Acknowledgements

First and foremost, I would like to express my deep sense of gratitude to Dr. N.V. Unnikrishnan for his invaluable guidance and inspiration. This work would not have been possible without his constant support, help and encouragement. I am extremely grateful for his patience, motivation, enthusiasm and the invaluable help he has given me through the course of this work. His immense knowledge in the subject, analytical approach and broad mindedness inspired me a lot.

I am extremely thankful to Prof. C. Sudarsankumar, Director of School of Pure & Applied Physics (SPAP), Mahatma Gandhi University, for providing necessary infrastructure and resources to accomplish my research work. I sincerely thank the former directors of SPAP, Prof. M.A. Ittyachan, Prof. C.S. Menon and Prof. C. Venugopal, for the help and support I received from them. I express my heartfelt thanks to Dr. Cyriac Joseph and Dr. P.R. Biju, Assistant Professors, SPAP for their encouragement and personal attention throughout the work. I owe my gratitude to Prof. K. Indulekha, Dr. K. Nandakumar, Dr. S. Antony, Mrs. A.C. Saritha for providing several valuable inputs and advices. I am thankful to Dr. Santhosh Kumar A, Technical Officer of SPAP for his support throughout the period of the research. I am grateful to all the administrative, technical and library staff of School of Pure and Applied Physics for their support.

I am very much indebted to Dr. Gin Jose of the University of Leeds UK, for his support and advice through the course of my work. I would like to thank Dr. Gijo Jose, Dr. Vinoy Thomas, Dr. P.I. Paulose, Dr. Toney Teddy Fernandez, Dr. Rejikumar P.R, Dr. Siby Mathew, Dr. Amrutha K. Adiyodi, Dr Jyothi P.V, Dr. Arunkumar K.V, Dr. Prathibha Vasudevan,
Acknowledgements

Dr. Karthika S, Mrs. Manju Gopinath, Dr. Tintu Ratnakaran, Dr. Revathy K.P, Dr. Ann Mary K.A, Mr. Sunil Thomas, Ms. Viji Vidyadharan, Ms. Sajna M.S, Ms. Remya Mohan, Ms. Rani George, Ms. Sreeja E, Mr. Subash Gopi, Mr. Prakashan V.P. and Mr. Sanu Mathew Simon for the informal support and encouragement. I really enjoyed working with such a vibrant, loving and encouraging group in the Sol-gel lab. I would like to specially acknowledge the constant help, support and encouragement I received from Mr. Sunil Thomas, Ms. Rani George and Ms. Sajna M.S. during the final stages of my work. I am thankful to all the other research scholars of SPAP for their help and encouragement.

I would like to thank my friends Dr. Thomaskutty Mathew, Dr. P. Gopakumar, Dr. Vinu Vikram, Dr. Rajesh R, Dr. Mathew K. Varghese, Dr. Sreejith Pisharady, Dr. Nisha Toney, Dr. Noble P. Abraham, Dr. Jeevan Job Thomas Dr. Shiji Krishnan and Dr. Seema R, for their valuable support.

I extend my thanks to School of Chemical Sciences, School of Bio-Sciences and International and Interuniversity Center for Nanoscience and Nanotechnology, Mahatma Gandhi University and STIC (CUSAT, Cochin) for providing some of the experimental facilities.

I would like to thank the Manager, the Principal and all the teaching and non-teaching staff, especially of the Physics department of Christ College, Irinjalakuda for their constant support and encouragement in fulfilling my efforts. I also thank University Grants Commission (UGC) for providing me fellowship under the Faculty Improvement Programme (FIP).

Words are not enough to express my gratitude towards my mother Rosamma, wife Jossina and my children Ashish and Adith for the sacrifices they made and the patience, love and support they have extended during the
period of my research. Their unfailing support and understanding had been my strength throughout this journey. I bow my head before the memory of my loving father late Mr. Joseph Thomas who left me during the period of my work. I thank all my relatives for their support and prayers.

Above all, I thank Almighty God for His grace and blessings for the successful completion of my work.

Xavier Joseph