Editorial: Nanotech Challenges, Part I

Some fifteen years ago, when the term 'nanotechnology' was almost unknown, ideas about molecular manufacturing or 'producing new materials at the nanometer scale' would clearly have been associated with synthetic chemistry or materials science. Nowadays, almost all of the natural and engineering sciences are engaged in nanotechnology, in some disciplines even as much as 10 percent. The rapid emergence and growth of nanotechnology across the disciplines, fuelled by visions of a new technological revolution and huge governmental funding, present many great challenges not only to scientists and engineers, but also to those whose profession is to reflect on science and technology and their place in society.

As the nanotechnology movement spreads across the disciplines and ignores classical boundaries, scholars in the humanities and social sciences are required to do likewise, which their institutions should not hinder. We can no longer afford to create our own disciplinary identities in correspondence to the disciplinary landscape of the 19th century or earlier, if we wish to reflect on current research. Particularly in areas such as nanotechnology, where the boundary between science and technologies increasingly blurs, philosophers of science and philosophers of technology need to cooperate.

With their particular audiences of philosophers of technology and philosophers of chemistry, respectively, TECHNE and HYLE have joined forces to address these challenges. Since we, the editors of these journals, believe that the two audiences share too much interest in this topic to go separate ways, we have decided to undertake the experiment of cooperatively editing a joint special issue. The overwhelming response to our Call for Papers [www.hyle.org/journal/issues/9-2/cfp_nano.htm] does not only support our decision, but also forces us to publish the special issue in two sequential parts in two issues of either journal. Thus, simultaneously with the current HYLE issue (10.2), we publish a TECHNE issue (8.2) with five different but related papers, which together form the first part of *Nanotech Challenges*. In spring 2005, we will publish the second part divided up among HYLE (11.1) and TECHNE (8.3). Readers of HYLE are strongly encouraged to read the corresponding papers in TECHNE [http://scholar.lib.vt.edu/ejournals/SPT/] and vice versa, as they altogether form an editorial whole.

The current HYLE issue starts with five papers and an essay review. The first two papers address what might be nanotechnology's most provocative challenge for chemists: its promise of being a different and better way of doing synthetic chemistry. Two philosophers compare chemical approaches to molecular manufacturing with nanotechnology in the sense of its visionary

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founder, Eric K. Drexler. BERNADETTE BENSAUDE-VINCENT explores the fundamental metaphysical differences between both approaches, particularly in their different notions of molecular machines and living systems, which allows her to unravel the metaphysical underpinnings of chemistry. By analyzing the well-known Drexler-Smalley debate, OTÀVIO BUENO points out the incommensurability between the chemical and the mechanical engineering approach, each on the conceptual, methodological, and theoretical level, and he suggest that both approaches should seek common grounds on the level of instrumentation.

The other three papers illustrate the intriguingly wide spectrum of current social studies of science and technology, from metaphysical to literary to innovation studies, which all have filled gaps left over by philosophers. All three focus on future aspect of nanotechnology. Yet, while the first two papers investigate how the future is created in nanotechnology narratives, the last one explores methods of forecasting future research trends. Starting from the observation that nanotechnologist avoid speaking about the present, CYRUS MODY critically analyses their various arguments for technological determinism, that nanotechnology would inevitably develop with its own logic and completely transform the world beyond human control. Complementarily, in his in-depth reading of a book by Eric Drexler and a 'report' by the US National Science Foundation, JOSÉ LOPÉZ demonstrates that both texts employ classical tropes of science fiction to jump from current research to a promising future. Fortunately, there are more professional, though more cautious, ways to extrapolate from current nanotechnology paradigms and research dynamics to the future, which MARTIN MEYER and OSMO KUUSI present in their paper.

Finally, in his essay review of recent books in nanotechnology, PIERRE LASZLO reminds us that nanotechnology has also a past, which may serve well to reshape the future historiography of chemistry.

We may add that also the reflection on nanotechnology has both a past and a future. The past is well documented in an online bibliography [www.hyle.org/service/biblio/nano.htm], which among others includes another anthology that we have just edited together with Alfred Nordmann (*Discovering the Nanoscale*, IOS Press: Amsterdam, 2004). The near future will be found in *Nanotech Challenges, Part II*, in the forthcoming issues of HYLE and TECHNE.

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