

PREFACE

The writing of this book was begun in 1995. A course on “Ceramics and Glasses As Biomaterials (51:174)” was first offered during 1988 under the Department of Biomedical Engineering at the University of Iowa. It was largely based on my *Biomaterials Science and Engineering* (Plenum, 1984), especially Chapter 9, “Ceramic Implant Materials.” Needless to say, there have been a multitude of significant new developments, notably with regard to cubic zirconia, diamond-like carbon, tissue engineering, and nanotechnology. The use of ceramics in tissue engineering is a logical extension of bioceramics, as bone and teeth are composed of ceramics and organic materials. The development of nanotechnology has unlimited potential for future applications. Already used as gemstones and in laser crystals, employment of bioceramics in sensory organ implants is promising. Their use means that cochlear implants can be made without electronic devices to feed sound waves to more than 20,000 nerve endings, as opposed to the 20 electrodes currently needed to stimulate the same number of nerves (see Example 11.3). One day we will manufacture a “direct-sensing” device made with ceramics and organic matter (e.g., collagen) that has piezoelectric properties. Similarly, electromagnetic wave-sensing ceramics or polymers can be developed for such “direct transfer” of energy in the eye or the ear and with other nerve signals.

The task of writing a textbook is difficult. One needs to cover all subjects in a balanced but adequate fashion. This author believes in mastering the basics and fundamentals first before advancing to other areas. It is therefore wise to study Chapters 2–5 before proceeding to Chapters 6–11, where specific bioceramics are presented and discussed. The final chapter (12) presents an amalgamation of all previous studies as applied to medicine and dentistry. The author has attempted to include as much related material as possible without overburdening the reader. Any errors of commission or omission that remain in spite of my and my copyeditor’s utmost efforts are our responsibility alone.

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