

Nano-Age

Change is most easily noticed when it is only seldom assessed. After my emigration to North America seven years ago (I was to obtain a PhD in the chemical sciences), I have had the chance to feel the veracity of this statement with every return to my home country. The opportunities for travel that I had during my studies took me to several conferences on the general subjects of materials and chemistry. In the same way as during my trips home, the infrequency of such exposures allowed me to perceive very clearly the changing landscape of nanoscience. The most common questions that I was asked changed rapidly from being solely about the present (What are you doing? How are you doing it?) to being about past and future (What is the purpose of what you are doing? What has been the impact of your research?).

While I find that daily scientific activity inevitably seems to focus one's attention on the here and now, the sudden jolt of panic associated with peering into the past and the future forces one to take a broader, and ultimately more rewarding, perspective of the meaning, scope, and role of one's scientific activity. Such questions are then particularly important, especially for fields such as nanoscience that are at the cusp of a new phase in their evolution.

This book attempts to answer such questions. It is a perspective about the impact (past, present, and possibly future) of nanotechnology in society—certainly a delicate topic, but one that the author—Mario Pagliaro, a researcher at CNR, Italy—appears to navigate comfortably. He has a strong background in applied sol-gel chemistry, and has a praiseworthy commitment to both entrepreneurship and teaching. In the past few years he has especially proved himself to be an exceedingly prolific book author, by publishing about ten books in three years. As a book author, I am very impressed by such productivity.

As with most scientific ideas, especially nowadays, nanoscience has gone through a hype cycle, which has provided researchers with a great deal of funding and exposure. As some years have passed, new ideas and priorities (energy, environment, water) are emerging, and it is becoming more common to hear questions about how nanoscience contributes to society, sometimes in sarcastic terms (“Where is your trillion-dollar industry?”).

The author takes a spirited and optimistic tone, starting from his opening chapters, by outlining the contributions of nanoscale materials in various areas of application: solar cells, batteries, catalysts, coatings, textiles, nanomedicine. In each chapter he

focuses attention on startup companies that have made it into the market (or are considered promising) and that use nanoscale materials in their products.

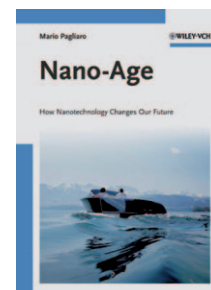
Pagliaro treads a very fine line by choosing this approach. It is extremely difficult to simultaneously: 1) sound genuinely enthusiastic and optimistic, 2) focus on startup companies that in most cases have few factual achievements in their arsenal, and 3) avoid making it read like a brochure. In my opinion, the author succeeds admirably, but some other readers might be averse to such enthusiasm within a scientific discourse.

In addition to these case histories, the author places in the middle of the book (somewhat awkwardly) a chapter on scientific methodology, in which he outlines some aspects of the chemical approach to problems. But, again, the odd placement of this chapter is quickly forgiven as the author's passion for the subject of methodology emerges quite clearly.

The result of Pagliaro's approach is a quite enjoyable book that has the rare gift of genuinely conveying enthusiasm. And it is the kind of enthusiasm that science could really make use of, as it is not achieved by the use of hyperbole and exaggerations, but through a calm tone of optimism.

I have three relatively minor complaints about the book. First and foremost, I believe the title of the book, *Nano-Age*, is very poorly chosen. It is the kind of title one would expect to find on the cover of some sensationalist magazine, and it fails to do justice to the content of the book. It took me a while to completely shake off the prejudice that the book's title had instilled in me. Similar considerations can be made about the image chosen for the cover. It is precisely the kind of image that you find on brochures advertising some resort in the Caribbean and, again, it is a betrayal of the content of the book. The third and last complaint is about the choice of organically doped metals (a very interesting class of composites that are quite hard to consider as nanomaterials) as the subject of a whole chapter. I understand that the author is very familiar with the topic, but it does detract from the book, in terms of focus and clarity.

It is in the conclusion that the book suddenly takes off. The last chapter is the most interesting, as it takes the author on a very personal and opinionated perspective of the state of modern business. Here he argues very persuasively that there is an inherent danger in having our businesses run by people who are essentially illiterate in history, philosophy, art, and general culture. Pagliaro argues against the specialization of our leadership (scientific, political, and economic) in a way that is both rigorous and vivid. And in a rare display of humility (for a scientist) he argues for a



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new definition of our role in society: the role of scholars, not merely that of scientists who solve puzzles. As such scholars, we should strive to learn about history, art, poetry, and literature. This, I would add, to enable us to understand what humanity really wants (which might not be a faster computer), and how humanity really communicates complex ideas (which might not be through papers in scientific journals such as this).

While I am not sure that politicians would necessarily be better if skilled in humanities (as an Italian, I have seen where the lack of pragmatism in politics leads to), I do strongly believe that science and the scientific community must make itself accessible. Our ivory tower is foreclosed.

As I was reading the last chapter of this book, I recalled my most vivid memory of my first mentor,

the one who changed my life and showed me the beauty of science. He was “just” a temporary teacher in our high school, a geologist by training. In my last chat with him he told me: “my advice is to not get stuck doing things without knowing why you are doing them. Don’t get fossilized on doing science just for doing it. Get out. Talk to people. Talk to philosophers. Talk to artists. Talk to writers. Force yourself to work with them. Then you will understand what science really is.” I have felt strongly about this ever since.

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