Acknowledgements

First and foremost, I have great pleasure in expressing my profound gratitude to my research supervisor Prof. R. K. Bedi for his inspiring guidance, enthusiastic encouragement and affection shown throughout my research work. I am highly indebted to him for introducing me to the field of thin films solar cells. I shall always cherish the academic freedom that I have enjoyed under his guidance. In spite of his heavy administrative responsibilities and involvement in many academic and research projects, he really spared time for academic interactions with me. I admire his ever active, enthusiastic views and approach on academics and life which imparted in me great source of inspiration and confidence to pursue my research carrier.

My sincere thanks are also due to my Co-Supervisor, Associate Professor, Department of Physics and Centre of Nanotechnology, Indian Institute of technology, Roorkee for his encouragement, support and providing necessary facilities. Special thanks go to Dr. Ramesh Chandra of same institute for his advice and help in completing this research work.

I also express my sincere thanks to Dr. lakhwant Singh, Professor and Head, Department of Physics, Guru Nanak Dev University, Amritsar for providing the necessary facilities. I acknowledge with thank the encouragements, constructive guidance and help provided by Dr. Aman Mahajan of the same department.

I am thankful to Inter University Accelerator Centre (UGC) and Council of Scientific and Industrial Research (CSIR), New Delhi for providing the financial support (fellowship) in form of Project fellowship and Senior Research fellowship, respectively. Thanks are also due to the funding agencies like International Centre of theoretical Physics (ICTP), Trieste, Italy, International Union of Crystallography, Department of Science and Technology New Delhi and Council of Scientific and Industrial Research (CSIR), New Delhi for their travel supports which make it possible to present a part of the research work at conferences held in Italy, China, USA and Poland.

I wish to extend my heartfelt thanks to the office staff for their kind help in dealing with the official requirements and their friendly interactions. I thank all the staff members from laboratory and library for their cooperation and help.

I wish to express my gratitude to many persons with whom I interacted during research work for their valuable suggestions. For this I wish to thank Dr. Ravi Kumar, Inter University Accelerator Centre, New Delhi, Dr. Yuji Ohashi (Neutron beam co-ordinator, Ibaraki Quantum Research center (IQBRC), Japan), Dr. J. Mitchell Guss, President, Asian Crystallographic Association and Dr. Habil Adam Georg Balogh of Institute of Material Science, Darmdtadt.
I would like to thank to all my friends for their encouragements during my stay at Amritsar, Roorkee and Delhi. A few of them are Dr. Sonic Bhatia, Mr. Sukhwinder Singh Brar, Rajan Saini, Kamal Preet Khun Khun, Amandeep Bal, Iqbal Singh Gurpreet Singh, Mandeep Singh, Ramanpreet Kaur, Anshul Sharma, Deepak Kumar, Vishal Baloria, Rohit Sharma, Dr. Praveen Kumar, Dr. Amandeep Singh Bains, Dr. Mohan Singh, Dr. Kamaljeet Singh, Vishal Arora, Rajinder kaundal, Vinod Kumar and Sourbh. My Special Thanks to Dr. Ashwani Kumar, Dr. Ajay Kaushal, Dr. Preetam Singh, Mr. Deepak Teotia. Dr. Manoj Kumar, Dr. Vipin Chawla, Dr. Amit Chawla, Dr Surender Sharma, Dr Shailendra and Dr Dinesh Shukla.

Words are not sufficients to acknowledge, being highly indebted to my parents Mr. and Mrs. K.N Pathak and brother Rakesh Pathak for their juvenile everlasting encouragements blessing and assistance. Their efforts deserve great appreciation for their cooperation, understanding and helping me. I also take the opportunity to thank community of my village Bhaeleth, Sujanpur Tira, HP who has always been a source of inspiration to me. I am also thankful to Mr. Satpal, Senior technical assistant for his help to carry out this work.

Finally and most importantly, I would like to thank almighty for his blessing, an endless source of inspiration for me always and helping creating a cheerful environment for me in completing this research work.

Amritsar.

Dinesh Pathak

Date.