

(wileyonlinelibrary.com) DOI 10.1002/aoc.1803

Book Review

MARIO PAGLIARO

Nano-Age: How Nanotechnology Changes our Future

Wiley – VCH, 2010, 196 pp.

price £22.50/ €27.00 (hardback)

ISBN 978-3-527-32676-1



A whole range of energy-efficient applications are beginning to incorporate nanotechnologies, and more researchers are starting to integrate green engineering and chemistry principles into production methods and processes. A number of books have recently been published on green nanotechnology and a new journal, the *International Journal of Green Nanotechnology*, was launched in 2009. There are high hopes that green nanotechnology will not only offer significant environmental

benefits, but also help public health crises, such as in the alleviation of disease and poverty, including addressing inequalities in access to clean water.

This book, written by a research chemist at Palermo National Research Centre, Italy, aims to demonstrate how and why nanotechnology has great potential for addressing such needs. Rich with images and examples, it is written in a generally accessible style with a broad readership in mind, including journalists, politicians and teachers. Pagliaro argues that nanotechnology holds great promise for addressing a range of problems associated with the sustainability crisis – economic, social and environmental. The nine chapters cover a range of applications in the fields of solar energy, clean energy and nanomedicine. The author advocates a green chemistry approach to both products and processes so that: ‘Rather than waiting for regulators, then, the winning nanotech companies will develop products that instead of being harmful will be *beneficial* to the environment’ (p. 144). However, the discussion glosses over some of the potential risks that may be present even where a green chemistry approach is taken. Perhaps it could have addressed the concerns raised by a coalition of non-governmental organizations in relation to whether claims about environmental benefits outweighing costs match the reality.^[1,2] For the nonspecialist reader it might also have been useful to have provided a brief outline of the Environmental Protection Agency’s (2006) 12 principles of green chemistry.

It is refreshing to see some consideration of societal implications and risk communication. Indeed, the author makes the case that scientists working in the nanotechnologies field should integrate risk communication into their research projects so that issues of public perception are taken on board. However, I would have liked to have seen a more in-depth discussion of some of these issues. The section on communicating risks draws closely upon the work of David Berube, as well as the Cultural Cognition Project, at Yale Law School and the Project on Emerging Nanotechnologies. The findings of the Cultural Cognition Project suggests that people who have an individualist/hierarchical outlook tend to view nanotechnologies in a more positive light, whereas those who have an egalitarian outlook tend to view them as more risky. There is a growing body of work on public perceptions that would have enriched this section. For example, the work of Pidgeon *et al.* (2009)^[3] has also drawn attention to cross-cultural differences in attitudes to nanotechnology^[2] applications. Also, I would also have liked to have seen greater mention of ethical issues.

Overall, however, this is a well-written book which provides a useful, interesting overview and commentary on the field. In the final chapter Pagliaro forcefully argues that both scientists and industry leaders need a broader education in order to better understand each other’s work. In relation to scientists he contends: ‘we need to rethink scientific education to include those elements of history, philosophy, sociology and economics that are nowadays indispensable resources of the scientific profession’ (p. 157). This is to be welcomed.

References

- [1] Nanotechnology and the environment: a mismatch between claims and reality; <http://www.nanowerk.com/news/newsid=11736.php> (accessed 31 March 2011).
- [2] For example, see S. Currall, New insights into public perceptions. *Nat. Nanotechnol.* **2009**, 79–80.
- [3] N. Pidgeon, B. Herr Harthorn, K. Bryant, T. Rogers-Hayden, Deliberating risks of nanotechnologies for energy and health applications in the United States and United Kingdom. *Nature Nanotechnology* **2009**, 4 February, p. 95–98. “<http://dx.doi.org/10.1038/nnano.2008.362>” doi:10.1038/nnano.2008.362.

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