Nanoscale: Visualizing an Invisible World

By Kenneth S Deffeyes (author) & Stephen E Deffeyes (illustrator)

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- Biology
- Chemistry
- Earth science

Nanoscale: Visualizing an Invisible World is a beautifully produced book, filled with engaging text and attractive illustrations, which provides a captivating tour of the 'invisible' world of the nanoscale.

Beginning with a short introduction in which the author tentatively suggests that he has attempted to update *The Architecture of Molecules*, published in 1964 by Linus Pauling and Roger Hayward (to whom the new book is dedicated), he cites advances in X-ray crystallography as being vital to our impressions of molecular and atomic structure. The book uses X-ray diffraction data to provide 50 colourfully illustrated short essays about atomic and molecular structures.

The essays start with familiar and relatively simple topics such as air, water, gold, diamonds and chemical bonds, moving on to haemoglobin, chlorophyll, viruses and nanotubes, and ending with more complex structures including superconductors, fuel cells and quasi-crystals. The subjects of each essay were chosen because they illustrate how different structures at the atomic and molecular levels create properties such as hardness, colour or even toxicity. However, others were chosen because they provide interesting stories, or simply for their beauty – as was the case with the fibrous virus sourced in bacteria of the species *Pseudomonas aeruginosa:* it resembles a sheaf of wheat when viewed side-on, but a fabulous floral asterisk from the end-on view.

The author answer questions such as how diamonds ride volcanoes to the Earth's surface (if they came up more slowly they would be graphite), how viruses reproduce, or how a fuel cell works, and provides links to everyday life wherever possible. There are also stories from the author's own experience, such as the day he was working with two rare earth magnets. He put one of the neodymium magnets on top of a bookcase, but when he picked up the other from his bench, the one on the bookcase flew off and trapped his finger in a 'magnet sandwich' – and needless to say the iron tools that were close by didn't help the situation.

Kenneth S Deffeyes, a professor emeritus of geology at Princeton University, USA, wrote the witty and informative essays. Stephen E Deffeyes is a freelance illustrator and designer who developed the illustrations for the essays from real X-ray diffraction data. Together they have produced a wonderful little book. Nanotechnology is here to stay, and promises to be the next trillion dollar industry – books like *Nanoscale*, which may be the stepping stone to studies in nanoscience, should be in every school library. They teach fundamental principles in a way that many textbooks cannot; for example, when was the last time you heard ionic bonding described as occurring where one of the parent atoms has custody of the bonding electrons? Or metallic bonding as 'some of the (outermost) electrons wandering around the street unsupervised'? This book may just capture the imagination of students, and in doing so attract them to science.

Details

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