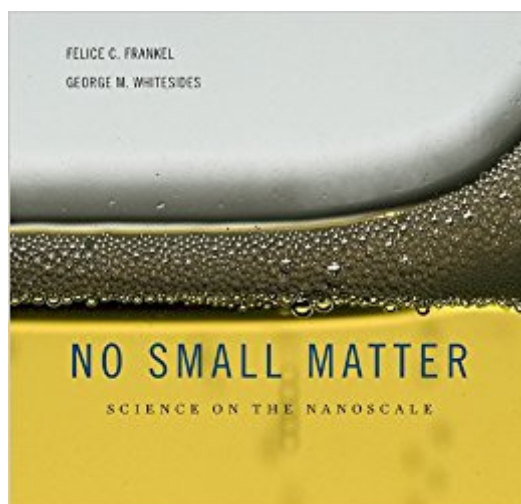


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# No Small Matter: Science On The Nanoscale



## Synopsis

A small revolution is remaking the world. The only problem is, we can't see it. This book uses dazzling images and evocative descriptions to reveal the virtually invisible realities and possibilities of nanoscience. An introduction to the science and technology of small things, *No Small Matter* explains science on the nanoscale. Authors Felice C. Frankel and George M. Whitesides offer an overview of recent scientific advances that have given us our ever-shrinking microtechnology—for instance, an information processor connected by wires only 1,000 atoms wide. They describe the new methods used to study nanostructures, suggest ways of understanding their often bizarre behavior, and outline their uses in technology. This book explains the various means of making nanostructures and speculates about their importance for critical developments in information processing, computation, biomedicine, and other areas. *No Small Matter* considers both the benefits and the risks of nano/microtechnology—from the potential of quantum computers and single-molecule genomic sequencers to the concerns about self-replicating nanosystems. By making the practical and probable realities of nanoscience as comprehensible and clear as possible, the book provides a unique vision of work at the very boundaries of modern science.

## Book Information

Hardcover: 192 pages

Publisher: Belknap Press; 1 edition (November 9, 2009)

Language: English

ISBN-10: 0674035666

ISBN-13: 978-0674035669

Product Dimensions: 10.2 x 0.8 x 9.9 inches

Shipping Weight: 2.6 pounds (View shipping rates and policies)

Average Customer Review: 4.2 out of 5 stars 10 customer reviews

Best Sellers Rank: #153,254 in Books (See Top 100 in Books) #15 in Books > Science & Math > Technology > Nanotechnology #18 in Books > Textbooks > Medicine & Health Sciences > Medicine > Biotechnology #28 in Books > Science & Math > Physics > Nanostructures

## Customer Reviews

Holy cow! It's exceptionally rare that science is rendered in such lucid, thoughtful, charming fashion. But I am not sure I've ever encountered a beautiful book as important as this one, or vice-versa. 'Awesome' is an overused phrase these days, but *No Small Matter* is exactly, totally, gratifyingly that. (Kurt Andersen, host of PRI's Studio 360) It is hard to grasp what we cannot see, even harder

when not even a microscope can see it. With unmatched clarity and arresting elegance, Frankel and Whitesides have designed a narrative and visual voyage into the nanouniverse, revealing its basic constructs without sacrificing its magic. (Paola Antonelli, Senior Curator of Architecture and Design, MoMA: The Museum of Modern Art) As modern science has explored the deepest foundations of the physical world, its discoveries have become ever harder to make sense of, ever more remote from everyday life. Yet these same discoveries have transformed our everyday lives, and continue to do so. Felice Frankel and George Whitesides are masters at the art of envisioning the invisible. In this beautiful and beautifully written book, they open our minds' eyes to the thrillingly enigmatic world that we inhabit, embody, and create. (Harold McGee, author of *On Food and Cooking: The Science and Lore of the Kitchen*) Seemingly invisible objects such as viruses and molecules are imaged in rich detail through high-powered microscopes and photography. (Science News 2009-11-21) Whitesides, a professor at Harvard University, is one of the most productive chemists in the world and arguably one of the most inventive. He brings this spirit to the book, an entertaining jaunt through the world of the micro- and nanoscale. The short essays, each dripping with enthusiasm for the topic, are roughly themed around the importance of scientific endeavour on this scale to such areas as medicine, modern computing and the quantum world. It's not just the text that playfully explores some of the stranger aspects of the invisible world. Frankel's photography can be equally creative, most obviously in a photo of a quantum apple with a shadow that appears to belong to a cube. The pictures are a mix of traditional photography, CGI and images produced using various microscopic techniques, and are dazzling in the best coffee-table tradition. The text is just as vibrant, which makes cover-to-cover reading a slightly exhausting experienceâbut worth it when it rewards the reader with such gems as why young children at a party behave like cellular molecules, or how Beethoven had much in common with plants. (Colin Barras New Scientist 2009-11-14) No Small Matter conveys science on the nanoscale through a remarkable series of photographsâ | This is a brilliant book that will help a wide readership to appreciate the wonders of the very small. (Andrew Briggs Times Higher Education 2009-12-10) Reorienting our eye to the nanoscale is No Small Matter. This coffee-table book juxtaposes images and ideas to encapsulate the significance of size and shapeâ | Exploring where art meets science, the authors search for promising paths to make small-scale science more intuitiveâ | Frankel and Whitesides's book adds gravitas and nuance to the popularization of nanotechnology, articulating its interest and vast opportunities. (Jeremy Baumberg Nature 2009-12-17) No Small Matter: Science on the Nanoscale by Felice C. Frankel and George M. Whitesides shows a world that is beyond our senses and reality. Through text, beautiful pictures, and illustrations, No Small Matter shows the small and

