

Mega Fear Over Something Nano

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If you believe the hype, the nanotechnology revolution will deliver a future of unprecedented material abundance for everyone, limitless energy, ecological sustainability, improved human health and performance, and smarter, cheaper and more efficient materials and products.

But there is another nanotechnological future that we are beginning to hear more about. This is one of toxic nanoparticle pollution, powerful new military equipment and weapons, ubiquitous surveillance devices, widening global inequities and the further concentration of corporate ownership and control across all industrial sectors.

Nanotechnology refers to a new range of techniques for manipulating nature and constructing materials and devices at the scale of about a billionth of a metre, including the ability to engage directly with nature at the level of atoms and molecules. These nanotechniques will not just stand alone, but will be used in conjunction with - and facilitate the convergence of - a range of other existing technologies, such as gene technologies and information technologies.

Products containing nanoparticles have already been commercialised, including sunscreens, cosmetics, car parts and silicon chips, and in the future we can expect them to also be used in food and pharmaceutical products.

Further down the track is the prospect of more complex nanoconstructs, such as molecular manufacturing techniques for putting together products atom-by-atom, the merging of non-living nanomaterials and living organisms, and even self-replicating nanorobots.

Simply dealing with materials at the nanoscale can change their properties in comparison with the same materials at a larger scale. The nanoscale material may be more reactive, have different optical, magnetic and electric properties, and be much stronger or more toxic.

It is the very size of these nanoparticles and the new properties they exhibit that is also the source of a range of possible human health and environmental hazards. Scientific experts acknowledge that these tiny particles can be breathed in, and may be able to pass through the skin, through the lungs, into the bloodstream, or penetrate cell walls. At this stage the greatest threat of exposure to nanoparticles is faced by the workers and scientists involved in manufacturing them.

Given their potentially greater reactivity and toxicity, the release and accumulation of these nanoparticles in the environment also raises concerns for their impacts on other living organisms and ecological processes. The release of nanorobots and nano-engineered organisms in the more distant future may create even more frightful scenarios.

I'd suggest we pencil the term "nanopollution" into our ecological lexicons now, and let the full implications of what that means sink in later.

Astonishingly - or perhaps not - very little testing of any kind has been done on the nanoparticles that have already been commercialised, and there are no regulations anywhere in the world dealing specifically with nanotechnology and nanoscale materials and products per se.

Proponents of nanotechnology suggest that particular applications of nanotechnology are likely to provide some environmental benefits and efficiencies in comparison with existing techniques and products. However, the ability to reconstruct nature at the nano-atomic level is likely to both expand the range of materials that can be used as interchangeable inputs into our manufacturing systems, and also expand the available range and volume of products.

In this sense, I'd argue that nanotechnology is likely to facilitate the next wave of growth in the industrial production of goods and services, and therefore an overall intensification of resource consumption and pollution emissions.

If it proceeds as industry intends, the nano-industrial revolution can also be expected to create considerable turbulence in the global economy - and therefore winners and losers - as existing industries are restructured or displaced by new modes of production and patterns of employment.

Some of the losers are likely to be the workers, farmers and communities in poorer countries if there is a decline in the demand and prices for the raw materials they now produce.

The winners are likely to be the corporations large enough to invest in and patent the techniques and products of nanotechnology, and able to capitalise on the technological convergences that are emerging.

In this sense, technological convergence may facilitate the convergence of formerly distinct industrial sectors, as well as the further concentration of corporate control across these sectors, as these corporations themselves merge or enter new alliances with each other.

One of the major areas of nanotech investment and research is for military applications, such as to protect and enhance the performance of soldiers.

The development of a new generation of weapons, such as novel ways of encapsulating and delivering biochemical weapons, may already be under way.

Another concern is the development of a new range of ultra-small and smart surveillance technologies that can be used to monitor every sphere of our social and working lives.

Some civil society groups, such as the Canadian-based ETC Group, are calling for a moratorium on the development and release of nanoparticles until they are adequately

tested and proven safe, and a comprehensive regulatory regime for this technology is put in place.

Unregulated, untested, unlabelled, prematurely released and commercialised, and developed and patented by large corporations in cosy partnerships with public research institutes - the parallels between nanotechnology and genetically engineered foods are indeed profound.

But it is precisely a repeat of the GE foods controversy that the nanotech industry is hoping to avoid this time around by "engaging with the public" at a much earlier stage.

At the core of the coming debate will be the question of who controls nanotechnology, who benefits from it, how it will be regulated and applied, and who takes the risks. If the GE food debate is anything to go by, the answers have already been decided and the trenches are being dug.

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