

Acknowledgements

I am incredibly grateful to the esteemed architect of my research work, **Dr. Tasnim Nisarahmed Shaikh**, Associate Professor, Department of Textile Engineering, Faculty of Technology & Engineering, The Maharaja Sayajirao University of Baroda, for her gracious guidance, motivating management, constructive criticism, substantial support, prevailing patience, and unwavering assistance, during this work that helped me to shape this research. Her profound scientific knowledge has made her a continual source of ideas and passions, which has greatly influenced and enriched my development as a student and researcher. I appreciate you, ma'am, for giving me confidence.

Additionally, I would like to express my gratitude to **Dr. Bharkumar Hiralal Patel**, Associate Professor in the Department of Textile Chemistry, for his unwavering backbone support and assistance from the beginning of this project, as well as for providing me with exceptional help throughout the process.

I appreciate the help I received from, **Prof. (Dr.) Dhanesh Parsottambhai Patel**, the Dean, **Prof. Chivukula Narayana Murthy**, the Ex-Dean, **Prof. Arun Pratap** and **Prof. Someshwar Santimoy Bhattacharya** the former Deans of Faculty of Technology & Engineering. It gives me great pleasure to express my sincere gratitude to, **Dr. Satyajeet Baban Chaudhari**, Head of the Textile Engineering Department and Vice-Dean of the Faculty of Technology & Engineering, and **Dr. Tasnim Nisarahmed Shaikh** and **Dr. Milind Vasudeo Koranne**, former Heads of the Textile Engineering Department, for providing me with authoritative support for the advancement of my work.

I would also like to acknowledge, **Dr. Sanjay Patel**, and **Dr. Mokshapani R. Tiwari**, Senior Scientific Officers at SICART (Sophisticated Instrumentation Centre for Applied Research and Testing), for their gracious assistance in testing Nano-composites' and Extract's samples.

I am also grateful to the **Dean of the Faculty of Science** and **Dean of the Faculty of Pharmacy**, as well as the **Head of the Department of Textile Chemistry**, **Head of the Department of Pharmacy**, **Head of the Department of Metallurgical and Materials Engineering**, **Head of the Department of Applied Physics**, **Head of the Department of Chemistry**, **Head of the Department of Physics**, **Head of the Department of Geology**,

Head of the Department of Microbiology, and **Head of the Department of Bio-Chemistry**, for providing me the access of their laboratories and helping for my experimental work.

I especially express my gratitude to **Prof. Haribhai Rudabhai Kataria**, Dean of the Faculty of Science, and **Prof. Laxman Singh Chamyal**, Former Head of the Department of Geology, for their unconditional support, inspiration and encouragement. Furthermore, I would like to thank the university professors, who assisted me during my course of work, including **Dr. Bishwajit S. Chakrabarty** from Department of Applied Physics, **Dr. Piyush P. Gohil** from Department of Mechanical Engineering, **Dr. Vandana J. Rao** from Department of Metallurgical and Materials Engineering, **Dr. Jaite P. Sharma**, **Dr. Snehal B. Rao**, and **Dr. Bharat S. Ratanpal** from Department of Applied Mathematics, **Dr. Viral V. Kapadia** from Department of Computer Science & Engineering, **Mr. Keval J. Umrigar** from Department of Textile Chemistry, **Mr. Devasi H. Chocha** from Department of Electrical Engineering, Faculty of Technology & Engineering. **Prof. Krutika K. Sawant**, and **Dr. Reshma A. Jain** from Department of Pharmacy, Faculty of Pharmacy, and **Prof. Dhananjay A. Sant** and **Prof. Deepak M. Maurya** from Department of Geology, **Dr. Anand Dave** from Department of Microbiology, **Dr. Sanjeev Kumar** from Department of Biochemistry, **Prof. Ashutosh V. Bedekar** and **Dr. Sonal I. Thakore** from Department of Chemistry, Faculty of Science. They have always been incredibly helpful with their advice whenever I have faced issues pertaining to their field. The university should be proud of their breadth and depth of expertise.

Special thanks must also go out to the lab mates whose presence shows how consistently upbeat, cooperative, and memorable they were. Many thanks to **Jaiswalbhai**, **Bhadreshbhai**, **Jawalebhai**, **Bhadubhai**, **Panchalbhai**, **Jyotindrabhai**, **Gamjibhai**, **Sudhirbhai**, **Rajendrabhai**, **Amrishbhai**, **Ileshbhai**, **Hemangbhai**, **Priteshbhai**, **Narendrabhai**, **Bhupendrabhai**, **Jayeshbhai**, **Hiteshbhai**, **Kantibhai**, **Harishbhai**, **Piyushbhai**, and **Jaiminbhai**, for making my doctoral work with them so enjoyable.

I advocating my whole and sole respect to my learning excellencies; my Schools', **Shree Jamka Prathmik Shala**, **Shree Sarashwati Vidhyalaya-Jamka (Gir)**, and **Shree Bansidhar Vidhyalaya**, **Junagadh**; Diploma's institute, **Department of Textile Manufacturing Technology (DTMT)**, **Dr. S. & S. S. (Sorabji & Sarosh Sorabji) Ghandhy College of Engineering and Technology**, **Surat**; Graduation's institute,

Department of Textile Engineering, Faculty of Technology & Engineering, The Maharaja Sayajirao University of Baroda (MSU), Vadodara; Master's institute, Department of Textile Technology, L. D. (Lalbhai Dalpatbhai) College of Engineering (LDCE), Gujarat Technological University (GTU), Ahmedabad; and again the one and only, The **Department of Textile Engineering, Faculty of Technology & Engineering, The Maharaja Sayajirao University of Baroda**, for adding another momentous milestone in my academic career.

