

ACKNOWLEDGMENTS

The work presented in this thesis would not have been possible without my close association with many peoples who were always there when I needed them the most. I take this opportunity to acknowledge them and extend my sincere gratitude for helping me make this thesis a possibility. At this moment of accomplishment, first of all I would like to pay the homage to the founder of Banaras Hindu University, Pandit Madan Mohan Malvia ji, who made this glorious temple to realize spiritual, technical and scientific knowledge about this vast existing universe.

*I embrace the opportunity to express my deep sense of gratitude to my supervisor **Dr. Rajiv Prakash**, Professor, School of Materials Science & Technology, IIT (B.H.U.), Varanasi for his constant guidance, valuable suggestions and kind encouragement during my association with his research group. His encouragement, constant support, intellectual stimulation, perceptive guidance, immensely valuable ideas, and suggestions from the initial to the final level enabled me to develop an understanding of the subject. His scholarly suggestions, prudent admonitions, immense interest, constant help and affectionate behavior have been a source of inspiration for me. His suggestions will remain with me as an inexhaustible source of scientific learning throughout my life.*

*I would like to express my sincere and whole hearted gratitude to the **Prof. P. Maiti, Dr. C. Upadhyay, Dr. B. N. Pal and Dr. C. Rath** (School of Materials Science and Technology, IIT-BHU, Varanasi) for discussion during seminars and valuable suggestions given by them. I am grateful to **Dr. A. K. Singh** for truthful discussions regarding XRD. I am indeed obliged and sincerely thankful to my RPEC member **Prof. P. C. Pandey**, Department of Chemistry, IIT- BHU for his guidance and untiring attention right from the inception to the successful completion of assigned research work. I owe a great deal of appreciation and gratitude to **Dr. S. R. Singh** (Visiting Faculty of SMST)*

*for his valuable suggestions. Most of the results described in this thesis would not have been obtained without a close collaboration with few laboratories. I am thankful to **Dr. A. K. Sihna** (Head, Department of Chemical Engineering, IIT (BHU)), **Dr. T. Shripathi and Dr. U. Deshpande** (UGC-DAE Consortium for Scientific Research, Indore, India) for providing XPS facility, **Dr. Ranjan Singh** (Department of Physics, BHU) for Raman facility.*

I am thankful to the unknown reviewers who have rejected my papers several times in some of the international conferences and journals. The comments that they provided helped to polish our articles in better shape. But the bigger and nobler cause of thanking them is that the rejections have equipped me with high level of patience and helped me a lot to exercise/implement my spiritual thoughts in practice.

*My acknowledgement will never be complete without the special mention of my lab seniors who have taught me the lab culture and have lived by example to make me understand the hard facts of life. I would like to acknowledge **Dr. Arun K. Singh, Dr. Akhilesh K. Singh, Dr. Leela Joshi, Dr. Ashish Kumar, Dr. Rajiv Pandey, Sandeep Gupta, Dr. Gopal Ji, Dr. Shraddha Singh, Dr. Monika Srivastava and Dr. Umashankar** for all their support and motivation during the initial days of my PhD.*

*My heartfelt thanks to my fellow lab mates **Preeti Tiwari and Kashish** for always being there and bearing with me the good and bad times during my wonderful days of Ph.D. Also I am thankful to my lab fellows and juniors of lab specially **Saloni, Richa, Manish, Vinita, Chandrajit and Vinit** for their helping behavior. My special thanks to **Dr. Bharat Kumar Allam** (Department of Chemistry, BHU) for his valuable suggestions, I can see my thesis in the good shape because of his help in formatting the entire thesis. I sincerely thanks to **Vinod Gupta** for his support during my PhD.*

*It's my fortune to gratefully acknowledge the support of some special individuals. Words fail me to express my appreciation to **Ankita Tripathi** (Department of Electrical Engineering), **Preeti Verma** (Department of*

Metallurgical Engineering), and **Priyanka Singh** (Department of Chemistry) for their support, generous care and the homely feeling at hostel. Their association has made my stay in IIT (BHU) a pleasurable and memorable experience. My outing and shopping with them will be etched permanently in my memory. They were always beside me during the happy and hard moments to push me and motivate me. My friends from the Materials Science **Arun Mahanta, Sushil, Sudipto Senapati, B. Bharti, Priyanka Tiwari, Pinki, Pramod, Jagdish, Arun Mishra**, and from department of Chemistry **Shikha, Abha, Nirmala, Siddharth, Durgesh and Dr. U. P. Azad** the list is endless...thanks to one and all.

I am also thankful to all, to whom I could not mention here who helped me directly or indirectly throughout the work. I am thankful to all non-teaching staff of the Department for their cooperation at all levels.

*I express my indebtedness to my parents **Smt. Shakuntala Tiwari and Sri. Ravindra Nath Tiwari** and my brothers **Sankata Tiwari and Pawan Tiwari** for their love, affection and support during every moment in my life.*

I gratefully acknowledge the CSIR, New Delhi for providing me the necessary funding and fellowship to pursue research work.

This work would not have been possible without the grace of the “Lord Shiva and Mata Di”.

(Madhu Tiwari)