(some of) the large things that we are ignorant about or take for granted. (Edmond Woychowsky TechRepublic 2010-01-04)[Frankel and Whitesides] present a game, insightful attempt to illustrate reality at the very smallest scales, where lengths are measured in billionths of a meterâ | Frankel's intricate work reveals a world of unexpected textures and landscapesâ | This visual and intellectual treat is best absorbed at leisure, with ample time for pondering the new relationships each topic reveals. (Publishers Weekly 2010-01-25)A book that's elegant in appearance, elegant in its images of the nanoworld and elegant in prose. (Robert Fulford National Post 2010-04-06)

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It is a picture album, nothing special, it gives you some artistic idea though.

I have given this book already to three scientist friends, it is a great mixture of art and science.

Good book

Was a wonderful book, promptly delivered.

My dad is an amateur scientist and photographer and I got this for him for his birthday...he loved it.

i'm a scientist and i really enjoyed this book. beautiful pictures. now i just need GMW to sign it. :-P

This lovely coffee-table book contains 60 full-page illustrations, each accompanied by an explanatory essay. The illustrations came from Felice Frankel, who is on the staff of both MIT and Harvard; the essays are by George Whitesides, a famous chemist at Harvard. Combining art and science is not an easy task. The Frankel-Whitesides agenda worked most naturally for the pictures numbered 15 (laminar flow), 37, (microreactor) and 40 (Christmas tree mixer). In all three, Frankel photographed a microchemistry gadget and Whitesides explained how it worked. At the other extreme, the essay accompanying illustration number 58 clearly explains how a fuel cell works but the adjacent photograph shows a crumpled-up sample of the proton-selective membrane taken out of a fuel cell. What did we learn from the photo? The membrane is black and crumples easily. If the

membrane had been white and stiff, the fuel cell would still have worked in the way that the essay explained. Illustration 34 is entitled 'Counting on Two Fingers.' It would have been better entitled 'Counting on One Finger.' The word 'binary' refers to two states of one finger: raised and down. On pages 153 to 163, Frankel describes the techniques she used to produce the illustrations; it's a fascinating story. However, I got hung up on her explanation of the carbon nanotube, illustration #7 in the book. On page 158, she says that she placed a rolled transparent picture of a graphite sheet on her flatbed scanner and obtained the image that she processed later into the final illustration. I tried the 'cross eyed stereo' test on her final product, and the carbon nanotube stood up in a beautiful, three-dimensional view. The implication is that her final product has perspective; my guess is that she made a camera photograph of the original tube instead of using a flatbed scanner. Picking on some minor errors doesn't destroy the value of the book. However, it does raise an interesting question. Years ago, one of my friends authored a textbook on oceanography. After the book appeared, messages came trickling in pointing out minor errors in the book. The disturbing part was that no two messages uncovered the same error. My friend said that he could not reject the hypothesis that there were an infinite number of errors in his oceanography book. I'm not saying that No Small Matter contains an infinite number of errors, but when the authors set out to speak for the full range of nanoscale technology they have to beware of the devil that lurks in the details.

For the last couple of days I have been browsing through No Small Matter: Science on the Nanoscale, a collaboration between art and science that has yielded a stunning new way of looking at a world we never see. The goal is to present through photography a way of looking at and thinking about how life and nature work at the smallest scale. What I find so powerful about the book is the way in which it leads the reader to understand how little we know about the such fundamental things as water and the role it plays in the chemistry of living and non-living things. That's assuming we know exactly where that line is, which after reading this book you might not be so sure about any more. This is a wonderful work of art and some of the most lucid science writing I have ever come across. Makes you thing anew about the vast void that exists in our understanding of just about anything.

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