ACKNOWLEDGEMENTS

I humbly prostrate myself before the Almighty for his grace and abundant blessings which enabled me to complete this work successfully.

My first and foremost offering of thanks must go to my supervisor Prof. Surinder Singh, who has been instrumental in ensuring my academic, professional, financial, and moral well being ever since. His perpetual energy and enthusiasm in research had motivated all his advisees, including me. He gave me the freedom to pursue my research interests and was always available for any help or discussion. Throughout my thesis period, he provided encouragement, sound advice, excellent teaching, good company, and lots of superior ideas which turned out to be an exciting and rewarding learning experience.

It gives me immense pleasure to express my deepest sense of gratitude to my supervisors Prof. Rajeev Mehta, Professor, Thapar University, Patiala, for their invaluable guidance, motivation, constant inspiration and co-operation that enabled me in bringing up this thesis in present elegant form. His deep-rooted knowledge, masterly approach, meticulous attention and timely suggestions have helped me to complete this piece of work. I consider myself lucky to have worked under his able guidance. The opportunity to work with him was a great honor and challenge for me. The thesis became distinctly easier to finish with his friendly helpfulness and confidence in my ability to carry this project through.

I am extremely grateful to Dr. Amit Roy, Director, Inter University Accelerator Centre, New Delhi and Accelerator User Committee for providing me a chance to use beam time facility. It is difficult to overstate my gratitude to my IUAC collaborator, Dr. D. Kanjilal. I have been very fortunate to have the privilege of working with him for his professional guidance to straighten and clarify my ideas, and advising me strategically. Special thanks are due to Dr. Sandeep Chopra for their valuable suggestions and help during my stay and using beam time at IUAC New Delhi. I wish to extend my special thanks to the Pelletron group at IUAC for providing stable beam during the
experiments, without which this experimental work could not have taken the present shape.

I would like to extend my gratitude to IUAC, New Delhi who funded this project for three years. Financial assistance in the form of fellowship provided by Council of Scientific and Industrial Research (CSIR), India is gratefully acknowledged.

I am also grateful to Dr. Ramesh Chandra, Institute Instrumentation Center, IIT Roorkee for providing FESEM facilities.

I owe special thanks to Dr. Atul Khanna, Dr. Ravi Chand, Dr. Lakhwani Singh, Department of Applied Physics, for allowing me to use the experimental facilities in their labs. Thanks are also due to Dr. Fouran Singh, Scientist, IUAC, for his help during the setup and utilization of beam time facility. The gamma irradiation facilities provided by Dr. S.P. Lochab, Scientist, IUAC, New Delhi, are thankfully acknowledged.

I would like to thank Mr. Santokh Singh for his unconditional support and appreciation throughout this work. It is a pleasure to thank all my friends. I offer my sincere thanks to Mrs. Jaskiran Kaur, Mrs. Harmanmeet Kaur, Mrs. Nisha Sharma and Komal. Special thanks to my friends Ms. Shilpa Narang, Ms. Pankil Singla at Thapar University and my hostel friends Shivani for lending me a supporting hand whenever I needed.

My deepest gratitude goes to my family for their unflagging love and support throughout my life; this dissertation is simply impossible without them. I will be forever in debt to my father (S. Kuldeep Singh) for his love, care and the tremendous sacrifices that he has made to ensure that I had an excellent education in spite of all the hardships in their life. I would like thank my brothers Tejinder Singh and Harmanjeet Singh for providing me assistance whenever needed and supported me in all my pursuits.

I am deeply grateful to my soulmate Jaspreet Singh for his endless love and encouragement throughout this entire journey. Without whom I would have struggled to find the inspiration and motivation needed to complete the thesis.

Finally, my greatest regards to the Almighty for bestowing upon me the courage to face the complexities of life and complete this project successfully.
Underneath the undeniably happy occasion of completing my Ph.D. is a deep sadness that my mother, did not live to see me become Dr. Manpreet Kaur. I know how much she would have loved seeing this day come, and it is to her that I dedicate this work.

(Manpreet Kaur)