Acknowledgement

I would like to express my deep sense of gratitude to my supervisor Professor. S.K. Samdarshi for his inspiring guidance and giving me the opportunity to work under him. It would have not been possible for me to bring out this thesis without his valuable help, support, and constant encouragement throughout the research work. I am also indebted to family members of my supervisor specially Mrs. Samdarshi, for their moral support during this period.

I would also like to express my sincere thankfulness to Dr. Hubert Mutin, Research Director and Prof. Bruno Bourn, Institute Charles Gerhardt Montpellier, UMR 5233 CNRS-UM2-ENSCM-UM1, University of Montpellier 2, Montpellier, France for their valuable guidance during my research stays in France.

I am grateful to Prof. A. K. Mukherjee, Department of MBBT to allow me to carry out bacterial inactivation experiments in his lab.

I would like to thank Prof. D. C. Barua, Head, Department of Energy, Prof. D. Deka, Dr. R. Kataki, (Assoc. Prof) Dr. D. Bora, (Assoc. Prof) Mr. S. Mahapatra (Asstt. Prof.) and Mr. P. K. Choudhury (Asstt. Prof.) of Department of Energy, Tezpur University, for their suggestions and discussions during my work. I am grateful to Mr. Tapan Borah, (Technical Asstt.) Department of Energy for his help and suggestions.

I am thankful to my Doctoral Committee members Prof. D. Deka, Dr. R. Kataki, (Assoc. Prof) Department of Energy, Prof. A. Kumar, Department of Physics and Prof. A. K. Mukherjee, Department of MBBT, Tezpur University, for their kind support and encouragement.

I am thankful to Dr. P. J. Lakkar, Dr. Samrat Paul, Mr. Anuj Chaturvedi, Miss Dijumani Rajbongshi, Miss Ranjana Verma and Mr. Anjali Ramchya, my research colleagues, for their help suggestions and encouragement throughout my research work.

I would also like to thank my friends Mr. Jetendra Kumar Roy, Mr. Alokmani Tripathi, Mr. Paranjyothi Bharadwaj, Miss Sweepna Ojha, Mr. Karim Bouchmella, Mr. Moon Moon Hlohadhari, Mr. Dhruvajyoti Talukdar, Miss Jutika Boro, Mr. Rahul Singh Chutia, Dr. Sudhir Rai, Mr. Biswajit Choudhary and many others for their help and support.

Also I am highly thankful to staff members, research scholars, M.Tech students of Energy department and my friends and well wishers of this University for their support and encouragement.
My special thanks go to non-teaching staff member of our department, specially Mrs. Pronita S Talukdar and others for their timely help during my work.

I am grateful to my parents also to my sister and other members of my family for their blessings, love and support. Words are not enough to express my gratitude to my wife for her support, understanding and patience without which this work would not have been possible.

Last but not least I would like to thank almighty for everything.

Ranjith G Nair