

1. Record Nr.	UNINA9910573098103321
Titolo	Multifunctional hydrogels for biomedical applications // edited by Ricardo A. Pires, Iva Pashkuleva, Rui L. Reis
Pubbl/distr/stampa	Weinheim, Germany : , : Wiley-VCH GmbH, , [2022] ©2022
ISBN	3-527-82582-7 3-527-82581-9 3-527-82583-5
Descrizione fisica	1 online resource (381 pages)
Disciplina	610.28
Soggetti	Biomedical engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- Preface -- Chapter 1 Extracellular Matrix Hydrogels from Decellularized Tissues for Biological and Biomedical Applications -- 1.1 Introduction to Hydrogels -- 1.1.1 Definition and Use of Hydrogels in Biomedical Applications -- 1.1.2 Classification and Properties of Hydrogels -- 1.1.2.1 Synthetic Hydrogels -- 1.1.2.2 Natural Hydrogels -- 1.2 Key Features and Functions of the Extracellular Matrix in Homeostasis and Development -- 1.3 Extracellular MatrixBased Hydrogels Derived from Decellularization of Organs -- 1.3.1 Production of ECM Hydrogels -- 1.3.2 Characterization of ECM Hydrogels -- 1.3.3 Pancreatic ECM Derived Hydrogels -- 1.3.4 ECM Hydrogels Derived from Liver -- 1.3.5 Lung ECM Hydrogels -- 1.3.6 Hydrogels Derived from Decellularized Colon -- 1.3.7 ECMDerived Hydrogels from Small Intestine -- 1.3.8 Cellular Responses to ECM Hydrogels -- 1.4 Commercially Available Products -- References -- Chapter 2 CollagenBased Systems to Mimic the Extracellular Environment -- 2.1 Cells in Tissues -- 2.2 Collagen in Tissues -- 2.2.1 Structure of Collagen -- 2.2.2 Collagen Sources -- 2.3 Controlling Collagen Architecture -- 2.3.1 Direction: Collagen Orientation -- 2.3.2 Diameter: Collagen Fibril Diameter -- 2.3.3 Density: Fibril Packing and CrossLinking -- 2.4 Engineering Collagen Scaffolds -- 2.4.1 Collagen CrossLinking -- 2.4.2 Diffusion of

