

Contents

		Page No.
List of Figures		i–viii
List of Tables		ix
List of Abbreviations		x-xii
Preface		xiii-xv
Chapter - 1	Introduction & Literature Survey	1-34
	1.1 Introduction	1
	1.2 Historical background and conduction mechanism of (π -conjugated) CP.	3
	1.3 Conducting polymer composites.	6
	1.4 Assembling/ordering techniques for polymer and its composites.	9
	1.5 Electronic device applications of CPs and their composites.	24
	1.6 Polyindole	29
	1.7 Scope of the work and objectives of the thesis.	33
Chapter - 2	Experimental and Instrumentation	35-56
	2.1 Introduction	35
	2.2 Experimental	36
	2.3 Sample preparation techniques by LB/LS method	43
	2.4 Characterizations	44
	2.5 Device fabrication	54
Chapter - 3	Air/ liquid interface assisted self-assembly of polyindole via Langmuir-Blodgett system	57-74
	3.1 Introduction	57
	3.2 Results and Discussion	59
	3.3 Conclusion	73
Chapter - 4	Liquid/liquid interface synthesis of poly (5-aminoindole) and its Langmuir assisted self-assembly at air-water interface	75–103
	4.1 Introduction	75
	4.2 Results and discussion	78
	4.3 Conclusion	102
Chapter - 5	Air/ liquid interface for homogenous dispersion of MoS₂ nanosheets in polyindole matrix assisted by Langmuir Technique	104-124
	5.1 Introduction	104
	5.2 Results and discussion	107
	5.3 Conclusion	124
Chapter - 6	Liquid/liquid interface size sorted silver nanoparticles for their	125-158

	uniform decoration in polyindole matrix at air-water interface.	
	6.1 Introduction	125
	6.2 Results and discussion	129
	6.3 Conclusion	156
Chapter-7	Summary and future work	159-163
References		164-180
List of Publications		

List of figures

Figure No.	Figure Caption	Page No.
Figure 1.1	Large area based application of CPs and its composites [2].	2
Figure 1.2	(i) Chemical structure of CPs, (ii) conductivity comparison of undoped (pristine) and doped polymers [7].	4
Figure 1.3	(a) Generation of polaron, bipolaron and bipolaron bands as a result of doping level in various CPs (b) Formation of neutral, positive and negatively charged soliton, (c) formation of two charged solitons on a chain of trans-PA [6].	4
Figure 1.4	(a) Schematic representation of the semi-crystalline structure of P3HT (b) High resolution-TEM micrograph showing the packing of P3HT chains, (inset: SAED pattern) [35].	13
Figure 1.5	Arrangement of polymer backbone from solution (bulk) to ordered array.	15
Figure 1.6	(a) TEM image of AgNP superlattice, histogram (PSD= 4.1 ± 0.23 nm) (b) HR-TEM (interparticle distance=1.51 nm) (c) 2-D Fourier transform spectrum of (b) [52].	15
Figure 1.7	Deposition type on hydrophilic and hydrophobic substrates for transfer of Langmuir monolayers: (a) Z-type, (e) Y-type, (f) X-type.	19
Figure 1.8	Various steps involved in Langmuir technique. Step 1: A-C) solvent spreading, Step 2: Barrier compression, Step 3: Substrate stamping (Schaefer style), Step 4: Substrate lifting.	21
Figure 1.9	SP vs. area (π -A) isotherm depicting various monolayer phase transitions.	22
Figure 1.10	Energy level diagram of metal-semiconductor (n-type) interface (a) before and (b) after the contact.	26
Figure 1.11	Energy level diagram of metal-semiconductor (p-type) interface (a) before and (b) after the contact.	27
Figure 1.12	Energy level diagram of metal-semiconductor interface for ohmic behaviour (a) before and (b) after the contact.	28