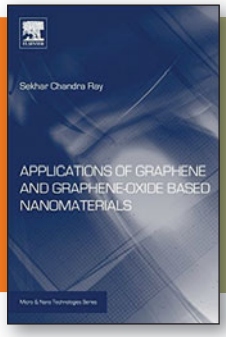


Applications of Graphene and Graphene-Oxide Based Nanomaterials

Sekhar Chandra Ray

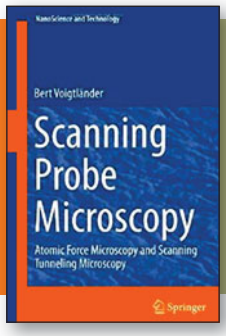
Elsevier, 2015
92 pages, $49.95
ISBN 978-0-323-37521-4

This book falls into Elsevier's Micro and Nano Technologies series. Graphene belongs to an outstanding new class of 2D materials that has opened up new avenues into low-dimensional physics and chemistry. Graphene's high mechanical strength, large surface area, and superior electrical and thermal conductivities have opened up avenues for new devices in a variety of applications, such as electronics and optoelectronics. The progress in this field is exceptionally fast, making headway for new developments. A number of books have been published at an advanced level and are available in the market to satisfy the experts. However, very few books on graphene address the needs of beginners. In this context, the present book is a small-sized edition on graphene written in three chapters with the following coverage.

Chapter 1 is devoted to the application and uses of graphene, with textual material of 31 pages and references running to 7.5 pages. Chapter 2 describes applications and uses of graphene oxide and reduced graphene oxide, with 17 pages and 2.5 pages of references. Chapter 3 is on graphene-based carbon nanoparticles for bioimaging applications, with 22 textual pages and 3.5 pages of references. The first two chapters are written by the author of the book, and the third is co-written with Nikhil R. Jana. The book offers short reviews of a variety of applications such as hydrogen storage, batteries, transparent conductors, flexible electronics, spintronics, ballistic transistors, fuel cells, and bioimaging.

The materials for the chapters are taken from publications in scientific journals and are very useful. In books aimed at describing historical developments and orienting the reader toward the progress of technology in the new and fast-emerging field of graphene, it is common for the author to use a non-scientific language; this book is no exception. The book is good reading material for researchers in the area of graphene who wish to know the developments that have taken place. While this book has limitations in regard to giving the basics along with supporting theory for undergraduate students, it will, however, serve as a useful tool for students seeking knowledge on the applications of graphene.

Reviewer: K.S.V. Santhanam *is a professor in the School of Chemistry and Materials Science at the Rochester Institute of Technology, USA.*



Scanning Probe Microscopy: Atomic Force Microscopy and Scanning Tunneling Microscopy

Bert Voigtländer

Springer-Verlag, 2015
382 pages, $179.00 (e-book $139.00)
ISBN 978-3-662-45240-0

Considering the number of excellent books that have been written to date on this topic, one may ask what another book on scanning probe microscopy (SPM) fundamentals can add to the existing texts. The answer lies in the extent of this burgeoning field. No single work is likely to cover it all, but a good book should describe the relevant topics. Indeed, this volume is not simply a rehash of existing books with some recent developments. It is a nice blend of serious and in-depth presentations of many of the basic fundamentals of the technique, written—in Voigtländer's words—in an "easily digestible manner."

The book begins with a brief introduction, and then plunges into topics (24 chapters) necessary to understand how SPM really works, including in-depth discussions of very technical matters, such as characteristics of operational amplifiers and piezoelectric materials as well as an entire section on noise. Purely technical topics cover about one-third of the content. On the other hand, there is a more fundamental development of tunneling theory and an extended description of the mechanics governing different oscillating modes of atomic force microscopy. In order to make difficult concepts accessible, important and useful equations are developed clearly, with step-by-step explanations. Each chapter starts with a short introduction, and ends with a ½–1 page bulleted summary of the key points. In addition to the topics mentioned previously, there are chapters on artifacts, image analysis, and manipulation, and a few SPM applications such as contact potential measurements, manipulation at the atomic scale, mechanical characterization, and surface spectroscopy. Where necessary, brief discussions on related topics such as surface states and electrostatics are inserted. This is definitely not a "how to" book, and certainly not an exhaustive treatment of SPM: for instance, the vital practical topic of image processing is treated in a very cursory way, and data

https://doi.org/10.1557/mrs.2016.17 Published online by Cambridge University Press