Nutrients and Oxygen Through Collagen Scaffolds -- 2.4.3 Proliferation of Cells in 3D -- 2.4.4 Mechanical Stimulation and Bioreactors -- 2.4.5 Growth Factors -- 2.4.6 DrugLoaded Scaffolds -- 2.5 Conclusions -- References -- Chapter 3 Designing ElastinLike Recombinamers for Therapeutic and Regenerative Purposes -- 3.1 Introduction -- 3.2 ELR Based Hydrogels in Tissue Engineering -- 3.2.1 Hydrogels in Musculoskeletal Tissue Regeneration. 3.2.2 Hydrogels in Cardiovascular Tissue Regeneration -- 3.2.3 Hydrogels in Skin Tissue Regeneration -- 3.2.4 Hydrogels in Neural Tissue Regeneration -- 3.3 ELRBased Hydrogels for Drug Delivery -- 3.3.1 Physically CrossLinked Hydrogels -- 3.3.2 Chemically Cross Linked Hydrogels -- 3.4 Future Remarks -- References -- Chapter 4 EnzymeAssisted Hydrogel Formation for Tissue Engineering Applications -- 4.1 Introduction -- 4.2 Enzymatically CrossLinked Hydrogels -- 4.2.1 Oxidoreductases -- 4.2.1.1 Peroxidases - HRP -- 4.2.1.2 Tyrosinase -- 4.2.1.3 Laccase -- 4.2.2 Transferases: Transglutaminase -- 4.3 Supramolecular EnzymeDriven Hydrogelation -- 4.3.1 Hydrolases -- 4.3.1.1 Phosphatases -- 4.3.1.2 Metalloproteinases -- 4.3.1.3 Thermolysin -- 4.3.1.4 Lactamases -- 4.3.2 DNA Polymerases -- 4.4 Conclusions -- References -- Chapter 5 Hierarchical Peptide and ProteinBased Biomaterials: From Molecular Structure to Directed Selfassembly and Applications -- 5.1 Introduction -- 5.2 Molecular Design/Selection of Building Blocks for Hierarchical Selfassembly -- 5.2.1 Hydrophobic Aromatic Amino Acids -- 5.2.2 Hydrophobic Aliphatic Amino Acids -- 5.2.3 Hydrophilic Charged Amino Acids -- 5.2.4 Others -- 5.3 Hierarchical Assembly Through Environmental Manipulation -- 5.3.1 Temperature -- 5.3.2 Magnetic Field -- 5.3.3 Electric Field -- 5.3.4 Patterned Substrates -- 5.3.5 Shear Forces -- 5.3.6 pH -- 5.3.7 Ultrasound -- 5.3.8 Other Methods -- 5.4 Techniques for the Characterization of Hierarchically Organized Biomaterials -- 5.4.1 Polarized Light Microscopy -- 5.4.2 HighResolution Microscopy (AFM, TEM, and SEM) -- 5.4.3 SmallAngle Xray Scattering (SAXS) -- 5.5 Application of Hierarchical Self assembling Peptide and ProteinBased Biomaterials in Tissue Regeneration -- 5.5.1 Cornea -- 5.5.2 Blood Vessels -- 5.5.3 Skeletal Muscle -- 5.6 Conclusions. Acknowledgments -- References -- Chapter 6 Short Peptide Hydrogels for Biomedical Applications -- 6.1 Introduction -- 6.2 Short Peptide Hydrogels -- 6.2.1 FmocProtected Short Peptides -- 6.2.2 Short Peptide Hydrogels with Alternating Hydrophobic/Hydrophilic Amino Acid Residues -- 6.2.3 Hairpin Peptides -- 6.2.4 AcetylProtected Short Peptides -- 6.3 Biomedical Applications of Short Peptide Hydrogels -- 6.3.1 2D/3D Cell Scaffolding -- 6.3.2 Tissue Engineering -- 6.3.3 Wound Healing -- 6.3.4 Drug Delivery -- 6.4 Conclusions and Outlook -- References -- Chapter 7 Supramolecular Assemblies of Glycopeptides as Mimics of the Extracellular Matrix -- 7.1 Introduction -- 7.2 Glycoproteins and Proteoglycans in the ECM -- 7.3 Design of Selfassembling Peptide-Saccharide Conjugates -- 7.4 Supramolecular Systems Generated by Interfacial Coassembly -- 7.5 Conclusions -- Acknowledgments -- References -- Chapter 8 Supramolecular Assemblies for Cancer Diagnosis and Treatment -- 8.1 Introduction -- 8.2 Cancer Diagnosis -- 8.2.1 Optical Imaging -- 8.2.2 Magnetic Resonance Imaging (MRI) -- 8.2.3 Photoacoustic Imaging -- 8.3 Cancer Treatment -- 8.3.1 Drug Delivery -- 8.3.2 EnzymeInstructed Self assembly (EISA for Cancer Therapy) -- 8.4 Future Perspectives -- References -- Chapter 9 Polyzwitterionic Hydrogels as Wound Dressing Materials -- 9.1 Polyzwitterions -- 9.1.1 General Structure and Properties -- 9.1.2 Nonfouling Properties -- 9.2 Wound Management

and Wound Dressings -- 9.3 PZIs as Dressings Materials for Acute Wounds -- 9.3.1 Polycarboxybetaines (PCBs) -- 9.3.2 Polysulfobetaines -- 9.4 PZI as Dressings for Chronic Wounds Management -- 9.4.1 Dressings for Chronic Wounds Management Based on Polycarboxybetaines -- 9.4.2 Polysulfobetaines as Dressings for Chronic Wounds Management -- 9.5 Conclusions -- References.

