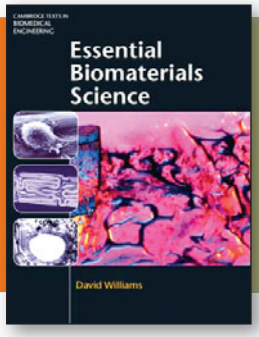


Essential Biomaterials Science

David Williams

Cambridge University Press, 2014
672 pages, $99.00 (e-book $79.00)
ISBN 9780521899086

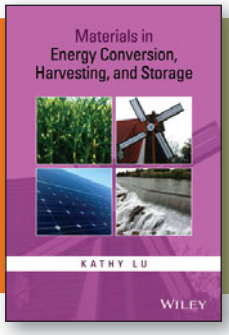
This textbook, written at an introductory level, covers a broad range of topics related to biomaterials from general materials science, biocompatibility, medical devices including drug-device combination devices to industrial infrastructure. The book also presents an introduction to the ongoing research on regenerative medicine, nanomaterials, etc. The writing style, depth, and balance between pure science and applications are consistent throughout the book. There are study problems at the end of each chapter—many of them are open-ended and suitable for students to use as homework projects.

One of the highlights is the discussion of biocompatibility. It starts from products and their interactions with tissues. Biocompatibility is not a simple reaction of the tissues to materials, components, or similar products. It deals with specific reactions of biological systems to the products that are made of the specific materials, in specific processes, and used in specific ways. In this book, the author uses examples of devices to describe physical, chemical, mechanical, and other possible interactions between medical devices and tissues. The causes and consequences of toxicity, inflammation, infection, immune response, and long-term reactions are discussed.

Introduction to medical devices is another highlight, which makes the discussion of biomaterials more relevant to their end use. The coverage is extensive, including orthopedic, cardiovascular, central nervous systems, eyes, ears, and other main organs and systems. Each section starts with a brief introduction to the diseases, followed by a description of the devices, their working principles, and device-biological interactions. Most of the devices discussed in the chapter have been approved by the regulatory agencies for treating the diseases of patients. History of the development is presented. Major failure mechanisms are discussed. This not only serves as examples to illustrate how materials are used in medical devices, but also describes how materials and devices, interact with biological systems in real applications.

The references are key publications in the field and up to date. The tables, figures, and in-box descriptions are valuable for readers to understand the content. This is one of the few books that I can highly recommend to college students, researchers, and engineers in the field as a desktop reference.

***Reviewer: SuPing Lyu** is a Principal Researcher at Medtronic Inc., Mounds View, Minn., USA.*



Materials in Energy Conversion, Harvesting, and Storage

Kathy Lu

Wiley, 2014
448 pages, $159.95 (e-book $127.99)
ISBN 978-1-118-88910-7

This book has both the advantages and disadvantages of a single-author volume. It flows much more smoothly than an edited text. However, the author seems to have taken much of the material from the literature without a sufficiently critical eye, leading to errors of emphasis that are exemplified by the chapter on energy storage discussed later. Also, it is not clear who the target audience is. It is not a textbook, as there are no questions or problem sets, and no introductory material for each area, such as a chapter on thermodynamics or electrochemistry. A student needs the latter to really understand the role of materials in energy production, harvesting, use, and storage.

The book starts with an introductory chapter 1, which is a bit too short. Figure 1.2 shows where the sources of energy are in the United States. It would have been useful for the reader to know also how this energy is used, for example, directly or indirectly by the user. How much is used to generate electricity? What proportion is used in the following sectors: manufacturing, residential, and transportation? How much energy is used per capita in North America compared to the rest of the world, and what are the implications of this to the global energy "pollution" if every other country were to wish for the same usage? It would also have been useful to have descriptions of where materials advances could have their largest impact. An area not discussed here or in similar books is where materials could be used to reduce the use of energy.

After the introduction, the remainder of the book is split into 11 chapters. Chapters 2–5 cover fossil energy, nuclear energy, solar energy, and bioenergy. The next two chapters on wind energy conversion, and hydro, geothermal, and ocean energy are much too short to educate the reader on the critical materials issues. For example, there is no mention of pumped hydro storage, despite the commonality of the turbine materials issues and the huge

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