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Polymeric Biomaterials, Edited by Severian Dumitriu, Marcel Dekker, New York, ISBN 0-8247-8969-5, x 845 pp, 1994, \$195.00

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BOOK REVIEW

Polymeric Biomaterials, Edited by Severian Dumitriu, Marcel Dekker, New York, ISBN 0-8247-8969-5, x + 845 pp, 1994, \$195.00

This is a comprehensive reference on the physicochemical and biological properties of biomaterials. It covers many classes of medical polymers, including vinyl polymers, polyurethanes, and polysaccharides. The volume contains 17 chapters from over 40 academic and industrial contributors, mostly from Europe. It is organized in three parts: Polymers as Biomaterials; Medical and Surgical Applications; and Polymeric Drug and Drug Delivery Systems. The lengthy introductory chapter by Severian Dumitriu and Cristina Dumitriu-Medvichi on Hydrogel and General Properties of Biomaterials offers a thorough, theoretical background on various structural, mechanical and characterization aspects of polymers. The authors also cover the sterilization and disinfection of polymeric materials, which is often overlooked in other texts.

Chapter 2 by Severian Dumitriu and Daniela Dumitriu examines polymer biocompatibility, including biomaterial interactions with tissue and blood compatibility. Chapter 3 by Casu discusses in detail heparin, chemically modified glycosaminoglycans and heparinoid polysaccharides, their structure and biological activity. Two other chapters provide accounts of chitin-derived medical products and polymer surface modifications for enhanced blood compatibility, respectively. The latter includes chemical and other modifications and the immobilization of biologically active molecules.

In the second part, there are chapters on medical uses of polyurethane elastomers, therapeutic vascular devices, and dental and maxillofacial surgery applications of polymers. Chapter 9 by Rastrelli briefly treats skin graft polymers. Guttman and Guttman describe in detail the uses and biological properties of sutures. In a particularly interesting section the authors also cover composite and drug-delivering sutures.

Part three opens up with Jozefonvicz and Jozefonvicz' chapter on polymers in contact with blood, such as in extracorporeal devices, catheters, tubings, hollow fibers and membranes. The authors describe the relationship of blood compatibility to polymer structure and polymeric surfaces, as well as the impact of polymers on the immune system. Fitzgerald and Wilson highlight the various uses of polymeric systems in ophthalmic drug delivery. They describe polymer gel systems derived from carboxyvinyl polymers, poloxamer-polyethylene glycols and natural polymers. Of note is also chapter 13 on biodegradable drug delivery polymers by Domb, Amselem and Maniar. The authors cover the synthesis and degradation of polylactides, polycaprolactones, polyamides, polyphosphazenes, polyanhydrides and other synthetic polymers. For each system they also provide information on the polymer's biocompatibility and toxicity.

Chapter 14 by the editor and Maria Dumitriu is a very comprehensive review of polymeric drug carriers, which should have more appropriately preceded the first two chapters of this section. At close to 300 pages, with 77 tables, more than 170 figures and over 800 references, this chapter, like chapter 1, could have easily constituted a monograph by itself. The authors summarize first the prodrug approach to improved drug delivery, the various types of drug delivery systems and their uses. Extensive tables list vinyl polymers and other reactive polymers, as well as examples of numerous polymeric drug conjugates. Other topics include the design criteria for the preparation of polymer-drug conjugates, and the hydrolytic lability of drug-carrier linkages. The remaining two-thirds of the chapter is devoted to the syntheses of drug delivery polymers by polymerization, polycondensation and other types of polymer reactions. Many examples of polyamino acids and synthetic carbohydrate polymers carriers are also provided.

Chapter 15 treats the syntheses and medical applications of synthetic oligomers, such as acrylates and vinylics. It also covers polyethylene glycols and their copolymers. Chapter 16 is dedicated to a discussion of the preparation, characterization, and clinical uses of micro- and nano-particle drug carriers. Uglea's final chapter, entitled "Oligomers as "Physical Catalysts" in Biological Processes", examines biological and artificial membranes.

The contributed chapters are of variable length and their contents vary substantially in their depth of subject coverage. Overall, however, this is a valuable book that covers many aspects of biomaterials and their dental and medical uses. The various discussions of relevant biological, chemical and physical polymer properties are also very useful. Extensively indexed, the volume provides some 2,800 literature references and is uniformly typeset.

Although the book does not treat any regulatory aspects and certain material applications, such as burn and wound dressings, it will nevertheless be an essential source of information for all those interested in polymeric materials.

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