

CONTENTS

	<i>Page No.</i>
Title Page	i
Certificate	iv
Declaration.....	v
Acknowledgement	vi
List of Figures	vii
List of Tables	xiii
List of Abbreviations	xiv
List of Symbols	xv
Abstract	xvi
 Chapter 1: Introduction	
1.1 Introduction	3
1.2 Problem Definition and Research Issues	3
1.3 Basics of Composites	4
1.3.1 Composites	4
1.3.2 Polymer Composites	4
1.3.3 Conducting Polymer Composites	5
1.3.4 Positive Temperature Coefficient to resistivity	5
1.3.5 PTC Intensity	6
1.4 Literature Survey on PTCR Polymer Composites	7
1.5 Objective of the Research Work	28
1.6 Structure of the Thesis	29
References	30

Chapter 2: Materials and Characterization

2.1 Materials Used	39
2.1.1. Different polymers	39
2.1.2 Different Fillers	41
2.1.2.1 Conducting Fillers	41
2.1.2.2 Non-conducting Fillers	43
2.2 PTCR Polymer Composites Investigated in the Present Work	44
2.3 Preparation of the Composites	45
2.4. Techniques Adopted for Materials Characterization	45
2.4.1 Measurement of PTCR Characteristics	45
2.4.2 X-Ray Diffraction Study	46
2.4.3 TMA Study	46
2.4.4 DSC Study	46
2.4.5 Scanning Electron Microscopy (SEM) Study	46
2.4.6 Dynamic Mechanical Properties (DMA)	47
2.4.7 Dielectric measurements	47
2.4.8 Thermo Gravimetric Analysis (TGA)	48

Chapter 3: PTCR Characteristics of HDPE/Cu powder Composites

3.1 Introduction	51
3.2 Preparation of the Composites	52
3.3 Results and Discussion	52
3.3.1 Temperature-Resistivity Study of the Composites under Static Measurement	52
3.3.2 Proposed PTCR Mechanism in HDPE/Cu (30 wt%) Composites	55
3.3.3 PTCR Characteristics of the Composites in Presence of the Clay	58
3.3.4 Morphology study	60

3.3.5 Current (I)-Voltage (V) Characteristics and PTCR Effect under Dynamic Measurement	61
3.3.6 Mechanical Properties	65
3.3.7 Thermo Gravimetric Analysis	66
Conclusions	68
References	69

Chapter 4: PTCR Characteristics of PMMA/Ag-coated glass bead Composites

4.1 Introduction	73
4.2 Preparation of the Composites	73
4.3 Results and Discussion	74
4.3.1 Temperature-Resistivity Study of the Composites under Static Measurement	74
4.3.2 PTCR Characteristics of the Composites in Presence of the Clay	80
4.3.3 Morphology Study	83
4.3.4 Studies on Current (I)-Voltage (V) Characteristics and PTCR Effect under Dynamic Measurement	84
4.3.5 Dielectric Properties	90
4.3.6 Mechanical Properties	91
4.3.7 Thermo Gravimetric Analysis	92
Conclusions	94
References	95

Chapter 5: PTCR Characteristics of PC/Ni-coated graphite composites

5.1 Introduction	99
5.2 Preparation of the Composites	99
5.3 Results and Discussion	100
5.3.1 Temperature -Resistivity Study of the Composites under Static Measurement	100

5.3.2 Proposed PTCR Mechanism in PC/PCL/Ni-coated graphite Composites	103
5.3.3 Morphology Study	106
5.3.4 Studies on Current (I)-Voltage (V) Characteristics and PTCR Effect under Dynamic Measurement	107
5.3.5 Dielectric Properties	111
5.3.6 Mechanical Properties	113
5.3.7 Thermal Analysis	114
Conclusions	116
References	117

Chapter 6: PTCR Characteristics of SAN/SS Composites

6.1 Introduction	121
6.2 Preparation of the Composites	121
6.3 Results and Discussions	122
6.3.1 Temperature-Resistivity Study under Static Measurement	122
6.3.2 PTCR Characteristics of the Composites in the Presence of Clay	127
6.3.3 Morphology Study	128
6.3.4 Current (I)-Voltage (V) Characteristics and PTCR Effect under Dynamic Measurement	129
6.3.5 Dielectric Properties	133
6.3.6 Mechanical properties	135
6.3.7 Thermo Gravimetric Analysis	136
Conclusions	137
References	138

Chapter 7: PTCR characteristics of PS/Ni-powder/MWCNT Composites

7.1 Introduction	141
7.2 Preparation of the Composites	141

7.3 Results and Discussion	142
7.3.1 Temperature-Resistivity Study under Static Measurement	142
7.3.2 Morphology Study	146
7.3.3 Current (I)-Voltage (V) Characteristics under Dynamic Measurement	147
7.3.4 Dielectric Properties	151
7.3.5 Mechanical Properties	153
7.3.6 Thermo Gravimetric Analysis	154
Conclusions	156
References	157

Chapter 8: Summary, Findings and Future Scope of Work

Summary	161
Major Findings	164
Conclusions	164
Future Scope of work	166