Declaration

I hereby declare that the thesis entitled "Electrical transport and dielectric

relaxation studies of poly(3,4-ethylenedioxythiophene) nanostructures",

submitted to the School of Sciences, Tezpur University in partial fulfillment

of the requirements for the award of the Doctor of Philosophy in Physics, is a

record of original research work carried out by me. Any text, figures,

theories, results or designs that are not of my own devising are appropriately

referenced in order to give due credit to the original author(s). All the

sources of assistance have been assigned due acknowledgement. I also

declare that neither this work as a whole nor a part of it has been submitted

to any other university or institute for any degree, diploma, associateship,

fellowship or any other similar title or recognition.

Date:

Place: Tezpur

(Paragjyoti Chutia)

Department of Physics

School of Sciences

Tezpur University

Tezpur-784028, Assam, India

vii

Dedicated to My beloved parents & Brother

Acknowledgements

At this moment of great satisfaction and relief, I cherish and acknowledge the love and affection showered on me by many people without whom immense support this work would not have been materialized.

Words fail when I try to express my gratitude to my supervisor Prof. Ashok Kumar for his excellent guidance, judicious advice, support and encouragement throughout the whole Ph. D. course. It has been a great opportunity for me to work under him. Having ventured to do Ph. D. at this stage of my career, I could not have met a better "Guide" than him.

I wish to thank Dr. Rajeev Rawat, Scientist UGC-DAE-CSR, Indore centre for allowing me to carry out DC resistivity and magnetoresistance measurements in his lab and his inspiring suggestions. His constructive comments and assistance at every stage of my work shall always be acknowledged. I would like to extend sincere gratitude to Dr. K. Asokan, Scientist IUAC, New Delhi for the dielectric measurements.

I am also thankful to my doctoral committee members, Dr. Dambarudhar Mohanta and Dr. Pritam Deb, Department of Physics, Tezpur University for their scientific advice, inspirations and showing me the proper direction to carry out my research work. I am highly grateful to all the faculty members of Department of Physics, Tezpur University for their constant help during my research work. The technical staffs of the Department of Physics are also highly acknowledged for the help extended for different experimental works carried out by me. My deep sense of thanks goes to office staffs of Physics Department for their help in office works.

I am grateful to UGC-DAE-CSR, Indore, for financial assistance to carry out my research work and reach this stage.

I would like to thank Mr. Joston P. Nongkynrih of Sophisticated Analytical Instrumentation Facility (SAIF), NEHU, Shillong for helping me with TEM experiments. I am grateful to Mr. Sachin Kumar, Junior Engineer

UGC-DAE-CSR, Indore, for his help during resistivity and magnetoresistance measurements.

I would like to extend my sincere appreciation to the past and present family member of Materials Research Laboratory, Department of Physics, Tezpur University: Deka da, Somik da, Chandrani ba, Anup da, Jnanendra, Jayanta, Rajiv, Arati, Madhabi and Rituraj. Special acknowledgement goes to Jagat da and Prakash da.

I sincerely acknowledge my lab-mate Jnanendra, Jayanta and Anup da for being wonderful friend and for the help I received during various stages of my research work. Special thanks to Deka da, Jagat da and Rajiv for being wonderful brother and friend. My hearty thanks to Tridikhsya Gogoi for her constant moral support and encouragement.

My time at Tezpur University was made enjoyable in large part due to many friends that became a part of my life. Special acknowledgement goes to friends and colleagues: Samiran, Biswa, Mahananda, Koushik, Sibashis, Pragyan, Manash, Pawan, Rizwin, Mani, Munmi, Naba, Rocket, Arunabh, Dipangkar, Dhruba, Bibek, Thakur, Hari, Iftak, Rupam and Deep. I sincerely acknowledge my seniors: Manjit da, Sourabh da and Debo da.

No words can repay for the continuous encouragement, moral support, blessings and everything else that I received from my parents, Chandeswar Chutia and Bhanu Chutia. Big thanks to my brother Panchajyoti Chutia, sister Bandita Chutia and brother-in-law Kanak Gogoi for their help and support at every stage of my life. Their prayers and love have made me strong and enabled me to surmount all difficulties and hardships in life.

Above all, I bow to God Almighty for blessing me with the strength to complete this work.

Place: Tezpur (Paragjyoti Chutia)

Date: