The last few years, which is one of the most happening period in my life have been greatly influenced by many people who have contributed either directly or indirectly to the making of this thesis. Before listing some of them, I would apologize to the persons whose names are not mentioned here. The selection made here is not meant to be valuing and omissions are inevitable due to space minimization.

First of all, I pay my sincere regards to my thesis supervisor Prof. Manabendra Mukherjee for his sincere guidance, inspiration, encouragement and continuous support during my doctoral research endeavour for past few years. A true gentleman and full of enthusiasm, Prof. Mukherjee provided constant support, encouragement and unparalleled flexibility in the laboratory and in choosing the research problem. His intuitive approach towards experimental problems and critical view of the observations has encouraged me in my work. This has also changed my overall scientific thinking and attitude towards the problems. It was a pleasure working with him. Even outside the campus, during beamtimes at Elettra Synchrotron, working alongside him was an invaluable, enjoyable and unforgettable experience.

I would like to extend my thanks to the former Director of our Institute Prof. Bikash Sinha, present Director Prof. Milan K. Sanyal and Prof. P. Chakraborty, Head of Surface Physics Division for providing the necessary facilities for my research work. I am also thankful to Prof. Satyajit Hazra for occasional discussion and advices of UHV related matters. I thank Prof. D. Ghose, Prof. A. Datta, Prof. S. Kundu,
Prof. S. Banerjee, Prof. S. Bhattacharya, Prof. T.K. Chini, Prof. K.S.R. Menon and Prof. S. Bhunia for their kind support and useful suggestions in various ways.

I thankfully acknowledge Mr. Anujit Das, Mr. Susanta Banerjee, Mr. Subir Roy, Mr. Sourik Banerjee and Mr. Mukul Das for their kind help and cooperation in my research work. It is my pleasure to specially acknowledge my friends Shubrangsu-da, Jayanta and Goutam for creating a nice working atmosphere and helping me to figure out solutions for a number of lab-related as well as everyday-life problems. I want to specially acknowledge Shubrangsu-da for his help and support in the laboratory. The times spent in the lab and during the academic trips outside the lab with them will be memorable for me.

It is my pleasure to acknowledge all my senior and junior in this division for creating a nice atmosphere and helping me to figure out a number of small things in everyday life. I am extremely thankful to Sarathi-da, maji-da, Amarjeet-da, Atukur-da, Rupak-da, Shirsendu-da, Smita-di, Mrinal-da, Biswajit-da, Puneet-da, Pabitra, Satya, sanjay, Abhisakh, Safi, Paramita, Nupur, Tanushree, Bishnu for their help and cooperation through all these years. I also take the opportunity to thanks Deba-da, Mishree-di, Debi-da, Indranil-da, Sudeshna-di, Sumana, Ishani, Mala, Manjula, Amaresh, Jayanta (Das), Santanu, Shyamal, Anuradha, Arpan, Swankar, Debasree, Mayukh, Tanmay, Kousik and all other who remained very cooperative during my work in this division. I would also like to thank my Post MSc batchmates Mojammel, Suman, Prasanta, Deep, Manasi, Mukesh, Nilanjana and Debashmita for their help and support during these years.

I will be ever thankful to Mantu-da, Haren-da and Gobardhan-da for the ever refreshing cups of tea that have energized me in times of fatigue.

Apart from my divisional members I would also like to acknowledge Prof. S. Nannarone, of TASC-INFM, Italy and all others who remained very helpful to arrange all kind of hospitalities during my stays in Italy. Sincere thanks also to Ruma-di, Italy for the warm hospitality during my Elettra visit. I will be ever grateful to Prof. Yaw-Wen Yang, Chiahsin and all other in the Yang's Lab for their hospitalities during my stay in NSRRC, Taiwan.
I thankfully acknowledge the Unit on Nano Science and Technology, IACS, Kolkata for the TEM facility and Supriyo Chakraborty and Arunim Paul for their contributions for the TEM measurements. I would like to thank Department of Science and technology(DST), Govt. of India for providing financial support to perform our experiments at various synchrotron laboratories.

I have spent a very good time in SINP hostel and the attitude of the boarders have been very cordial for making ‘the living’ better. I am also thankful to hostel and Institute cooks for providing excellent healthy food.

Finally, I would like to share this moment of happiness with my parents, wife, daughter, and all other family members. Their cheerful faces have motivated me to overcome difficult times. They have rendered enormous support and constant encouragement throughout this long journey. I would like to especially acknowledge my wife Nazira whose support, encouragement, patient, love, and of course sacrifice enabled me to complete this work. Since last few years she is providing a unconditional support and confidence. Without the care and love of these people I could never have completed my work. This thesis mostly owes to them.

Kolkata, August 2012

A. K. M. Maidul Islam