I would like to express my sincere gratitude to, **Late Prof. Vijay. N. Soni Sir**, Former Head of Department of Textile Manufacturing Technology, Dr. S. & S. S. Ghandhy College of Engineering and Technology, Surat, for his guidance and generosity, supportive nature, and constant inspiration, all of which helped me to really motivating and continue my learning endeavours.

I profusely recognised my sincere thanks to all my teachers; **Doshi Sir, Vyas Sir, R. T. Patel Sir, D. G. Desai Sir, Shalini Mam, Chetan Sir**, and **Nakrani Sir** from the Department of Textile Manufacturing Technology (SS Ghandhy); **Prof. Bhattacharya Sir, Prof. P.C. Patel Sir, Bhawalkar Sir, Vernekar Sir, Sanghadia Sir, Vasavada Sir, Dr. Koranne Sir, Vagheliya Sir, Dr. Mankodi Mam, Dr. Tasnim Mam, Dr. Pragnya Mam, Dr. Pratihari Sir, Dinesh Sir, Dr. Satyajeet Sir, Dr. Aadhar Sir, Malek Sir, Dr. Sweetie Mam, Dhore Sir**, and **Sanjay Sir** from the Department of Textile Engineering (MSU), and **Prof. Chattopadhyay Sir, Dr. Mairal Sir, Dr. Agrawal Sir, Dr. Shah Sir, Dr. Shailesh Sir**, and **Dr. Bharat Sir** from the Department of Textile Chemistry (MSU), I also want to express my gratitude for the support and encouragement I received from my co-teachers, **Dr. Periyasamy Sir, Poonam, Anuradha, Disha, Janki, Sanjay, Javed Sir, Ankur Sir, Keval, Priyank, Devang, Dishant** and **Javed**; and from the Department of Textile Technology (LDCE), **Prof. M. R. Patel Sir, Dr. Thakkar Sir, P R Patel, Vaishali Mam, Selin Mam, Shimoli Mam, Mansi Mam**, and **Hiren Sir**.

I consciously thankful to my **Halls of Residence Parivaar**, especially **Major (Dr.) Vijay M. Parmar Sir**, Chief Warden, and **Dr. Jaita Sharma Ma'am**, Deputy Chief Warden (Girls), as well as to all my colleagues, **Wardens (Boys)**, and **Wardens and Superintendents (Girls)**, Halls of Residence, The Maharaja Sayajirao University of Baroda, who all are directly or indirectly associated and blessed me for my research work.

I am also grateful to **M/s. Shankar Packagings Limited, Vadodara**, for giving me an opportunity to work with them. I am incredibly thankful to my senior team leaders for believing in me and allowing me to commence my Ph. D. studies in-line with my profession work.

Special thanks go out to **"My parents"** for their encouragement and devotions. My mother **Smt. Muktaben**, who honestly nurtured me with her care, love and continuous source of inspiration, and my father **Shree Vitthalbhai**, who instilled in me the foundation of learning character and encouraged me to continue my educational career. I can't begin to tell you how appreciative I am of all the sacrifices you've made on my behalf.

I owe a lot to my soul mate, **"Trisha"**, who has patiently experienced all of the difficulties of a research scholar, believes in me, and has written Ph. D. under my name on our marriage card before my achievement! I ADORE her consistent support and encouragement, as well as the fact that she has stood by my side all my life.

I'd like to extend a warm welcome and grateful to our newest member, my daughter **"NIR"**, who has made me happy, proud, and smiling. Now, you are what I call "the heart of my life".

I owe a great deal to my **"Bhai and Bhabhi"** [**Ketan** and **Daya**], and my niece **"Diksha"**, who played with me and brought back my childhood memories just when I needed them, as well as to all the other members of my family for their unwavering support, love, and moral guidance throughout my life. I really thank my in-laws and relatives for their moral support and their constant desire to see me in this position.

I would like to express my heartiest gratitude to my friends **Chauhan Anirudhdhsinh D.** and **Sheladiya Dharmesh K.**, my master's armed forces, for their unwavering commitment to seeing that I finish my doctorate and for their unending encouragement and support. I'm also grateful to **"my cohort"** in general.

I also want to thank all of my **"Student Friends"** from the Department and the Halls of Residence, who patiently awaited the completion of my doctorate.

Here I must mention and obliged my Badminton Squad, The **"Majestic Shuttlers United (MSU)"**, who permits me to enter in to the court with my constant inconsistencies while working on my Ph. D. thesis.

I gratefully acknowledge my home village **"Jamka (Gir)"**, which inspired me to consider my research topic.

Fortunately, I would like to thank **"Each and Every one"** who contributed directly or indirectly to the successful completion of my thesis, and I apologies if I was unable to thank you all individually.

Once again, I respectfully thank the person mentioned at the top, the another **"MOTHER"**, who just cares me!

Above all, I specially thank to the **"Supreme power"** for his unending favours on me forever.....

Thank you all.

Radadiya Rainish V.