

Dedicated to my

Beloved parents

My Father - Mr. Jahar Lal Barman.

My Mother - Mrs. Sabitri Bala Barman.

And

My Brothers

DECLARATION

I declare that the thesis entitled “PHASE TRANSITIONS AND PHYSICAL PROPERTIES OF SOME MESOGENIC COMPOUNDS AND THEIR BINARY MIXTURES” has been prepared by me under the guidance of Prof. Malay Kumar Das, Department of Physics, University of North Bengal. No part of the thesis has formed the basis for the award of any degree previously.

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Analysed Document: Barnali Barman_Physics.pdf (D88336099)
Submitted: 12/8/2020 10:10:00 AM
Submitted By: nbuplg@nbu.ac.in
Significance: 2 %

Sources included in the report:

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PREFACE

The thesis entitled “**Phase transitions and physical properties of some mesogenic compounds and their binary mixtures**” is devoted to the work in the field of liquid crystalline research under the supervision of Prof. Malay Kumar Das, Department of Physics, University of North Bengal. The motivation behind this work is the growing interest of the liquid crystalline (LC) compounds in various applied fields. The entire thesis consists of eight different chapters. The first Chapter covers a brief introduction about the background to the general topics of liquid crystals. In Chapter-2 a concise theoretical as well as the experimental procedures associated to this work have been discussed. Chapter-3 to Chapter-6 thoroughly highlight on the study of the behaviour of the achiral and chiral liquid crystalline phase transitions. Chapter-7 and Chapter-8 explain electro-optical and dielectric properties of some pure chiral ferroelectric liquid crystalline compounds (FLCs) and their binary mixtures for better understanding of the molecular structure-property correlations and for proper tuning of the different physical properties. These pure chiral ferroelectric liquid crystalline compounds and their bi-component mixtures are very useful in the optoelectronic and photonic applications. At the end of this thesis all the concluding remarks are taken from each chapter and the future scope has also been discussed.

This whole journey of this research work was very much interesting and helpful for me. In this course of study my self-learning capacity has been grown day to day and I have learnt many important things about the liquid crystalline field of research. This work gives me an opportunity to understand in an easy way by using many sophisticated experimental procedures. Although, numerous studies are going on both experimentally and theoretically in this field of research; still there are many unresolved phenomena which necessitate further investigations. It is believed that this work should provide some contribution towards the experimental investigation on the phase transitional behaviour and physical properties of various liquid crystalline compounds and their binary mixtures.

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ACKNOWLEDGEMENT

First and foremost, praises and thanks to the Almighty God, for the showers of blessings throughout my research work to complete the research successfully.

There are some helping hands without whom it was very difficult for me to complete this work. I would like to acknowledge my heart felt gratitude to every person who has helped me enormously directly or indirectly in every perspective and encouraged me all the time to complete this work.

I express my deep sense of gratitude to Prof. Malay Kumar Das, Department of Physics, University of North Bengal for his inspiring guidance, invaluable help and encouragement throughout the entire course of my Ph.D. work.

I am very much grateful to Prof. Banani Das, Siliguri Institute of Technology, whose active involvement and keen interest in the progress of my research work have made the completion of this thesis possible.

My heartiest gratitude goes to my so loving and caring parents, my father Mr. Jahar Lal Barman and my mother Mrs. Sabitri Bala Barman whose endless faith on me, gave me the internal energy in doing this work for a long period of time and they have continuously encouraged me in every perspective of my journey. So again, thanks to my mother and my father, although the ‘thanks’ word is not enough for their contribution in my life.

I would like to thank all the members in my family especially my elder brothers Mr. Biswajit Barman, Mr. Indrajit Barman and Mr. Satyajit Barman whose endless help and enormous support during the whole period of my research work gave me the power to fulfil this work.

I also convey my sincere gratitude to my University Professors and Mentors namely Prof. Sawpan Kumar Ghosal, Prof. Pradip Kumar Mondal, Prof. Amitabha Mukhopadhyay, Prof. Bikash Chandra Paul, Prof. Suman Chatterjee, Prof. Sripada Halder, Prof. Rajat Kumar Dey and Prof. Pravash Mali for their fascinating and inspiring process of teaching throughout the post-graduation course which motivated me for further higher studies.

I also very much thankful to the Head of the Physics Department Prof. Suman Chatterjee and all the office staff in the Department of Physics for their immense help and support.

My special gratitude also goes to all the non-teaching staffs and all the Honorable persons of the Administrative building and Library of the University of North Bengal, for extending their helping hands in various perspectives.

I also convey my special thanks to all the staff of Registrar branch, Ph.D. and project section, Finance Department and University Science Instrumentation Centre (USIC) for their immense help in various matters.

I would like to acknowledge Prof. Vera Hamplova and Prof. Alexej Bubnov of the Institute of Physics of the Czech Academy of Sciences, 18221, Prague, Czech Republic for providing me some important pure chiral ferroelectric liquid crystalline compounds which I have studied experimentally and have included in some chapters of this thesis.

I would like to convey my very special thanks to my senior and junior co-workers Dr. Akhileshwar Prasad, Dr. Prajnamita Dasgupta, Dr. Anamika Pramanik, Dr. Anish Chakraborty, Dr. Sudipta Kumar Sarkar, Dr. Susanta Chakraborty, Miss. Smriti Mitra, Miss. Pryanta Barman, Miss. Apsari Parvin, Mr. Shantiram Nepal, Mr. Animesh Halder and Mr. Prabir Sarkar for their help to solve various problems arose during this work and made the task easy for me.

Finally, I am highly grateful to the Department of Science and Technology, DST-INSPIRE, New Delhi [DST/INSPIRE Fellowship/2015/IF150049] for the financial support as Junior Research Fellowship for this beautiful and informative work.

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