
	Page No.
Contents	i
List of abbreviations	ix
List of figures	xii
List of tables	xviii
Preface of the thesis	xix
1 CHAPTER 1: INTRODUCTION	1-4
1.1 Statement of the problem	1
1.2 Biopolymeric scaffolds: A probable solution	2
1.2.1 Biopolymers as biomaterials	2
1.2.2 Biopolymeric scaffolds	2
1.3 Rationale of the study	3
2 CHAPTER 2: LITRATURE REVIEW	5-30
2.1 Biopolymers and their applications	5
2.2 Scaffold	11
2.3 Biopolymers used in febrication of scaffold	11
2.3.1 Silk Fibroin (SF)	12
2.3.2 Gellan Gum (GG)	14
2.3.3 Chitosan (CS)	15
2.4 Techniques used for scaffold fabrication	16
2.4.1 Particulate Leaching Method	18
2.4.2 Electrospinning Technology	19

2.4.3	Freeze Drying Technique	20
2.5	Wound and its treatment	20
2.5.1	Wound?	20
2.5.2	Wound healing	20
2.5.3	Factors affecting wound healing	23
2.5.4	Conventional wound dressings	23
2.5.5	Regenerative medicinal therapy: a modern approach for wound healing	25
2.5.6	Drug (antibiotic) loaded scaffolds as a tool of regenerative medicinal therapy for wound healing	26
2.6	Plan of work	29
3	SECTION I	
	CHAPTER 3	31-60
3.1	Chapter Introduction	31
3.2	Materials	32
3.3	Methods	33-40
3.3.1	Isolation of SF from <i>B. mori</i> cocoons and construction of <i>cpr</i> loaded SF _{sc}	33
3.3.2	Preparation of <i>cpr</i> loaded GG _b beads and GG _{sc} scaffolds	34
3.3.3	Preparation of SF-GG and SF-GG _b -SF scaffolds	34
3.3.4	Scanning electron microscopy and measurement of scaffold porosity	35
3.3.5	Drug loading and release study	37
3.3.6	Drug assay	37
3.3.7	Drug release kinetics	38

3.3.8	Swelling studies	39
3.3.9	In-vitro degradation studies	39
3.3.10	Mechanical properties	40
3.3.11	Selection of best system and post selection evaluation	40
3.4	Results and discussion	42-60
3.4.1	Morphology, ultra-structure and porosity of scaffolds	42
3.4.2	Drug loading and release studies	45
3.4.3	Drug release kinetics and <i>cpr</i> release mechanism	47
3.4.4	Swelling Studies	49
3.4.5	Mechanical properties	50
3.4.6	Degradation Studies	52
3.4.7	Selection of best system and post selection evaluation	52
3.4.8	Some further characterizations of selected scaffold to explore its suitability for biomedical applications	53
a	<i>Haemocompatibility</i>	53
b	<i>Surface roughness</i>	53
c	<i>Dehydration rate or water evaporation rate (WER)</i>	53
d	<i>FTIR analysis</i>	55
e	<i>Antimicrobial activity</i>	56
3.5	Conclusion of the chapter 3	58
4	SECTION II	
	CHAPTER 4	61-85
4.1	Chapter Introduction	61

4.2	Why AgNPs and their herbal biosynthesis?	61
4.3	About <i>Salvinia molesta</i>	63
4.4	Materials	64
4.5	Methods	64
4.5.1	Preparation of aqueous extract from <i>Salvinia molesta</i> leaves (AES)	64
4.5.2	Bio-synthesis of AgNPs using AES	65
4.5.3	Characterization of AgNPs	66
4.5.4	Microorganisms and inoculum preparation	67
4.5.5	Disc diffusion assay	67
4.5.6	Assay for minimum inhibitory concentration (MIC) of AgNPs	67
4.5.7	Cell viability test	68
4.6	Results and discussion	
4.6.1	Primary verification AgNPs synthesis	68
4.6.2	Effect of sunlight exposure time on bio-synthesis of AgNPs	70
4.6.3	Effect of AgNO ₃ concentration on AgNPs biosynthesis	71
4.6.4	Effect of AES inoculum dose on AgNPs	73
4.6.5	Characterization and stability of AgNPs	74
4.6.6	Stability of synthesized AgNPs	78
4.6.7	Biosynthesis mechanism of AgNPs using AES	80
4.6.8	Disc diffusion assay and minimum inhibitory concentration	82

