Acknowledgment

My PhD years at the Department of Physics, Cochin University of science and Technology, Cochin and this thesis has had mentorship from numerous outstanding individuals both from within the university and outside of it. It is to these individuals, that my heartfelt gratitude and thanks go out to, for without their help, this thesis would not have seen possible.

First and foremost I would like to express my deep and sincere gratitude to Professor Dr. M. R Anantharaman, Head of the Department of Physics, Cochin University of Science and Technology, Cochin who has been my supervisor since the beginning of my research career in CUSAT, Cochin. The association with him, which started in the February 2004 as a M.Phil student, and later in August 2005 as a Ph.D student, has transformed me in scientific as well as personal terms. He provided me with many helpful suggestions, important advice and constant encouragement during the course of this work. His understanding, encouraging and personal guidance have provided a good basis for the present thesis. In addition, he was always accessible and willing to help his students with their research. As a result, research life became smooth and rewarding for me.

I am deeply grateful to Dr. Raju V Ramanujan, Associate Professor, School of Materials Science and Engineering, Nanyang Technological University, Singapore for his detailed and constructive comments, and for his important support throughout this work.

I owe my most sincere gratitude to Prof. A K George, Dr. Salim Al-Harthi and Dr. Imad Al-Omari, who gave me the opportunity to work with them in the Department of Physics at Sultan Qaboos University Muscat and gave me untiring help during my difficult moments.

I was delighted to interact with Dr. D. K. Avasthi of IUAC, New Delhi during ion beam irradiation experiments. His insight to Ion-Matter interactions is second to none. Besides, he sets an example of a world-class researcher for his rigor and passion on research.

Special Gratitude goes to Dr. D Sakthikumar, Associate Professor, Bio Nano Electronics Research Centre, Toyo University Japan for electron microscopy measurements and useful discussions.

I am grateful to Dr. P A Joy of NCL Pune, Prof Nickolai Sobolev of University of Aveiro, Portugal and Dr. P Radhakrishnan of CUSAT for their help during the various stages of my work.

I am grateful to all teachers, former head of the departments and non teaching staff of the Physics department, CUSAT for their help during various stages of my work.

I would like to thank my friends and colleagues that I have met in this my home far away from home called CUSAT. All my lab buddies at the Magnetics laboratory made it a convivial place to work. In particular, I would like to thank Vijuha, Veena, vasudevan sir, Narayanan, Reena, Ramkumar, Geetha, Sagar, Jamal Sir, Hysen and Tom Chettan for their friendship and help in the past five years. All other folks, including Malini Chechi, Asha Chechi, Swapna, Mathew Sir, Sanoj, Vinaya, Soumya, Anjali, Rajeev, Shyam, Ratheesh, Prema Teacher, Ajimsha, Anoop, Saji, Jose, Solar, Sreekumar, JK, Kishore, Radhakrishnan, Wilson, Teny Chechi, Beena, Arun, Binu, Rajeev
Tommy, Sajeevettan, Saravanan Chettan and my room mate Arun—Chemistry had inspired me in research and life through our interactions during my days in CUSAT. Thanks. I thank with love and gratitude all my friends in Physics, Chemistry, Hindi, Statistics, Biotechnology, Instrumentation, Photonics and Polymer science Department.

I remember the days in IUAC and I thank my friends Abhilash, Jay, Srinivas, Patel, Misra, Dinesh, Prasad and Kishore for their love and support.

I am also greatly indebted to many teachers in the past: Prof. V K Premnath (St. Thomas College Ranni) and Prof. K A Jacob (St. Thomas College Kozhencherry) for getting me interested in experimental physics and coming to CUSAT.

During the course of this work, at CUSAT (2005 – 2009), I was supported in part by Inter University Accelerator Centre-New Delhi under UFUP 35036. Junior Research Fellowship from UGC and senior research fellowship from CSIR during the period 2008-2009 is gratefully acknowledged. I was also privileged with AG Merit scholarship from Marthoma Syrian church of Malabar during the year 2007.

My deepest gratitude goes to my family for their unflagging love and support throughout my life; this dissertation is simply impossible without them. I am indebted to my father, for his care and love. As a typical father in an Indian family, he worked industriously to support the family and spare no effort to provide the best possible environment for me to grow up and attend school. He never complained in spite of all the hardships in his life. I cannot ask for more from my mother, as she is simply perfect. I have no suitable word that can fully describe her everlasting love to me. I remember her constant support when I encountered difficulties and I remember, most of all, her delicious dishes. My special gratitude is due to my sister and her family for their loving support.

Last but not least, thanks be to God for my life through all tests in the past five years. You have made my life more bountiful. May your name be exalted, honoured, and glorified.

Cochin, India, December 2009

Senoy Thomas