

Acknowledgements

With profound appreciation, I would like to convey my acknowledgements to one and all, who helped me directly or indirectly during my doctoral studies. First and foremost, I must express my deep thanks to THE GOD ALMIGHTY, who kindly helped me with infinite blessings and mercies.

It is my sincere gratitude and appreciation to my supervisor, Dr. Vishvesh J Badheka, for his continuous encouragement, support, time management for the task execution and ability to inspire throughout the tenure of my doctoral studies. It is my privilege to thank, Board for Research in Fusion Science & Technology (BRFST), Institute for Plasma Research (IPR), Gandhinagar, for the support of consumables through sponsored project of NFP/MAT/A 10/04. I am equally thankful to Space Applications Centre, Indian Space Research Organisation (ISRO), Ahmedabad and ORSP cell, Pandit Deendayal Petroleum University (PDPU) for its support on FSW machine (via project of E33011/60/2010-V) and funds (by project of ORSP/R&D/SRP/2014/RDKM) for the testing and characterisation respectively.

I wish to impart my gratitude to the head of the department Prof. S S Kachhawaha and my colleagues cum friends, Dr. Nirav Patel, Mr. Jaydeep Patel, Mr. Vivek Patel, Mr. Jay Vora, Mr. Bhargav Gadhvi, Mr. Naimish Bhatt, Mr. Shabbir Memon, Mr. Garlapati Nagababu, Mr. Parth Prajapati and Mr. Rakesh Chaudhari for their continuous motivation, sharing happiness and helping me at many instances. I am very much thankful to Dr. Nirav Patel for his guidance in research paper writing and proof reading, also to Mr. Jaydeep Patel for his motivation on my research work. I am also thankful to Dr. Abhishek Kumar for his encouragement on my each and every publications. I am also thankful to the authority of the Pandit Deendayal Petroleum University (PDPU), Gandhinagar for providing favourable research atmosphere.

I would like to thank the members of my doctoral committee, Prof. Amit Trivedi, Dr. Ritu Sharma, Prof. Raghavendra, Prof. Nirendra Misra and Prof S S Kachhawaha for instigation through excellent remarks. Special thanks to Prof. Amit Trivedi for his continuous directions after each six months review. I am also thankful to my doctoral mates Mr. Vivek Patel, Mr. Jay Vora, Mr. Gaurang Joshi, Mr. Pritesh Prajapati and Mr. Harikrishna Rana for technical discussions and suggestions.

I would like to thank Prof. Indrajit Mukhopadhyay, Mr. Nisarg and Ms. Dharini for helping me to obtain results of SEM and EDX analysis. I am thankful to Dr. Nirav Jamnapara and Mr. Arunsingh Zala for helping me to acquire the results of XRD analysis.

I am grateful to Mr. Ashok Chavda, Mr. Dharmesh Patel, Mr. Vivek Patel and Mr. Gaurang Joshi, as they helped during experimental performances. I would like to extend my thanks to Mr. Hardik Vyas and Mr. Shabbir Memon for their support on literature collections.

I am always thankful to my beloved friends Mr. Hardik Choksi, Mr. Ashish Patel, Mr. Jeet Desai, Mr. Amish Raval, Mr. Chirag Panchal and Mr. Punit Panchal for being with me and my thoughts, moral boosting support and sharing happiness.

I would like to convey my gratitude to editors and reviewers, who have considered these results, and converted into reputed publications. I am hearty thankful to Prof. Amitava De, Professor, Indian Institute of Technology, Bombay and Prof. Esther Akinlabi, Head of Mechanical Engineering Department and Professor, University of Johannesburg for their precious time and energy that provided to review the PhD thesis document.

I am grateful for the help and support of many over the course of doctoral studies, and regret that I cannot acknowledge all by name, being constrained to a specific page limit. I am sure you all know who you are, and I commend you my wholehearted thanks.

Last but most imperative, this work could not have been seen this day without the patience shown by my family members. My father Mr. Pragneshbhai, who put the fundamental learning characters in me, and my mother Mrs. Truptiben, who sincerely raised me with her caring and gentle love. I owe my deepest gratitude to my parents. I am thankful to my younger brother Mr. Lav Mehta for his supports, love and sharing hapiness. I am highly indebted to Mrs. Rajvi Kush Mehta for her love, care, moral support and co-operation. There are no words to justify their involvement.

Mehta Kush P.