Chapter 10 HyaluronanBased Hydrogels as Modulators of Cellular Behavior -- 10.1 Introduction -- 10.2 Biological Relevance of Hyaluronan -- 10.2.1 Hyaluronan in Biological Tissues and Fluids -- 10.2.2 Hyaluronan as a Signaling Molecule -- 10.3 HyaluronanBased Systems for Biomedical Applications -- 10.3.1 Hydrogels for Tissue Engineering -- 10.3.1.1 Differentiation of Stem Cells -- 10.3.1.2 Space Filling Hydrogels -- 10.3.2 3D Cancer Models -- 10.4 Conclusion and Future Remarks -- Acknowledgments -- References -- Chapter 11 Hydrogel Fibers Produced via Microfluidics -- 11.1 Introduction to Microfluidics and Microfluidic Wet Spinning -- 11.1.1 Fundamentals of Microfluidics -- 11.1.2 Application of Microfluidics to Fiber Production: Microfluidic Wet Spinning -- 11.2 Fabrication of Chips for Microfluidic Wet Spinning -- 11.3 Biomedical Applications of Hydrogel Fibers Produced via Microfluidics -- 11.3.1 Tissue Engineering -- 11.3.1.1 SingleFiber Scaffolds -- 11.3.1.2 Assembled Fiber Scaffolds -- 11.3.2 Sensors and Actuators -- 11.3.2.1 Sensors -- 11.3.2.2 Actuators -- 11.3.3 Controlled Drug Delivery -- 11.3.4 Other Biomedical Applications -- 11.4 Hydrogel Optical Fibers -- 11.4.1 Materials -- 11.4.2 Applications -- 11.5 Conclusions -- Acknowledgments -- References -- Chapter 12 Embedding Hydrogels into Microfluidic Chips: Vascular Transport Analyses and Drug Delivery Optimization -- 12.1 Introduction: Microfluidic Chips for Modeling Human Diseases and Developing New Therapies -- 12.2 Hydrogels to Mimic the Extracellular Matrix (ECM) -- 12.3 Fabrication of Microfluidic Chips -- 12.3.1 Single Channel Microfluidic Chips -- 12.3.2 DoubleChannel Microfluidic Chip -- 12.4 Applications of Microfluidic Chips in Biophysical Transport Analysis -- 12.4.1 SingleChannel Microfluidic Chips -- 12.4.2 Double Channel Microfluidic Chips. 12.5 Nanoparticle Transport Analyses -- 12.6 Computer Simulations of Nanoparticle and Cell Transport -- 12.7 Conclusions and Future Directions -- References -- Chapter 13 Multifunctional Granular Hydrogels for TissueSpecific Repair -- 13.1 Introduction -- 13.2 Granular Hydrogels - Functional Features and Design -- 13.2.1 Injectability -- 13.2.2 Interparticle Annealing Toward MAPs Assembly -- 13.2.3 Void Spaces and Microporosity -- 13.2.4 Modularity and Multifunctionality in Granular Systems -- 13.2.5 Bioactive Molecules Delivery -- 13.3 Granular Hydrogels for TissueSpecific Repair -- 13.3.1 Vascularization Strategies -- 13.3.2 Skin Tissues Repair -- 13.3.3 Bone Tissue Repair -- 13.3.4 Emerging Trends and Applications -- 13.4 Conclusions and Future Perspectives -- Acknowledgments -- References -- Chapter 14 Injectable Hydrogels as a Stem Cell Delivery Platform for Wound Healing -- 14.1 Wound Healing -- 14.1.1 Clinical Needs for Wound Healing -- 14.1.2 Wound Healing Pathology -- 14.1.2.1 Hemostasis -- 14.1.2.2 Inflammation -- 14.1.2.3 Proliferation -- 14.1.2.4 Remodeling -- 14.2 Stem Cells for Skin Wound Healing -- 14.2.1 Stem Cell Overview -- 14.2.2 AdiposeDerived Stem Cells for Wound Healing -- 14.2.3 Current Limitations and Future Directions of SCs for Wound Healing -- 14.3 Injectable Hydrogel Dressing as a Delivery Platform -- 14.3.1 Types of Injectable Hydrogels -- 14.3.1.1 Naturally Derived Injectable Hydrogels -- 14.3.1.2 Synthetic Injectable Hydrogels -- 14.3.1.3 Hybrid Injectable Hydrogels -- 14.3.2 Injectable Hydrogels as Scaffolding for Stem Cells Delivery -- References -- Index

-- EULA.

---