

NANOTECHNOLOGY DANGERS

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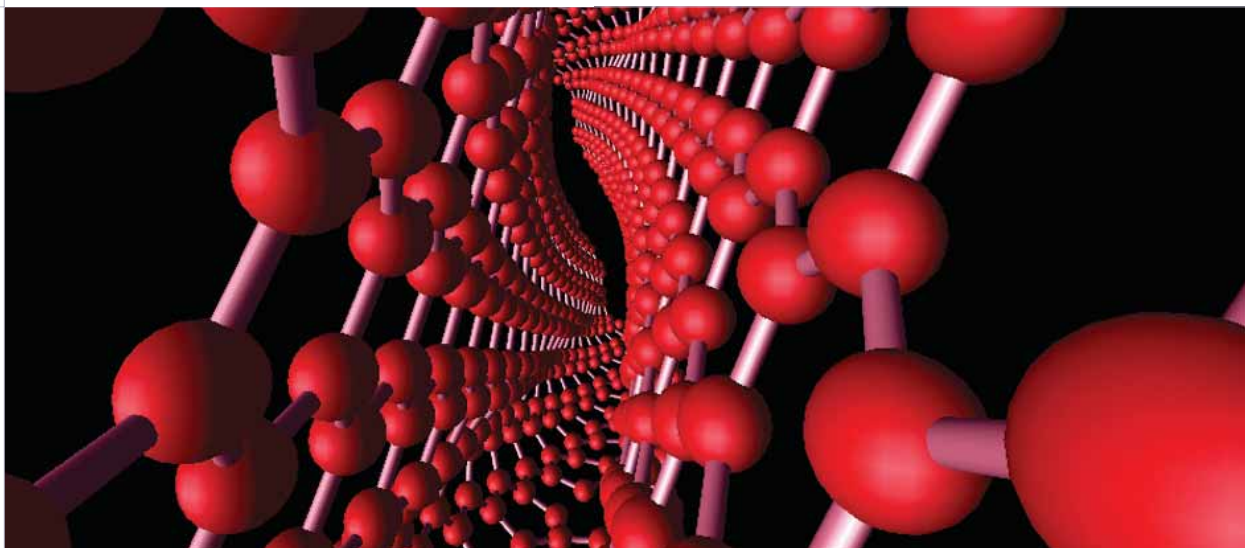
Who's Afraid of Nanotech?

In a little-noticed announcement, Britain's Soil Association has declared that any foods and cosmetics containing nanotechnology additives can no longer be labelled 'organic'. Few consumers would have realised that manufactured nanoparticles – tiny materials measured in millionths of a millimetre – have been in commercial use for years. They can be found in skincare cream, sports clothing, kitchenware, cooking oil and wall coatings.

Some scientists and insurers are ringing alarm bells too. Is nanotech safe?

tHE NANOSCIENCES ARE ABOUT altering the properties of materials at the molecular level, for example, to make them harder or lighter, or more or less reactive. They open the way to a vast range of process innovations and novel products, from food production to chemicals and medical uses, making them highly attractive to industry. Some experts predict that global markets valued in trillions of US dollars will be affected by nanotechnologies in less than a decade.

Even fewer consumers might have suspected that these additives pose 'a serious new threat to human health', as the Soil Association says in its January statement. Concerned scientists are warning that nanoscale particles may react in unexpected ways, potentially harming the



human body and the environment.

Because of their miniscule size, such particles may penetrate human cells and could damage DNA or the lungs. At this point, however, no firm medical evidence exists that nanotech materials have negative side effects. Is this a case of technophobia out of control, or should governments take health and environmental safety warnings more seriously?

RISKY RESEARCH

Public understanding of nanotechnologies and their associated risks is still paltry, despite a growing safety debate among scientists and regulatory experts. Likewise, regulatory oversight of the new technology is patchy and underdeveloped. As so often in modern industrial history, regulators are struggling to keep up with technological innovation.

