Many years of my work at PRL with help, support, suggestions, discussions and encouragement of people, enabled me to complete the work presented in this thesis. After having so many years of love with all PRL and my family members it is time to express my gratitude to all of them.

I would first like to thank my supervisor Prof. Ashok Kumar Singhvi, his guidance, enthusiasm, commitment and integral view made it possible to complete this work. His ideas and commitment of working will inspire me to do always a better work in science and in personal life. He guided me as a supervisor in the lab and advised as a father in taking personal decisions. I am glad to be his student and overwhelmed in expressing my gratitude to him. I am thankful to Aunty ji for giving love and affection like mother, which reduced the overload of work at lab.

Present thesis would not have been possible without the understanding of geological process, which were explained and discussed by Juyal sir with me. He made me to understand all those things which I might not have been thorough otherwise. His style of working on war front in lab made me a quick and systematic worker in the lab. I am thankful to Juyal sir and bhabhi ji for their love and care which they provide and made homely environment for me whenever I was with them.

I would also like express my gratitude to Prof. R. N. Singh for his guidance and discussion on theoretical part of my work. I am thankful to Prof. M. D. Shastry for various discussions during his visits in PRL.

I am thankful to my seniors Nagar, Madhav, Bhavesh and Morthekai for their valuable inputs, suggestions on time to time basis. They helped in early days of my research work in gaining insights of many physical processes. I am thankful to Nagar for explaining things at lab. Special thanks to Nagar for his support and advice like an elder brother who is your supervisor. Madhav and Bhavesh bhai introduced me with Matlab and encouraged to use it at all possible places even for small calculations which helped me in the later part of work.
I am thankful to my lab mates Naveen and Rabiul for helping me as and when needed and for all fruitful discussions with them. I am thankful to Vaidehi, Pinkky, Komal, Nikita and Haresh for making my stay in the lab comfortable in later days of my work.

I would like to thank Dr. Devender Kumar from NGRI Hyderabad, who helped me to undertake the filed in the North-East (Assam). His efforts made it possible to identify the dikes in the area which otherwise would not have been possible for me. He made me to understand how to search for a dike in the field.

I am grateful to Prof. M. M. Sarin, Prof. S. V. S. Murty, Prof. J. N. Goswami, Prof. Ramesh, Dr. J. S. Ray, Dr. S. K. Singh, Dr. D. Banerjee, Prof A. Jayaraman, Dr. Angom, Prof. Shyamalal, Dr. Jitesh Bhatt and Dr. P. Sharma for their valuable suggestions during my seminars and reviews at PRL.

Many thanks to Jigar bhai, Mishra ji and Alok bhai in computer lab for their help in setting up things during course work and afterwards as well. I am thankful to people at workshop, library, canteen, admin, stores and purchase for providing their help and support as and when needed. I am greatly thankful to Mr. Rajesh Kaila for immediate help at workshop for making sampling pipes. Thanks to Vishnu bhai and Ubale ji for their help in making small instruments which I used in lab. I am thankful to Vaghela bhai and Bhavsar bhai for providing distilled water for our laboratory use.

I am thankful to Dr. Anil Shukla, Dr. Ravi Bhushan, and Dr. M. G. Yadava for their guidance and support at various stages.

I would like to thank my PRL batch mates Naveen Gandhi, Sumita Kedia, Aswini, Gyan, Rahman, Kirpa, Sanjeev, Ram, Bhavik, Vishal, Manan, Harindar Pal, Sumanta, Brajesh, Jeetu, Shuchita and Arvind Singh for giving cheerful company at PRL. I am also thankful to Neeraj, Saxena and Manan for the cheerful moments at tea time during writing of thesis at PRL in later days.

I am thankful to Dr. Shishir Deshpande and Dr. Vinay Kumar at ITER-India, IPR for their help and support to allow me to complete this work.

I am thankful to PRL for providing me opportunity to work at Luminescence lab during my stay as a research scholar in the early stage of my research carrier, and providing necessary help and support as a guest after I left from PRL.
I feel a deep sense of gratitude for my late parents it was their effort which led to me to reach at PRL, and to my brother Arvind and my bhabhi Neeraj who guided and encouraged me after I lost my parents. I am thankful to my mother in law and father in law, who made it possible to feel me that I am always with my parents and supporting me throughout my work at PRL. I am thankful to my sisters Bebi, Babli, Anita, Abha and sister in law Deepa, for their love and care. I am thankful to Dipen bhai who encouraged, advised and helped me at various levels in personal life.

Finally this thesis would not have been possible without the support from my best friend and best half, my wife Sejal. The time dedicated to work in lab was stolen from what I would have spent with my wife and daughter Soumya. They allowed me to spend quality time on this work without complain. One single smile on their face refreshed me at reaching home and gave sense of happiness.