ACKNOWLEDGEMENTS

I am really glad and pleased to submit this thesis. The journey of my research dealt with lots of excitement and adventures. However, success story of my research would be incomplete if I don't mention about lots of "ups and downs" as well as "trials and errors" which I had experienced during my research work. Of course, I cannot forget to thank a few people from the bottom of my heart to make my research journey easy and comfortable by providing throughout a light and lively atmosphere. I would extend my sincere thanks to everyone who helped me directly or indirectly in the long endeavour of Ph.D.

First and foremost I would like to thank the Almighty to provide me the strength and patience to finish my research work successfully inspite of several failures which came in the progress of my research work, in the form of hurdles and obstacles.

Next, I would like to thank my research guide, <u>**Prof. Dinesh K. Kanchan**</u>, who gave me an opportunity and freedom to think and explore independently and provided me the knowledge encircling research as and when I required. He not only guided me professionally but also helped me to find ways out of dilemmas and confusions in my research activities.

I express my deepest gratitude to the former Head of Physics Department, Faculty of Science, The M.S. University of Baroda and the coordinator of DRS Phase-III, **Prof. C.F. Desai**, for providing the laboratory facilities; to the entire Staff of Physics Department, Faculty of Science, The M.S. University of Baroda, especially, **Mrs. Apexa Patel** (Staff : Research & Consultancy Cell) for providing a helpful atmosphere throughout my research work and to The M.S. University of Baroda and Council of Scientific & Industrial Research (CSIR, HRD Group), New Delhi for providing me the financial/official/academic/technical support. I also want to thank the entire staff from Workshop, Faculty of Science, The M.S. University of Baroda, who helped me in providing primary technical facilities required for carrying out my research work.

The voyage of my research, introduced me with **Dr. Dharmesh Kothari**, **Dr. Deepak Kumar** and **Ms. Khushboo Gohel** who not only shared their beautiful ideas and knowledge regarding my research work as and when I required but also actually became my golden friends for lifetime. I am really thankful to each of them as they made my research trip lively and easy.

I also extend my heartiest thanks to my senior colleagues **Dr. Meenakshi Pant**, **Dr. Poonam Sharma** and **Dr. Nirali Gondaliya** and to my present colleagues **Ms. Gargi Dave**, *Mrs. Vaishali Adhwaryu* and *Mr. Maheshwaran* for providing lovely and friendly atmosphere.

I am very grateful to (i) **Dr. Geeta Padate** (Ex. Head, Zoology Department) & **Prof. P.C. Mankodi** (Head, Zoology Department, Faculty of Science, The M.S. University of Baroda) for providing the facility of hot air oven, (ii) **Dr. Kinnari Parekh** (Sr. Research Scientist) & **Dr. Sachin Joshi** (Research Scientist) at Dr. K.C. Patel R & D Centre, Charotar University of Science & Technology (CHARUSAT), Changa, Anand, Gujarat for facilitating the X-Ray Diffraction (XRD) facility of their university, (iii) Dr. Prasanna Ghalsasi (Chemistry Dept., Faculty of Science, The M.S. University of Baroda) for aiding me with the Differential Scanning Calorimetry (DSC) facility (iv) Dr. Vandana Rao (Metallurgical & Materials Engineering Dept., Faculty of Sciencing and Engineering, The M.S. University of Baroda) for availing me the facility of Scanning Electron Microscopy (SEM) and (v) Laboratories of Chemistry Dept., The M.S. University of Baroda for providing me deionized water needed for sample preparation.

Special thanks to **Dr. D.K. Avasthi** (Scientist at Inter-University Accelerator Centre (IUAC), New Delhi) to avail me the swift heavy oxygen ion (O^{7+}) irradiation facilities (not included in the present thesis), helping in carrying out the irradiation of blend specimens for the present research work and to provide precious time and interest for useful discussions.

I cannot end up without thanking **Prof. Pradeep Deota** (Applied Chemistry Dept., Faculty of Technology and Engineering, The M.S. University of Baroda) & **Prof. S.K. Joshi** (Electrical Engineering Dept., Faculty of Technology and Engineering, The M.S. University of Baroda) for sharing some of their ideas and views regarding the electrochemical studies as discussed in the present research work.

I feel quite lucky to have friends like **Dr. Kavita Mishra**, **Dr. Hemant Mande**, **Dr. Shardul Bhatt**, **Dr. Krupa Patel**, **Dr. Rahul Kadu** and **Mrs. Neelam** who provided their constant support to me in both formal as well as informal discussions and for being there to always cheer me up during my failures and enjoy my success with me throughout my research work.

Last but not the least; I cannot forget to thank my mother, <u>Mrs. Shubhangi N. Joge</u> and my father, <u>Mr. Niranjan N. Joge</u> for believing and having confidence in me all the time not only professionally but personally also. My mother's love and care and my father's confidence in me and my hardwork boosted me and gave me strength to fight against all fruitless experiences which came across me in my research journey. Without their blessings, constant love, care, support and confidence in me, I would not have achieved my goal ever in my life. Of course, I can't miss thanking my dear sister, <u>Mrs. Pradnya M. Halbe</u> and my jiju, <u>Mr. Madhav S. Halbe</u>, along with my very close family friends and relatives, Mr. Jayesh J. Modi & Family, Dr. Ankur Desai and Dr. Nishidh Pandya, my paternal uncle, Mr. Purushottam N. Joge, my maternal uncles, Mr. Umakant D. Pandaw and Mr. Lekhraj D. Pandaw and finally, my sweet younger cousin Mr. Himanshu U. Pandaw to constantly encourage me during the crisis of confidence and making me forget all the worries by making the atmosphere light, cheerful and lively. I feel proud to have such supportive family members & relatives deprived of whom I am incomplete. Without support and blessings of all of you, my dream would not have ever come true!!!

Prajakta Niranjan Joge