

Contents

1 Scaffolding Biomaterials	1
1.1 Introduction	1
1.2 Biomaterials	2
1.2.1 Biopolymers	2
1.2.2 Bioceramics	2
1.2.3 Polycaprolactone (PCL)	4
1.2.4 Poly(ortho esters) and Poly(anhydrides)	5
1.2.5 Poly(glycolic acid), Poly(lactic acid) and Their Copolymers	5
1.2.6 Chitosan	6
1.2.7 Gelatin	6
1.2.8 Biodegradable Metals	7
1.2.9 Biodegradable Polymer Blends	8
1.2.10 Composites	8
References	9
2 Scaffold Fabrication Protocols	13
2.1 Techniques of Producing Scaffolds	13
2.1.1 Electrospinning	14
2.1.2 Solvent Casting and Particulate Leaching	14
2.1.3 Polymer Phase Separation	14
2.1.4 Rapid Prototyping	15
2.1.5 Melt Molding	15
2.1.6 Gas Foaming	16
2.2 Electrospinning Protocol	17
2.2.1 Electrospinning Process and Principle	18
2.2.2 Nozzle Configuration	19
2.2.3 Solution Versus Melt Electrospinning	20

2.3	Parameters in Electrospinning	20
2.3.1	Processing Parameters	21
2.3.2	Solution Parameters	22
2.4	In Vitro Degradation of Scaffolds	23
	References	23
3	Fabrication of Polymer and Composite Scaffolds	
	Using Electrospinning Techniques	25
3.1	Fabrication of Poly(Caprolactone) Nano-fibrous Scaffolds	
	Using Electrospinning Technique	25
3.1.1	Conclusions	33
3.2	Fabrication of Electrospun Hydroxyapatite/Polycaprolactone	
	Scaffolds	34
3.2.1	Conclusions	40
	References	41
4	Fabrication and Characterization of Polymer	
	and Composite Scaffolds Using Freeze-Drying Technique	45
4.1	Hydroxyapatite/Chitosan Scaffolds Using Freeze-Drying	
	Technique	45
4.2	HA/PCL Composite Scaffolds Using Freeze-Drying	
	Technique	55
4.3	Conclusions	58
	References	59
	Summary	61

Composite Synthetic Scaffolds for Tissue Engineering
and Regenerative Medicine

Sultana, N.; Hassan, M.I.; Lim, M.M.

2015, X, 61 p. 24 illus., 7 illus. in color., Softcover

ISBN: 978-3-319-09754-1