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# Book Review

NANOSCALE: VISUALIZING AN INVISIBLE WORLD by Kenneth S. Deffreyes and Stephen E. Deffreyes. (2009) MIT Press, 144 pages $22.95 Trade; $12.95 paper (coming in October 2011) ISBN: 978-0-262-01283-6.

From buckyballs to memresistors to lipid membranes to flash memory, *Nanoscale: Visualizing an Invisible World* is dedicated to the world of crystalline structures that we cannot use our vision—even where augmented with the best optical microscopes—to see. These structures impact our lives and our interactions with our surroundings in ways we are scantly aware, and this book effectively reminds the reader that the nanoscale properties of these materials control their macroscopic influence on us.

In the introduction, the authors give a quick review of the technological and theoretical advances that have led to our present understanding of nanoscale crystal structure. The authors suggest with humility that this book is could in some respects be considered an update to the *Architecture of Molecules* by Linus Pauling and Roger Hayward to whom *Nanoscale* is dedicated. The body of *Nanoscale* examines examples of crystalline structures, which are briefly discussed and beautifully illustrated. The contents page does not give page numbers; instead, the themes are listed from 1 to 50. Most of these themes are either individual or groups of minerals (Theme 6-Diamond, Theme 33-Montmorillonite), inorganic (Theme 39-Supercapacitor, Theme 43-Rare Earth Magnets) or organic (Theme 11-Amino Acids, Theme 15-Drugs) structures. However, some of the themes concern important properties of some crystalline structures, like Ferromagnetism (Theme 42) and Chemical Bonds (Theme 4). With a few exceptions, most of the 50 examples are covered in two pages: a one-page color illustration and a single page of succinct discussion. The book is a slim 133 pages in length.

The discussion strikes a good balance between delivering information and the use of entertaining anecdotes and facts that many readers, even non-specialists, will find engaging and entertaining. I have several favorites. The fact that the chains of silicon atoms in 1 $cm^3$ of pyroxene would stretch 1 000 000 000 km from the Earth to Jupiter (Theme 10). A personal anecdote relates the discovery and report of the second occurrence of the zeolite mineral erionite (described as his baby) in 1956. In the intervening years, erionite has been found to be much more abundant and unfortunately a cause of mesothelioma, a deadly lung cancer. The author concludes, "Like all parents of mass murderers, I could only say, 'I don't understand it; erionite was such a nice quiet mineral' (Theme 30)." In the section on hexagonal diamond (Theme 7) named lonsdaleite, the story of the eminent crystallographer Kathleen Lonsdale is related. Lonsdale, a Quaker, refused to cooperate with U.K. war preparations in advance of the outbreak of World War II and was sentenced and served a prison term during the war. Following the war, she was released and, in a turnaround, appointed to the board of governors of the prison. She was subsequently named Dame Commander of the Order of the British Empire (DBE).

*Nanoscale* would make interesting, informative, and entertaining reading for professionals and enthusiasts in the fields of mineralogy, crystallography, and chemistry.

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