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# Nanofuture: What's Next For Nanotechnology



## Synopsis

Nanotechnology is the science of designing and building machines at the molecular and atomic levels. Dr. Hall is a leading researcher on the frontiers of nanotechnology who has designed for NASA describes nanotechnology in a very accessible way, so that anyone can understand what it's about, what it could do, and what it can do. He puts it into historical context, explaining how previous technological developments have affected us, how nanotechnology fits into the historical trends for technologies ranging from motors to medicine, and how the continuation of these trends, with nanotechnology as a strong determining factor, will have a profound impact on the future. Together with its sister science of biotechnology, nanotechnology has the potential to alter the very human race, change who we are. Can this possibly be good? Should it be encouraged or opposed? No one knows for sure, but the basis for informed thought can be found in these exciting, stimulating pages, which will open the doors of the future to you.

## Book Information

Hardcover: 333 pages

Publisher: Prometheus Books (May 6, 2005)

Language: English

ISBN-10: 1591022878

ISBN-13: 978-1591022879

Product Dimensions: 6.3 x 1 x 9.3 inches

Shipping Weight: 1.3 pounds (View shipping rates and policies)

Average Customer Review: 3.7 out of 5 stars 17 customer reviews

Best Sellers Rank: #738,510 in Books (See Top 100 in Books) #111 in Books > Science & Math > Physics > Nanostructures #125 in Books > Science & Math > Technology > Nanotechnology #3961 in Books > Science & Math > History & Philosophy

## Customer Reviews

Nanotechnology has become a hot topic in recent years, but few laypeople understand what it is. Hall writes that nanotechnology "involves building machines whose parts are of molecular size, but more importantly, of atomic precision...." He foresees nanotechnology progressing through five stages of development, stage one being our current ability to image objects at an atomic scale with a limited ability to manipulate them, and stage five being the ability of miniature robots to reproduce and learn from experience. A fellow of the Molecular Engineering Research Institute in Palo Alto, Calif., Hall devotes a chapter to his own concept, "Utility Fog," a fog composed of nanoparticles that

will coalesce to form sofas, coffee tables and maybe even artificial plants, and then disintegrate back into fog. More realistic predictions include thin body suits that will control body temperature, allowing people to live in the tropics or in the Arctic and medical advances that will send artificial antibodies into the bloodstream to destroy bacteria or viruses. Hall admits that civilization could face many dangers as nanotechnology advances, but he argues that banning its development in the U.S. would only result in other countries or groups gaining technological dominance. Readers excited by the promises of nanotechnology will find this book a gripping read. (May) Copyright © Reed Business Information, a division of Reed Elsevier Inc. All rights reserved.

A leading nanotechnology researcher, Hall offers this popularization of the subject, covering the physical principles of engineering at the atomic scale, possible applications of nanomachines, and their potential alteration of human society. Before overreacting to that last prospect, readers would benefit from learning how a nano-sized gadget is built, which Hall explains clearly with references to chemical bonds, the van der Waals force, and quantum mechanical behavior. What to build comes next, and Hall explores the mechanical possibilities. Traits such as self-repair and self-replication, Hall avers, could be imitated by tiny machines designed for targeted medical therapies, as touted in a recent tract of techno-optimism, *More Than Human*, by Ramez Naam (2005). Hall also discusses wild-sounding household appliances--a synthesizer that makes clothes and furniture, air cars, fog composed of nanobots, and more that would make techno-pessimists, such as Bill McKibben (*Enough*, 2003), blanch, and Hall directs more than a few ripostes McKibben's way. Expressed in conversational prose, Hall's positive outlook gives readers the buzz behind the buzzword nanotechnology. Gilbert Taylor Copyright © American Library Association. All rights reserved

Great stuff and gives much to think about. But he does go off the beatin path just a little. Still a great book!

Bravo!

For what the book says it will provide I was very impressed. Hall does indeed provide the content in a way that it is readable by people that do not have specilized knowledge in this area, such as myself. I also enjoyed his opinions on the future possibilities involving nanotech, which were presented in a way that you knew they were his opinions, not facts. Overall I would highly recommend this book for anyone looking to get a feel of what nanotech is about and where it may

be able to take us in the future.

## Movie material

There are two main reasons why I don't recommend this book to anyone. The first, and most annoying, reason is readability. This book was written horribly. Many times I found myself struggling to understand what the author wanted to say. This book requires a great deal of editing. I managed to go through some of it, but I just couldn't continue. The second and very important reason is the structure of the book. The author digs into details without giving the big picture. Although the details are not that technical, but they lack perspective. I got lost in the details without understanding the reason behind them. One other thing I didn't like, but wasn't a big factor in my decision to stop reading the book was the examples. Sometimes the examples didn't convey the idea well enough. They weren't thought out well enough.

The book still holds up after 11 years, I found it a great overview of history of nanotechnology (atomically precise manufacturing) and a great preview of where nanotechnology might go. J. Storrs Hall is not afraid to cover the topics which other authors on the subject shy away from but which are likely to be feasible with nanotechnology such as utility fogs, spaceflight for everyone and life extension.

For those who are new to nanotechnology, this is a good place to start. But be prepared for a journey through a variety of disciplines that relate to this topic, including physics, engineering, biology, and others. The descriptions and analogies that explain what nanotechnology is, how it would work, and what it would be good for are useful and understandable. Those who are already reasonably familiar with these concepts might find the first half of the book tedious, and should probably look for something more advanced, perhaps addressing particular applications of nanotechnology. The character of the narrative changes about two-thirds of the way into the book, as Hall shifts to discussions of possible nano-futures and why we should embrace them rather than fear them. At this point, technical explanation gives way to speculation and opinion. There's nothing wrong with that - it's always interesting to hear what experienced, forward-looking technologists have to say about their perspective on the future. From my perspective (political scientist specializing in science & tech policy, especially for space), I would have liked to see more about how evolving nanotech can be used to develop capabilities and solutions in the medium term and

less about how we're going to become preternatural transhumans who all own Star Trek-style matter synthesizers. The artificial intelligence chapter is an interesting intro to AI, but the tie-in to nanotech is almost non-existent, so it seems like a sidebar discussion. Regarding the chapter on space, I would have liked to see this topic far more developed given the author's obvious interest in it. The role of nanotech in space seems relegated to making better spacesuits and stronger, lighter spaceships - and of course, providing spacefarers with those handy synthesizers that can turn asteroid dust into food. There must be a multitude of other applications: sensor nets, very large-scale life support systems, space agriculture, energy generation and distribution, propulsion, etc. For those who are fond of the "space elevator" and similar concepts, Hall quickly dismisses these as infeasible and proposes his own idea for an immense launch tower (60 miles high, 240 miles long) that seems like it would be even more difficult to construct than the space elevator. Some readers will prefer the technical exposition of the first part of the book; others, the futurist speculation of the second part. Either way, this is a topic we need to be thinking about, since the future is what we make it.

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