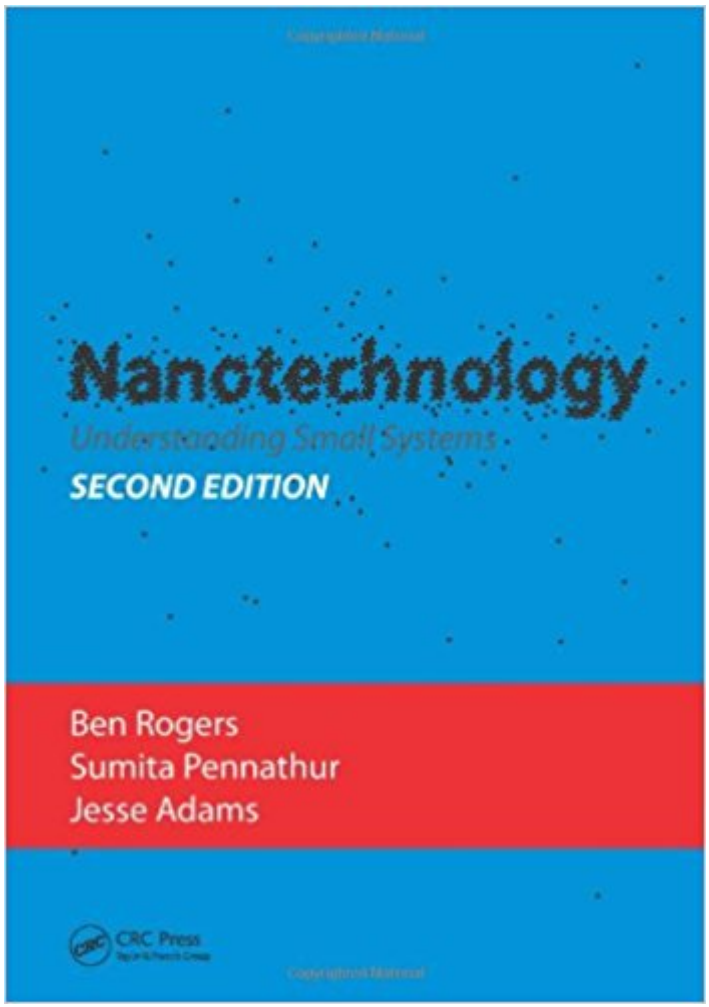
Nanotechnology: Understanding Small Systems, Second Edition (Mechanical And Aerospace Engineering Series)



Synopsis

Winner of a CHOICE Outstanding Academic Book Award 2011!Transistors using one electron at a time. Sunscreens made with titanium dioxide particles that look transparent to our eyes but block harmful UV rays. Nanometer-sized specks of gold that change color to red and melt at 750Ã Â C instead of 1064Ã Â C. Nanotechnology takes the unique physical properties of items measuring roughly 0.1 to 1000 nanometers and puts them to use. Such applications have made nanotechnology a hot topic, but the search for a true introductory resource usually comes up cold. Nano novices come from a wide variety of backgrounds, so an effective text must assume limited understanding of background material and not be overly focused on any particular area. Still, it must maintain scientific rigor and quality. Fitting neatly between popular science books and high-level treatises, Nanotechnology: Understanding Small Systems, Second Edition works from the ground up to provide: A detailed yet accessible introduction to one of the worldÃ¢â ¬â„¢s fastest growing fields, understandable to members of a variety of disciplines A clear presentation of real-world examples and original illustrations, as well as hundreds of homework problems of varying types, including multiple choice, true-false, in-depth calculation, and essay (with complete solutions manual) A systems-based approach that illustrates how underlying areas of nano are assembled to create systems with unique functions and characteristics Comparing nanoscale and macroscale systems reveals the complex and fundamental differences between phenomena at different scales and uncovers the specific challenges and opportunities of nano. With its engaging and entertaining style, this book provides a gateway into an exciting and rapidly evolving area of science.

Book Information

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Customer Reviews

"Ever since Richard Feynman gave his classic talk in 1959, "There Is Plenty of Room at the Bottom," there has been a steadily increasing buzz in manipulating matter at the atomic scale--nanotechnology. This updated work (1st ed., 2008) takes the revolutionary concepts and techniques that have traditionally been fodder for graduate study and makes them accessible for all. Covering subjects ranging from materials science to mechanics and biotechnology to photonics, Rogers and Adams (both, Nevada Nano) and Pennathur (Univ. of California, Santa Barbara) deftly introduce the reader to each topic and quickly explain why it is important on the nanoscale. An exciting feature is the 'back of the envelope' examples, where the reader is walked through 'quick and dirty' calculations to illustrate and understand (mathematically) the complex concepts discussed. The end of each chapter includes traditional problem sets and short answer questions to test understanding. While not a comprehensive text in any specific area of nanoscale science or engineering, this outstanding introduction to the broad field of nanotechnology provides a solid foundation for further study. Summing Up: Highly recommended. Lower-division undergraduates and above; general readers."Ã¢â ¬â ¢N.M. Fahrenkopf, University at Albany,Ã Â CHOICE, 2011 Praise for the First Edition"It is written in an easily understandable manner, not requiring from the reader deep knowledge in the related topics of physics and mathematics before reading this book. It uncovers the most important things about nanotechnology explained in a very illustrative manner with many simple examples, figures, and Ã¢â ¬Ëœback-of-the-envelopeÃ¢â ¬â„¢ calculations, so that the reader can get a good feeling for the numbers of nanotechnology."Ã¢â ¬â ¢Zentralblatt MATH, 1185

