Acknowledgement

It is a great pleasure to show my indebtedness to Dr. S.G. Patel who remained for me not only a supervisor but also a real philosopher and a guide. He showed me the path to work in the area of crystal growth and high-pressure characterization. His enlightened approach, keen interest and constant encouragement made it possible for me to complete this work. Words are not enough to express my gratitude towards him. I feel very proud and privilege to be his student and consider myself very lucky to work under his guidance. He is not only the guide of my Ph. D. work but also of my progressive life. I express my sincere gratitude to him for all his valuable suggestions, encouragement, guidance and the trust in me.

I am very much thankful to Prof. A.R. Jani, Head, Department of Physics, for providing me all the facilities for my experimental research work and valuable guidance as and when required with warm feelings.

I am highly grateful to DAE-BRNS, Mumbai and UGC, New Delhi for providing me financial assistance during my Ph.D. work.

It is a matter of great privilege to express sincere feelings towards a great scientist Dr. B.K. Godwal, Head, High Pressure Physics Division, Bhabha Atomic Research Centre (BARC), Mumbai who remained continuous source of inspiration. Dr. V. Vijaykumar, Mrs. Alka Garg and Mrs. Minaxi, Dr. Gautam Mukharji are highly obliged for introducing me to the high pressure DAC work and helped me a lot through their kind support during my visit at BARC, Mumbai. I am also thankful to Dr. H. L. Bhat, Head, Department of Physics, IISc., Bangalore for supporting me by giving permission for reference work at Department of Physics as well as at IISc. Library, Bangalore.

At this stage, I cannot forget my colleagues, Mr. Kaushik Patel and Mehul Dave for their brotherly support and day & night help during the span of last one and half year of this work. I wish to thank them from the bottom of my heart. I wish to record the words of hearty thanks to Dr. Tarun H. Patel for his kind support and suggestions. I am also thankful to my colleagues Mr. Jagdish Prajapati, Mrs. Jyotiben Batra, Mr. Jayeshbhai Gandhi and my senior colleagues Dr. Neha Shelat, Dr. Madhavi Dave and Ms. Dhairya Dholakiya for their kind and generous co-operation and inspiration during the initial start of the research work.
I wish to record my wholehearted thanks to Dr. M. P. Deshpande, Dr. G.K. Solanki and Dr. A. T. Oza for their kind help. They have provided me deep knowledge related to the research work during the span of this work.

I am very much thankful to Dr. K. D. Patel and Dr. V.M. Pathak for their valuable suggestions during the crystal growth and characterization. I am also thankful to Prof. S. K. Arora for their valuable guidance about the microstructural analysis of the as-grown crystals.

My gratitude to Dr. H.D. Hochheimer, Professor of Physics, Colorado State University, Fort Collins, USA for his valuable guidance and fruitful discussion about high pressure research work during his visit to Vallabh Vidyanagar.

I express my deep gratitude and concern for the non-teaching staff members of the Department of the physics.- Navinbhai, Harshadbhai, Harshadbhai, Rajubhai and Bhavinbhai for their kind support and co-operation during my research work.

I am also grateful to the staff of VSIC: - especially Late Shri Raokaka, Nileshbhai, Deewanbhai, Gorbhai, Patilbhai and SICART members- Gopulbhai and Chetanbhai for their timely and valuable help whenever I needed.

I am very much grateful to my parents. Without their blessings I cannot achieve this academic milestone and reach upto my ambitions. I wish to convey my regards to kindhearted grandmother for showering her blessings. I extend my feeling of thanks to my wife Hetal and loving children Parth and Aditi for expressing their moral and emotional support to me. Their support and faith encouraged me time to time. I am very much thankful to my brothers Rupesh and Chirag who provided me a constant moral support during my work. I also convey thanks to other family members Dineshkumar, Kalyani, Vandana for giving me boost of energy throughout the work.

I am also thankful to all the persons who supported me directly or indirectly throughout the tenure of this work. The most importantly, at the end, I thank the almighty Supreme Soul, whose thoughts keeps me energetic and enthusiastic at every moment in my life.

Rajiv Vaidya