

Contents

	<i>page</i>
Abstract	ii
Acknowledgements	v
Contents	vii
List of Figures	ix
List of Tables	xii
List of Symbols	xiii
List of Abbreviations	xv
Chapter 1: INTRODUCTION	
1.1 Organic Electronics	1
1.2 Organic Semiconductors	2
1.2.1 Classification	3
1.2.2 Structure	4
1.2.3 Physics	5
1.3 Charge Transport	6
1.3.1 Hopping Model	6
1.3.2 Small Polaron or Energy Transfer Model	7
1.3.3 Multiple Trap and Release Models	7
1.3.4 Grain Boundary Models	7
1.4 Solution Processing	7
1.5 Organic Field Effect Transistors	8
1.5.1 Device Architectures	9
1.5.2 Operating Principles	9
1.6 Factors Affecting Performance of OFETs	11
1.7 Sensors Based on OFETs	12
1.8 Current Status	12
1.9 Research Focus and Thesis Organization	15
Chapter 2: Experimental and Analytical Techniques	
2.1 Atomic Layer Deposition	17
2.2 Spin Coating	18
2.3 Drop Cast	19
2.4 Thermal Evaporation	19
2.5 Surface Profiling	20
2.6 X-ray Diffraction	21
2.7 Atomic Force Microscopy	22
2.8 Scanning Electron Microscopy	23
2.9 Ultra-Violet and Visible Absorption Spectroscopy	24
2.10 Electrical Characterization	25
2.11 Parameter Extraction	25
Chapter 3: Effect of Solvent Additives on OFET Performance	
3.1 Introduction	28
3.2 Solution Dynamics and Solubility Analysis	29
3.3 Experiments	32
3.4 Film and Device Characterization	32
3.5 Conclusions	36
Chapter 4: Semiconductor:Polymer Blend OFETs	
4.1 Introduction	37
4.2 Phase-Separation in Semiconductor:Polymer Blends	38
4.3 Fabrication of Devices	39
4.4 Results and Discussions	40
4.4.1 Crystallite Characterization	40
4.4.2 Electrical Performance	41

4.4.3 Electrical Stability	43
4.5 Conclusions	46
Chapter 5: TIPS-pentacene Based Flexible OFETs	
5.1 Solution Processed Flexible OFETs	47
5.2 Fabrication of Flexible OFETs	48
5.3 Results and Discussions	49
5.3.1 Crystallite Characterization	49
5.3.2 Electrical Performance of Flexible OFETs	51
5.3.3 Bias Stress Stability	52
5.4 Conclusions	53
Chapter 6: Electro-mechanical Stability of Flexible OFETs	
6.1 Electro-mechanical Stability	55
6.2 Experimentation	56
6.3 Results and Discussions	57
6.3.1 Characterization of Blend Crystallite	57
6.3.2 Electrical Characterization of Flexible Low-voltage Blend OFETs	57
6.3.3 Electro-mechanical Stability of Blend OFETs	58
6.4 Conclusions	60
Chapter 7: Photo-response of Flexible OFETs	
7.1 Introduction	63
7.2 Organic Semiconductors Under Illumination	64
7.3 Operation of Photo-OFETs	65
7.3.1 Photovoltaic Mode	65
7.3.2 Photoconductive Mode	66
7.3.3 Figures of Merit of a Photo-OFETs	66
7.4 Experimentation	66
7.5 Results and Discussions	66
7.5.1 Visible photo-response	67
7.5.2 UV photo-response	74
7.6 Conclusions	78
Chapter 8: Conclusions and Future Scope	
8.1 Summary	79
8.2 Conclusions	80
8.3 Future Scope	81
<i>References</i>	83