ACKNOWLEDGEMENTS

I am indebted to Prof. Vakil Singh, Department of Metallurgical Engineering, my supervisor, for his constant encouragement, support and guidance during the entire period of my research work. The way he teaches me is really excellent and he is always source of inspiration for me. He always supported me in both research and in personal problems. He is always my best teacher. I would not have been able to complete the thesis without his utmost involvement and invaluable efforts.

I sincerely thank my co-supervisor Prof. N. C. Santhi Srinivas, for her invaluable guidance for the thesis work. She has also rendered constant encouragement and support during the course of this thesis work.

I sincerely thank Prof. R. K. Mandal, Head of the Department of Metallurgical Engineering for providing all the research facilities to successfully accomplish my research in the Department

Besides my Supervisors, I would like to thank other members of RPEC: Prof. A P Harsha, Department of Mechanical Engineering, Dr. K. Chattopadhyay, Department of Metallurgical Engineering and also Dr. G S Mahobia (DPGC Member), for their insightful comments and encouragement.

I have deep sense of gratitude to Prof. N. K. Mukhopadhyay, Prof. S. N. Ojha, Dr R. Manna and all other faculty members of the Department of Metallurgical Engineering, IIT (BHU), for their cooperation and inspiration.

I am highly thankful to Prof. S.R. Singh, Guest faculty, School of Material Science, IIT (BHU) and Dr Joysurya Basu, Department of Metallurgical Engineering for their important and valuable suggestions related to deformation study.

I wish to express my gratitude to Dr. Nagesha, and Dr. Sunil Goyal of IGACR Kalpakkam, for their valuable discussion and also to Dr. Sathyanarayanan, IGCAR Kalpakkam, for extending his help in supply of research material, the modified 9Cr–1Mo steel.

I wish to thank Prof. I Samjdar, Indian Institute of Technology Bombay for his help in texture study and to Prof. S. Tiwari, Department of Physics, BHU, for providing the Internal Friction measuring facility.

I am obliged to all my seniors, friends and juniors specially Dr G. Sudhakar Rao, Mr Sanjeev, Mr Vaibhav for their constant encouragement, making joyful and memorable life being with my moments of happiness and troubles at IIT (BHU), Varanasi.

I am also thankful to all my junior students of M. Tech and PhD of our group from 2012 to 2016 for their constant support during fatigue testing.

I am thankful to all the Lab and workshop staff specially Mr Balwant Ji and Mr Rajnarayan Ji for making fatigue and tensile specimens, Shri Lalit Kumar Singh for transmission electron microscopy, Shri Ashok Kumar Ji for helping in scanning electron microscopy, Shri Sushil Ji, Shri Samardeep, Shri Deepak, Shri Lal Ji, Shri Janardan Dubey Ji, Shri Kamlesh Ji, Shri Minz Ji and all the office staff.

I am thankful to wonderful friends Mrs Priyanka Singh, Mrs Ankita Dwivedi, Ms Madhu, Mrs Rati, Mrs Ipsa for their constant encouragement, making joyful and memorable life being with my moments of happiness and troubles at IIT (BHU), Varanasi.

I would also like to acknowledge the BRNS for financial support under the research project entitled "Evaluation of cyclic deformation behavior of structural

materials for advanced nuclear reactor application" and MHRD, for fellowship during the entire period of my PhD.

Last, but not the least, I would like to express my deepest gratitude to my family for their unconditional support and encouragement to pursue my interest.

I also wish to thank all my friends and the persons whose names have not been mentioned on this piece of paper for extending their cooperation directly or indirectly.

Preeti Verma