

Nanotechnology-Enhanced Orthopedic Materials: Fabrications, Applications and Future Trends

Lei Yang

Woodhead Publishing, 2015

234 pages, \$170.00

ISBN 9780857098443

This book is split in two parts. Part one, “Fundamentals of Nanotechnology and Nanomaterials for Orthopedics,” has four chapters covering fundamentals, metals and alloys, nanoceramics, and bioinspired nanopolymers and nanocomposites for implants and applications. Part two, “Future Trends in Nanotechnology-Enhanced Orthopedic Materials,” has five chapters, covering carbon nanostructures, self-assembled nanostructures for bone-tissue engineering, nanotechnology-controlled drug delivery for treating bone diseases, frontiers, and safety in the field.

The objectives of the author are ambiguous: the book does not have the wide and deep approach to be a textbook, nor the related necessary educational approach (e.g., there are no homework problems for students or similar teaching material). Moreover, it is hardly an exhaustive account of current trends in the field, as informative material on

the well-established results versus open problems and new approaches is insufficient. In fact, the introductory concepts (all of chapter 1 and the introductory notions of every chapter) are quite trivial for researchers active in the field and too generic for young researchers.

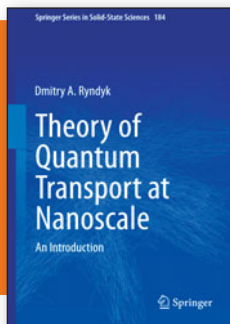
Furthermore, the short technical portion of every chapter has only a partial literature review. It basically mentions the summary of results from a curiously select choice of papers in the field, and only concisely. It lacks discussions of significant contributions from important scientists in the field. For example, in chapter 2, the author discusses titanium-based biomaterials, summarizing the results of 15 references—supposedly the crucial ones in the field—in two and a half pages out of the chapter’s 17 pages. The problem is that among the references, most of which come from the group to which the author belongs, not one comes from the

extensive data produced by the group of M. Textor, which also published a reference book and a large number of papers on titanium-based biomaterials. For such a current and relevant topic, this chapter is lacking. The same attitude can be found for other “hot” topics, notably the carbon-based biomaterials. This suggests that the value of the book will decrease exponentially with the aging of the set of references listed by the author.

Finally, a discussion of future trends is effectively absent. Indeed, the perspectives and future trends given in chapter 8 are quite obvious to any researcher in the field: implant multi-functionality is discussed in detail in many seminal papers (not even referenced from 2010 is the analysis of the fate of stem cells, more of a current topic rather than a future trend, since it has existed for at least the last five years).

Overall, the book has substantial informational value, and the figures are appealing and self-explicative. However, such a wide overview of the results should have prompted a more thorough treatment of the field’s problems and perspectives. I cannot recommend this book except as a review of some recent literature.

Reviewer: Giovanni Marletta of the Department of Chemical Sciences, University of Catania, Italy.



Theory of Quantum Transport at Nanoscale: An Introduction

Dmitry A. Ryndyk

Springer, 2016

246 pages, \$129.00 (e-book \$99.00)

ISBN 978-3-319-24086-2

Professor Dmitry A. Ryndyk is an expert on quantum transport theory and has taught classes on this subject at the University of Regensburg and Technische Universität Dresden. This book has been developed from his course notes and is aimed at being a suitable advanced-level textbook for master’s- and PhD-level students, with the further intent that it be

useful for experts working in the fields of quantum transport theory and nanoscience. Topics that the author says are not discussed include quantum interference of the Aharonov–Bohm type, weak localization, universal conductance fluctuations, random matrix theory, the quantum Hall effect, and quasiclassical and semiclassical transport. There are nine chapters split in two parts.

Chapter 1 is a brief introduction that outlines the excluded subjects listed previously, and provides an overview of the rest of the book. Part I, covering basic concepts, then follows. Chapter 2 explores the Landauer–Büttiker method with sections on quantum junctions, a formulation and derivation of the Landauer formula, multichannel scattering and transport, and a consideration of multi-terminal systems. Chapter 3 discusses Green functions with sections on the scattering problem, matrix Green functions, recursive methods, semi-infinite electrodes, and resonant transport. Chapter 4 explores tunneling with sections on the Hamiltonian method and sequential tunneling. Chapter 5 explores electron–electron interactions and the Coulomb blockade, including sections on