Ben Rogers graduated Cum Laude with a Bachelor of Science in Mechanical Engineering (2001) and a Master of Science in Mechanical Engineering (2002), from the University of Nevada, Reno. He's worked on a due diligence team to evaluate and mentor start-up companies, and as a staff writer for multiple newspapers.. More recently, he's worked as a research scientist at Nanogen, Inc., the Oak Ridge National Laboratory, the NASA Jet Propulsion Laboratory, and the Nanomechanics Research Group at the University of Nevada. He's coauthored 19 technical papers in journals including Nature and Applied Physics Letters, has two patents and has served as a reviewer for both scientific and educational journals, as well as the National Science Foundation. He is the lead

author of Nanotechnology: Understanding Small Systems (CRC Press), a first-of-its kind, comprehensive textbook on nanotechnology, and teaches a course on the topic. Ben currently serves as the principal engineer at Nevada Nanotech Systems, Inc., working to commercialize a new sensor technology. He lives in Reno with his wife and two daughters. In his spare time, he loves to write and has published a novel as well as many short stories and essays. Professor Sumita Pennathur started her tenure at the University of California, Santa Barbara (UCSB) in July 2007. Prior to UCSB, she held postdoctoral positions at both University of Twente in the Netherlands and Sandia National Laboratories in Livermore CA. She received her PhD in Mechanical Engineering at Stanford University in March 2006, where her research investigated electrokinetic transport of fluids at the nanoscale. Prior to Stanford, she received both her B.S. and M.S. in Aerospace and Aeronautical Engineering from M.I.T. where she studied microscale cavitation in MEMS devices. In addition to co-authoring an undergraduate textbook about Nanotechnology, she is the recipient of both the 2008 DARPA Young Faculty Award and the 2009 UC Junior Regents Faculty Award. Jesse Adams received a bachelor's degree in mechanical engineering with a business minor from the University of Nevada, Reno. He graduated Summa Cum Laude and also received the outstanding mechanical engineering senior award. After winning a NSF graduate fellowship, Jesse went to Stanford University, where he received a Masters of Science in mechatronics. His research interests led him to pursue a Ph.D. in nanotechnology working with the co-inventor of the Atomic Force Microscope, Calvin Quate. He developed a high-speed multi-probe AFM, which necessitated extensive work in the Stanford clean room to fabricate active AFM probes. This research was enhanced by a learning technology and educational reform component under the direction of Larry Leifer, then Director of the Stanford Learning Laboratory. While at Stanford, Jesse served on a special committee for the provost, then Condoleezza Rice, to explore and recommend emergency graduate housing solutions. Jesse also served two terms as the assistant director of the respected sophomore college at Stanford. While an assistant professor at the University of Nevada, Reno, Jesse did research on a self-sensing microcantilever platform being investigated for explosives detection, chemical vapor detection, and water quality sensing. In addition to this research, Jesse developed a new course in nanotechnology that trained students in a broad understanding of the field. Jesse is a co-author of a first-of-its-kind textbook, Nanotechnology: Understanding Small Systems, as well as 25 technical papers. He has multiple patents and patents pending, has given invited talks on scanning probe microscopy and microcantilever chemical sensing and won a regional and a national speaking award, as well as a national design award, a university innovation award, and the 2004 Scientific

American 50 award in the defense category.

Not a bad book for a first exposure to nanotechnology. It doesn't get into a lot of the nitty-gritty details or math/physics, but instead gives the reader a medium-depth exposure to some of the concepts and phenomena occurring at the nanoscale. A good read for someone considering getting into this field, but unsure of exactly what nanotechnology/nanoengineering entails.

It is a very good Book to begin to understand the basis of Nanotechnology

So clear without using overly complex technical jargon

Great product. .....

This was one of the required texts for my class. It does give a good overview of nanotechnology and I found that it made me excited to study the topic in more depth. It does not go over very much detail about any individual topic, it's more like an appetizer. The problems in the text were creative, yet simple. There is not a lot of heavy math from my perspective. On the down side, it was obviously not written by physicists, this is very clear in the quantum chapter. There were several errors I found while reading. One was a density of states picture, which I can forgive, but it is also stated that 2D motion on the surface of earth is exponential and the derivative of an exponential equation is a linear equation. This is clearly not true. Overall, I think it is a great introduction.

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