

It's my great pleasure to thank my supervisor *Prof. K. D. Mandal*, Department of Chemistry, Indian Institute of Technology, (B.H.U) for allowing me to join his research group, and for providing the knowledge base for my future. *Prof. Mandal* is an excellent advisor and good friend. He was always available for discussions and regularly took the time to answer my many questions. As a supervisor, he was very active in my continuing education and scientific growth, allowing me to explore different aspects of materials science independently and with guidance. In addition, he continually provided opportunities for collaborations with other scientists, which allowed me to learn more about related fields.

My sincere gratitude is also expressed to *Prof. D. Tiwary*, Head, Department of Chemistry, Indian Institute of Technology, (B.H.U) Varanasi, for his fruitful suggestions and providing research facilities available in the Department.

It's my great pleasure to thanks my RPEC members *Prof. D. Tiwary*, Department of Chemistry, Indian Institute of Technology, (B.H.U) and *Prof. P. Maiti*, School of Material Science and Technology, Indian Institute of Technology, (B.H.U) for giving valuable suggestions throughout my Ph.D program.

I also want to acknowledge the In-charge and members of central instrumentation facility center (CIFC) and office staff of the Chemistry Department for their help and support.

My special thanks goes to my senior and good friend Dr. Laxman Singh, Mr. Shiva Sundar Yadava Department of Chemistry, University of Ulsan, South Korea, Dr. Sunita Sharma, Dr. Ankur Khare and Dr. Pooja Gautam, for useful discussions and help throughout my research.

I would also like to thank to my lab mates Dr. Ankur Khare, Dr. Pooja Gautam,, Mr. Vinod Kumar and Mr. Manish Kumar Verma for their active support.

I am very much thankful and grateful to all faculty members of the Department for their encouragement and support.

I heartly thank my best friends Mr. Dinesh Kumar Verma, Mr. Jiraul Hauge, Ms. Pratibha Verma and Mr. Adesh Kumar for encouraging me to get enrolled for this degree.

Parents are the God on earth and I am very lucky to have very caring and loving parents Mr. Ashok Ram and Mrs. Kalawati Devi. I would like to put in words my gratitude to my family members and specially thanks my siblings Mr. Satendra Kumar , Mr. Rabindra Kumar, Mr. Virendra Prasad and Ms. Ashish Kumar for making my life happy with their constant love and moral supports.

I wish to express my special thanks to IIT (BHU) for providing the financial support to carry out this work.

Last but not least, I thank Almighty God for providing me strength and courage to do this work.

*Date:*

*Place: Varanasi*

*(Atendra Kumar)*