4.6.9	Cell Viability test	84
4.7	Conclusion of the chapter 4	85
CHAPTER 5		86-101
5.1	Chapter Introduction	86
5.2	About <i>Tamarindus indica</i>	86
5.3	Materials	87
5.4	Methods	87
5.4.1	Preparation of aqueous extract of <i>tamarindus indica</i> leaves (AET)	87
5.4.2	Procedure of biosynthesis, characterization and evaluation of antimicrobial efficacy of AgNPs	87
5.5	Results and discussion	
5.5.1	Primary verification AgNPs Biosynthesis	87
5.5.2	Effect of reaction time on biosynthesis of AgNPs in direct sunlight by AET	89
5.5.3	Effect of AgNO ₃ concentration on the synthesis of AgNPs by AET	90
5.5.4	Effect of "AET" inoculum dose on the synthesis of AgNPs by AET	92
5.5.5	Characterization of AgNPs	93
5.5.6	Disc diffusion assay and minimum inhibitory concentration (MIC)	98
5.5.7	Cell viability test	99
5.6	Conclusion of chapter 5	100
5.7	Conclusion of Section II	101

6 SECTION III

CHAPTER 6	102-135
6.1 Chapter Introduction	102
6.2 Materials	102
6.3 Methods	103
6.3.1 Preparation of polymeric solutions and scaffolds	103
6.3.2 Post processing of fabricated scaffolds	103
6.3.3 Characterization of scaffolds and selection of best scaffold	104
6.3.4 Further characterization of selected scaffold	105
6.3.4.1 <i>Confirmation of presence of AgNPs over the surface of scaffold</i>	105
6.3.4.2 <i>Release of silver from scaffold</i>	105
6.3.4.3 <i>Verification of time dependent differential antimicrobial potential of selected scaffold</i>	105
6.3.4.4 <i>Blood compatibility assay</i>	106
6.3.4.5 <i>Water evaporation rate (WER)</i>	107
6.3.4.6 <i>Analysis of surface roughness by AFM</i>	107
6.3.5 Designing of wound dressing	107
6.3.6 In-vivo evaluation of designed wound dressing	108
6.3.6.1 <i>Animals</i>	108
6.3.6.2 <i>Surgical procedure</i>	109
6.3.6.3 <i>Histopathological examination</i>	110

6.4	Results and discussion	111
6.4.1	Morphology and ultra-structure (FESEM analysis) of fabricated scaffolds	111
6.4.2	Porosity measurement	111
6.4.3	Swelling Studies	113
6.4.4	In-vitro enzymatic degradation studies	114
6.4.5	Mechanical behavior of scaffolds	115
6.4.6	Drug loading and release studies	116
6.4.7	<i>cpr</i> release kinetics and release mechanism	117
6.4.8	FTIR analysis	119
6.4.9	XRD analysis	121
6.4.10	Selection of best scaffold for designing of wound dressing	122
6.4.11	Confirmation of presence of AgNPs over the surface of scaffold	123
6.4.12	Release of silver from S/C/NpCp (1:1)	124
6.4.13	Evaluation of time dependent antimicrobial potential of S/C/NpCp (1:1)	125
6.4.14	Blood compatibility assay and dehydration test (WER)	127
6.4.15	Surface topology and roughness (AFM analysis)	129
6.4.16	Deigning of the wound dressing	130
6.4.17	Morphological examination of wound healing	130
6.4.18	Statistical evaluation of wound healing	132
6.4.19	Histological studies	133
6.5	Conclusion of the chapter 6	134

7 Conclusion	136-139
References	140-155
Appendix	
List of publications	
Published manuscripts	
Communicated manuscript	
Personal profile	