Scientists themselves were the first to raise concerns about the breakneck speed with which nanotechnology firms brought new products onto the market, without adequate knowledge about their potential risks. Citing parallels with asbestos, which was originally considered safe, but later found to be highly damaging to those who had inhaled it, health experts have expressed fears about the health and safety of workers who might be exposed to ultrafine nanoparticles in the production process.

Size matters, therefore. The very advantage of nanotech products – namely that they are constructed or altered at the molecular level and thereby create new chemical properties in materials – is a key source of health and environmental concerns. Once released into the environment, for example when used to treat

pollution in environmental clean-up operations, nanomaterials may damage non-target organisms and have unforeseen effects on eco-systems.

UNKNOWN UNKNOWNNS

Nanotech robots, which would lead to self-replicating machines – grey goo – that could end up consuming all living organisms on earth, remain the stuff of science fiction. However, as the Royal Society and the Royal Academy of Engineering concluded in a comprehensive survey of current risk research, not enough is known about the environmental impacts of nanoparticles. Avoiding their release into the environment should therefore be a priority for producers and researchers.

Scientists are not alone in sounding the alarm. The insurance industry has recently added its voice to the growing chorus calling for more regulatory oversight. Concerned about growing liability risks, Swiss Re and Munich Re have launched numerous initiatives to raise awareness of potential nanotechnology dangers and assess business implications for the insurance sector.

In a report to underwriters and brokers last December, Lloyds of London warned that nanotechnology, while offering huge commercial benefits, could, in a worst case scenario, 'lead to unexpected life, health and workers compensation and physical damage and pollution losses'. All major insurers agree that a wider public debate is needed to avoid damaging overreaction by consumers in future. Above all, they are calling on governments to consider the need for better regulatory oversight.

REGULATORY GAP

The Soil Association's ban on nanotechnology is the first of its kind worldwide, and few other organisations have called for such drastic measures. But concern is growing among policy-makers, in the United States and Europe, that existing environmental and consumer protection may not be enough.

So far, governments in leading nanotechnology countries have struggled to come up with an appropriate response. Relying on existing health, safety and environmental legislation, their approach has been wait and see.

Most nanotechnology companies would prefer their products to be treated in the same way as conventional substances. Producers of carbon nano-tubes, for example, argue that they have similar chemical properties to graphite and therefore pose the same level of risk. But whereas graphite is assumed to be safe, recent studies suggest that inhaling nano-tubes may cause lung damage. Should this be borne out by future research, then a new approach to regulation of these materials would be required.

The regulatory situation in Europe is complicated by weak coordination and integration. While the European Commission is keen to promote nanotechnology development as part of its competitiveness strategy, it lacks the powers to require a comprehensive risk assessment for all newly introduced nanotech products. Safety campaigners are calling for mandatory labelling, as exists for genetically modified food, but the Commission has so far rejected new, technology-specific, legislation.

Meanwhile, some nanotech companies and scientific bodies have begun to create their own voluntary safety standards. Such efforts received a boost in February, when the European Commission issued its own Code of Conduct for Responsible Nanosciences and Nanotechnologies Research, which provides member states with principles and guidelines for their own national nanotech strategies. Adoption of these principles by industry is not guaranteed, however, as the code is voluntary.

TRANSATLANTIC TENSIONS?

So far, both the European Union (EU) and the US have been treading carefully when considering new safety regulations. None of the leading nanotech countries wants to undercut the huge growth and innovation potential that nanotechnology presents. But

as pressures grow for regulators to act on safety concerns, the search for the right balance between regulatory precaution and technology promotion is bound to become more complicated.

Already, US industry circles are concerned about European Commission references to the precautionary principle in debates on how to handle nanotech risks. Neither would like to see a re-run of the transatlantic conflict over the EU's genetically-modified food regulations and their restrictive impact on international trade. But given the EU's commitment to implementing the precautionary principle across all areas of risk regulation, it might take only a minor safety crisis involving nanomaterials to trigger a more intrusive regulatory response in Europe.

Polymakers on both sides of the Atlantic now have a unique opportunity to develop more effective and convergent regulation, to prevent future transatlantic conflict. So far, the safety debate among experts has run ahead of public awareness and consumer concerns, giving governments breathing space. This situation is unlikely to last.





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