

Acknowledgement

These three and a half years of research feel to me like a voyage and my passage was enlightened by the guidance and supports of many a people. It is a pleasant aspect that I have now the opportunity to express my gratitude towards them. First and foremost, I offer my sincere and heartfelt gratitude to my guide, Dr. C. J. Panchal, for his invaluable guidance throughout this journey. I am indebted to him not only for introducing the objective of this work to me but also for his encouragements and faith in me, which enabled me to solve the problems encountered during the various stages of my work.

I express my sincere and warmest thanks to Dr. T. K. Sharma, Scientific Officer, Semiconductor Laser Section, RRCAT, Indore, for giving me an opportunity to carry out a part of my Ph.D. work at RRCAT. He spent lots of time with me to discuss and explain the theoretical and the experimental aspects about MOVPE growth and characterization of semiconductors. I have benefited a lot from his expertise in the field as well as from his guidance and suggestions on general research matters.

I extend my gratitude to Prof. B. M. Arora, TIFR, Mumbai, for his impeccable and persistent guidance, which would ever remain a source of inspiration for me. I owe him a lot for reading and providing me with invaluable comments on earlier versions of this thesis. I am sincerely thankful to Prof. V. N. Potbhare, Applied Physics Department, The M. S. University of Baroda, for his continuous encouragement and motivation. To have a teacher like Potbhare sir makes the voyage much smoother and fruitful. I must express, here, my personal and particular gratitude to Dr. M. S. Desai, Applied Physics Department, for his profound interest, care, and advices. I have also benefited enormously and learned a lot from his writing skills and I am very grateful to him for revising my manuscripts and thesis.

I truly believe that my work would have been impossible without the suggestions, helps and co-operations of my companions of the voyage, my lab-mates. I learnt the nuts and bolts of thin-film deposition from Mr. Kamlesh Patel and Mr. Pravin Patel. Later in the voyage, Mr. Pranav Vakil, Mr. Nitin Shah, Keyur Patel, and Jaymin Ray, all joined

me and made it unforgettable by their goodwill. They supported me by all means, as teachers, as friends and as philosophers.

It has been a privilege and an enjoyable experience of having done a part of my Ph.D. work at Semiconductor Laser Section (SLS), RRCAT, Indore. I feel, few places can offer an atmosphere so conducive to research and I must thank Dr. T. K. Ganguli, Dr. V. K. Dixit, Mr. S. D. Singh, Dr. S. Pal, Mr. Ravindra Jangir, and Mr. G. Jayaprakash, Mr. Ravi Kumar, Mr. Sanjay Porwal, Mr. U. K. Ghosh, Mr. Alexander and all SLS team members for their invaluable help and co-operation. I am also thankful to Dr. C. Mukharjee, RRCAT, for useful discussions and tips. I also thank Ms. Palika Rawat, M.Tech. project trainee at SLS, RRCAT for her invaluable support.

I thank the Dean of the Faculty of Technology and Engineering, and the Head of the Applied Physics Department, for providing me the infrastructural facilities. I also thank teachers of Applied Physics Department for their support during this work. I would also like to express my thanks to non-teaching staff members of the department.

I wish to express my gratitude to some of the teachers who have always been an inspiring force in my life: Upadhyay Sir, Mehta Sir, Bhatnagar Sir, Sutariya Sir, Dodia Sir, Dipika Mam, and Bharad Sir. Friends are a treasure and I am very fortunate to have this wonderful wealth in my life. Anand, Nidhi, Bhupendra, Nirav, Yogesh, Dharmendra, Ranjit, Rohini, Nilkanth, Nikunj, Piyush, Hiten, Dushyant, Kavita, Rajat, Vikas, Palika, Renuka, Eglon, Rahul, Indrajit, my brother and buddy Vicky and many more, who directly or indirectly contributed in making my voyage smooth. Thank you all....for being with me. Finally, I extend my heartfelt gratitude to all my family members for their unflagging patience, love and constant support.

Lastly, but not the least, I am thankful to the Board of Research in Nuclear Science (BRNS), Department of Atomic Energy (DAE), BARC, Mumbai, for providing me the financial assistance.

Vipul Kheraj