

Nanotechnology

What is nanotechnology?

Nanotechnology is the set of technologies that enables the manipulation, study or exploitation of very small (typically less than 100 nanometres) structures and systems. To put this into perspective, one nanometre is one-billionth of a metre, or around 80,000 times smaller than the diameter of a human hair. Nanotechnology contributes to novel materials, devices and products that demonstrate different properties.

Nanomaterials are those chemicals that underpin this technology. At this scale materials can start to exhibit new and different characteristics from when the material is not at the nano-scale. Such changes in characteristics can affect, for example, strength, chemical reactivity or conductivity.

Why is nanotechnology important?

Nanotechnology is likely to offer a wide range of benefits and help address a range of societal and environmental challenges. It is also often referred to as a General Purpose Technology, meaning that whilst there are many direct uses, nanotechnology behaves as a supporting or enabling technology across a range of sectors. These include: medicine (e.g. detection of genetic sequences using DNA-tagged gold nanoparticles); environment (e.g. waste-water treatment with carbon nanotube filters); and energy production (e.g. solar cells using silicon nanocrystals).

It is this broader supporting aspect of nanotechnology which identifies it as a potentially vital future component for many existing and innovative sectors.

How has nanotechnology changed in recent years?

Nanotechnology has been in widespread use for decades, such as in car tyres where carbon black is often utilised to improve durability. However, there has been a recent acceleration in the take-up of this technology across a large number of fields. A significant increase in R&D funding has taken place, coupled with an increasing amount of patent activity and product design.

The regulatory landscape has also been changing with governments considering how the use of nanomaterials and nanotechnologies should be addressed. This has already resulted in some changes to the way nanotechnologies are managed both in legislation and 'on-the-ground'. However, this remains an area of consideration.

What are the main policy issues?

Given the potential benefits of nanotechnology it is important to develop this area further and encourage the commercialisation of valuable application areas. However, all new technology areas must be developed in a safe and responsible manner and the use of nanomaterials also raises questions regarding potential unintended risks to humans and the environment.

It is important to establish frameworks that foster the responsible development of nanotechnology, such as ensuring adequate numbers of 'nano-skilled' individuals, and why work is ongoing to examine health and safety issues, understand aspects of the life cycle and consider how nanomaterials are dealt with at the waste management stage.

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