Acknowledgement

It is my proud privilege to thank my supervisors, Prof. Devinder Mehta and Dr. J. S. Shahi. As none other, the duo created enthusiasm and inspired me. Throughout this research, Prof. Devinder Mehta provided valuable advice to potential methodologies for solving problems. He has been a wonderful mentor, incredible advisor, unstoppable and untiring worker defying adversity with unending zeal to solve problems. Dr. J. S. Shahi taught me that there may be simple technical solutions to apparently complex situations so not to leave any stone unturned. The opportunity to work with Prof. G.S.S. Saini, seek his advice and share the Raman spectroscopic facilities was great.

I am thankful to the erstwhile and present Chairpersons, Prof. Devinder Mehta, Department of Physics, for providing me necessary facilities to pursue the research work. I want to thank Dr. Bimal Rai, Prof. S. K. Tripathi, Prof. J. Goswami, Dr. V. Bhatnagar, Prof. Navdeep Goyal and many other teachers of the department that I could not mention by name here. I am thankful to my labmates - Dr. P.S. Pundir, Dr. Samarjit Sihotra, Dr. K. S. Chakkal, Dr. Sanjeev Kumar, Dr. Veena Sharma, Dr. Sunil Kumar, Dr. Muhanand, Dr. Gurjeet Singh and Dr. Surender Kumar, Heena Duggal, Ranjit Singh, Arun Upmanyu, Gurjot Singh and Vipenpal for their sincere help and cooperation. I am grateful to the technical and administrative staff of the department for their timely help.

I am thankful to Ramesh Sharma for occasional feedback, Tejbir Singh and Anoop for their help in WDXRF analysis from SAIF. Further, I would like to thank Principal Dr. B. B. Sharma, Prof. T.D. Saini, Dr. Navjeet Sharma and Dr. Rajive Sharma from my home institute i.e., D.A.V. College, Jalandhar. Finally, I am overwhelmed by my near and dear ones for unconditional support, interest in my work, wellbeing and reminding me what is truly important in life at the time of need. Last but not least, I would like to thank impeccable Almighty for showering his blessings for successful completion of the project, and may you further give us strength, determination and zest to keep on working on problems for the social cause.

Chandigarh

(Atul Bhatta)