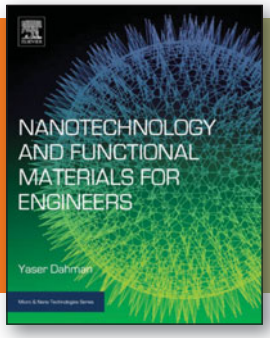


Nanotechnology and Functional Materials for Engineers

Yaser Dahman

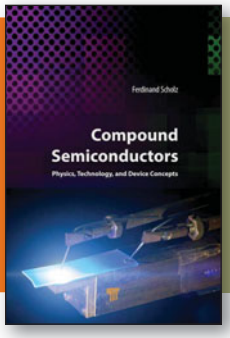
Elsevier, 2017
282 pages, $130.00 (e-book $130.00)
ISBN 9780323512565

In recent years, the subject of nanotechnology applied to engineering has seen a significant growth in both academia and industry. This book presents the fundamental concepts, techniques, and applications of nanotechnology in different engineering fields. It will be of interest to senior undergraduate and graduate students in chemical and materials engineering, electrical engineering, biomedical engineering, chemistry, physics, and related disciplines, as well as researchers, engineers, and technicians interested in applications of nanotechnology.

Each chapter deals with a major aspect of nanotechnology related to synthesis and processing of different types of nanomaterials and their applications, while also presenting the current state of the art and future perspectives. Chapter 1 provides the basic concepts of nanotechnology in a simple but comprehensive manner. It also presents a historical perspective and the current status of this field. Using a theoretical background, chapter 2 explains the main techniques for characterization of nanoparticle properties, such as morphology, crystal structure, and composition. The different types of nanomaterials are presented and explored in chapter 3. The mechanisms of response to different stimuli of these nanomaterials are discussed, and four potential applications are described: (1) entrapping ability as nanocarriers, (2) biological potential, (3) field-effect transistors, and (4) field-emission displays. Chapter 4 is devoted to the manufacturing methods and materials for various types of nanosensors for applications in medicine, security, environmental sensing, and industrial sensing. Chapters 5–8 deal with nanoparticles, nanopolymers, carbon nanotubes, and nanoshells, respectively. The methods of synthesis, the fundamental properties, and applications of these materials are summarized. Chapter 9 highlights the electronic and electro-optic nanotechnology. Some examples of devices, such as displays, dendrimers, modulators, and photodetectors, are described. Chapter 10 discusses the methods of preparation of self-assembling nanostructures. It also presents the definition, background, and principles of self-assembly. The last chapter presents applications in nanomedicine, highlighting nanopharmaceuticals, nanoophthalmology, tissue engineering, and bone engineering. A good number of adequate and up-to-date references are provided at the end of the book.

This book is well written and well illustrated with figures and tables, which allows easy reading and comprehension. It can be used as a textbook. There are no homework exercises, but some examples are shown. It covers the main aspects of nanotechnology for engineering applications and can serve as a good source for courses on this topic.

***Reviewer: Mariana Amorim Fraga**, full professor and researcher in the Applied Nanoscience and Plasma Technology Group at Universidade Brasil, Brazil.*



Compound Semiconductors: Physics, Technology, and Device Concepts

Ferdinand Scholz

Pan Stanford, 2017
306 pages, $149.95 (e-book $49.46)
ISBN 9789814774079

This is a well-organized, concise introduction to the field of compound semiconductors and their applications in optoelectronic and electronic devices. The fundamental science and technology necessary to understand research in this field is covered in easy-to-read text: short paragraphs, bullet lists of key points, copious figures, and short chapters (typically less than 20 pages). There is a logical flow from basic properties through process technologies to device applications. The emphasis is on III–V compound semiconductors, particularly gallium arsenide, indium phosphide, and gallium nitride, with the occasional comparison to silicon. Aside from the coverage on gallium nitride, many of the characterization techniques and materials processing methods have been well established and written about for close to 40 years; more than 75% of the references are from before 2000. Still, Scholz's presentation is fresh with its inclusion of quantum effects, low dimensional systems, and group III nitrides and their distinctive properties.

The book is roughly divided into four sections.The first four chapters cover the basic properties of compound semiconductors and their synthesis. The defining general properties of semiconductors such as crystal lattices, energy bandgaps, and charge-carrier statistics are covered in chapter 1. The distinguishing properties of compound semiconductors, their direct bandgaps, the ability to control the bandgap by forming alloys such as $Al_xGa_{1-x}As$, and energy bandgap discontinuities realized with heterojunctions, are described in chapter 2. Methods of growing bulk

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