

ACKNOWLEDGMENTS

Firstly, I would like to express my sincere gratitude to my supervisor Prof. N.K. Mukhopadhyay for his consistent support, motivation and valuable discussions during the course of study. His guidance helped me in all the time of research and writing of this thesis.

I am thankful to Prof. N.K. Mukhopadhyay, Head of the Department of Metallurgical Engineering and former Head Prof. R.K. Mandal and Prof. G.V.S. Sastry for their valuable inputs and permitting to use the facilities of the department. Beside my supervisor, I would like to thank the other members of RPEC: Prof. P. Maiti, School of Materials Science and Technology and Dr. N.K. Prasad, Department of Metallurgical Engineering, for their insightful comments and encouragement which incited me to widen my research from various perspectives.

A very special gratitude goes to Dr. Joysurya Basu, for his help, valuable inputs and encouragement throughout this journey. I would like to thank to all other faculty members of the Department of Metallurgical Engineering IIT (BHU), for their cooperation and inspiration.

I am thankful to my all friends, Vaibhav, Arun, Vivek, Himanshu, Manish, Rajendra, Ankitendran, Neeraj, Vishwas, Ankit, Avnish, Aman, Soham, Saptrishi, Roopchand, Sarika, Harsh, Aakansha, Priyatosh, Ketan, Sakshi, Varalakshmi and seniors Dr. Deepa Verma, Dr. Raj Bahadur Singh , Dr. Sanjeev Rana and Dr. Preeti Verma. My special thanks to Dr. Manish Kumar Singh and Mr. Yagnesh Shadangi for their help in different ways. I would also like to thanks all my junior student of M. Tech and Ph.D. during the tenure of my work.

I would like to extend my sincere thanks to the entire Lab and non-teaching staffs especially, Mr. Lalit Kumar Singh, Anjani Ji, Ramasare Ji, Ashok Ji, Minj Ji, Arun Ji, Ramesh Ji and J.P. Patel Ji for their kind help during the course of work.

I am grateful to Prof. Rajiv Prakash (Prof. - in-Charge) of Central Instrument Facility IIT (BHU), for providing characterization facilities and his technical team especially Mr. Girish Sahu. I am also thankful to Dr. R. Manna, Coordinator, Advanced Research Centre for Iron and steel (ARCIS) IIT (BHU), for providing melting and XRD facility. I would also like to thanks Dr. I. Chakraborty for providing microwave furnace for sintering.

And finally, last but by no means least, I would like to express my deepest gratitude to my family, especially my father Shri Rakesh Kumar Kanaujia for his support, care, sacrifice and encouragement to pursue my interest. I would also like to thank my elder brother Shri Vivek Kumar Kanaujia for his care and support in all my decisions. I wish to express my sincere thanks to my uncle and aunt Shri Viswesh Kanaujia and Sangeeta Kanaujia for their consistent support. In last, I would like to extend my thanks to all my aunties, especially Mrs. Vibhu Kumari for her constant support, love and care.

I also like 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.

Above all, I bow my head before 'The God Almighty' who blessed with health and confidence to undertake and complete the work successfully.

Vikas Shivam