department for his kind support towards the completion of this work. My sincere thanks to Prof. P. K. Mehta for constructive suggestions and help. I am grateful to Prof. M. B. Sureshkumar, Dr. D. G. Rathod, Prof. M. Srinivas, and all other faculty members for their suggestions and moral support. I would also like to acknowledge Mr. Parikhbhai and other non-teaching staff members for their prompt assist at several phases of this work.*

*I am grateful to Dr. Sundeep Chopra, IUAC, New Delhi, for being friendly and cooperative. Many thanks to my Coordinator, Dr. Fouran Singh, IUAC, New Delhi for his keen interest, generous help, and guidance in carrying out the experiments. I am thankful to the entire group of Material Science Division for providing the irradiation facility. I gratefully acknowledge Dr. D. K. Avasthi, Dr. P. K. Kulriya, Dr. G. B. V. S. Lakshmi, Ms. I. Sulania for different characterizations and productive discussions during the various stages of this work. Financial*

*assistance from IUAC is thankfully acknowledged. I would like to thanks Dr. Mukesh Rawat and Dr. Madhu Lata Bharti for their help and cooperation during my stay at IUAC, New Delhi.*

*My special thanks to Prof. V. A. Rana, Department of Physics, School of Sciences, Gujarat University, and Dr. Mukesh Ranjan, FCIPT, Gandhinagar, Gujarat for providing laboratory facilities. I would like to thank Dr. Rajesh Kumar, Assistant Professor of Physics, University School of Basic and Applied Sciences, Guru Gobind Singh Indraprastha University, New Delhi for his help and suggestions.*

*I am grateful to CA Hardik K. Patel for being a noble friend and his family for continuous moral support during the struggling time. I am also thankful to Dr. Nimesh P. Patel, Dr. Rajnikant Makwana, and Mr. Vishwnath Verma for accompanying me at the department and their kind help. My special gratitude goes to my hostel mates, Mr. Nutan Patel, Mr. Upendra Patel, Mr. Dharmesh Patel, Mr. Manoj Patel, Mr. Rakesh Patel, Mr. Tejash Shah, Mr. Sanket Thakor, and Mr. Ravi Patel for their pleasant friendship.*

*I also extend my profound gratitude to my labmates, especially, Dr. Chaitali Gavade, Ms. Shilpa Bhavsar, Mr. Mayur Mehta, Mr. Ratan Kumar Singh, Mrs. Asha Panghal, Mr. Rakesh Chauhan, Mrs. Chhavi Joshi, Ms. Deepa Singh. I am thankful to the research scholars, Department of Physics for their help and cooperation.*

*I would like to acknowledge all the teachers, since my childhood for their guidance, love, and blessings. I am also grateful to all my relatives for motivation.*

*Transcending all this, I owe everything to my grandparents for tons of blessings and care. Sincere regards to my parents for the encouragement throughout my academic career and comfort. I equally convey my respect to parent-in-law for their moral support and encouragement. I am grateful to my brother and brother-in-law. The inspiration, mean and stepping stone behind this success story is my soul mate, my wife, Krupa. Her unbounded affection, love, belief, emotional and financial backing made it possible to accomplish this task. I express my deepest appreciation and love to my daughter Anushree. I am feeling positive vibrations, and delightful meditation to have her grace, joy, fun, and chat in my life.*

*Gnansagar B. Patel*