

1. Introduction

While no definition has been internationally agreed upon, nanomaterials are commonly defined as materials having at least one external or internal dimension between 1 and 100 nanometers.



2. Why is it relevant?

Despite being often composed of known chemicals (e.g. metals or carbon structures), the small size of manufactured nanomaterials and nanoparticles can lead to behaviour different from the “bulk phase.” While this “nano-behaviour” enables a multitude of nanotechnology applications, it has also given rise to concerns about potential adverse effects of nanomaterials.



Nanotechnology has rapidly developed in the past few decades and led to the widespread presence of nanomaterials in consumer products and industrial applications.

Consumers may be exposed to nanomaterials via a wide range of products, including food packaging, textiles and personal care products, and workplace exposure to nanoparticles may occur in various types of industries.



Once released to the environment, nanomaterials may undergo many transformations, potentially altering their fate, transport and toxicity.

Most nanomaterials do not undergo biological degradation and can therefore persist in the environment.



The low level of knowledge of their effects on human health and the environment coupled with a rapidly growing market led to the identification of “nanotechnology and manufactured nanomaterials” as an issue of concern under the Strategic Approach to International Chemicals Management (SAICM) at the second meeting of the International Conference on Chemicals Management (ICCM2) in 2009.



3. Existing instruments and actions

The variety and variability of nanomaterials and their behaviours make it difficult to determine a “one-size-fits-all” approach to nanomaterials as a whole.

At the moment, no global-scale regulation is in place. Intergovernmental institutions have worked on developing guidelines, developing guidance for testing and assessments, capacity building, and technical assistance. These are complemented by tools and actions by other stakeholders, for example, clearinghouse mechanisms for information sharing or tools to inform businesses about chemicals likely to be banned or restricted.

3 Existing instruments and actions (cont.)

At the regional and national scales, different regulatory instruments containing specific provisions for nanomaterials have been and are being developed, building on existing regulations that apply to the substances of which a nanomaterial is composed, e.g., establishing specific reporting and record keeping obligations.

From a non-regulatory perspective, voluntary partnerships between regulators, industry and other stakeholders also have led to various actions. For example, countries and companies cooperating to support the Organisation for Economic Co-operation and Development guidance and testing development for nanomaterials.



4. Challenges and opportunities



Perhaps the largest gaps in knowledge necessary for regulation and sustainable management of nanomaterials are production, use and end-of-life of nanomaterials.

Academic and commercial interests remain high in developed countries, which have great capacity to develop and use nanomaterials, but policymakers have yet to follow up on these rapid developments and the fast-growing introduction of these materials markets and waste streams.

Nanomaterials cannot be identified and assessed based on their chemical identity alone. Their physical characteristics strongly affect their behavior. As a result, no uniform definition exists and currently, different regulatory instruments apply different definitions.

Challenges in the analysis of nanomaterials makes it unlikely that regulations could truly be enforced at present.

There exists a need to adapt regulatory data requirements around the world to take into account the properties and life cycles of nanomaterials, and thus inform hazard and risk assessments.

There is an opportunity to work towards a common definition and grouping strategies.

More work is needed to develop new analytical tools or further develop existing ones until robust and routine high-throughput methods are available.

At the international level, enabling a systematic assessment of the risks of manufactured nanomaterials may be considered.

Developing standardized tests, validating and possibly harmonising existing testing methods would help facilitate comparison and reliability of data.

