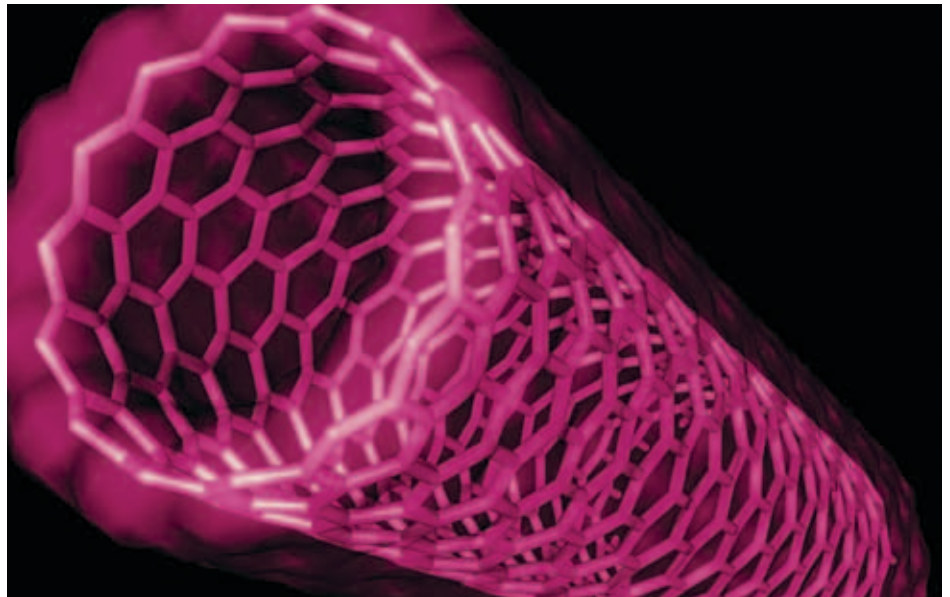


Nanotechnology

Maximize the benefits, minimize the risks

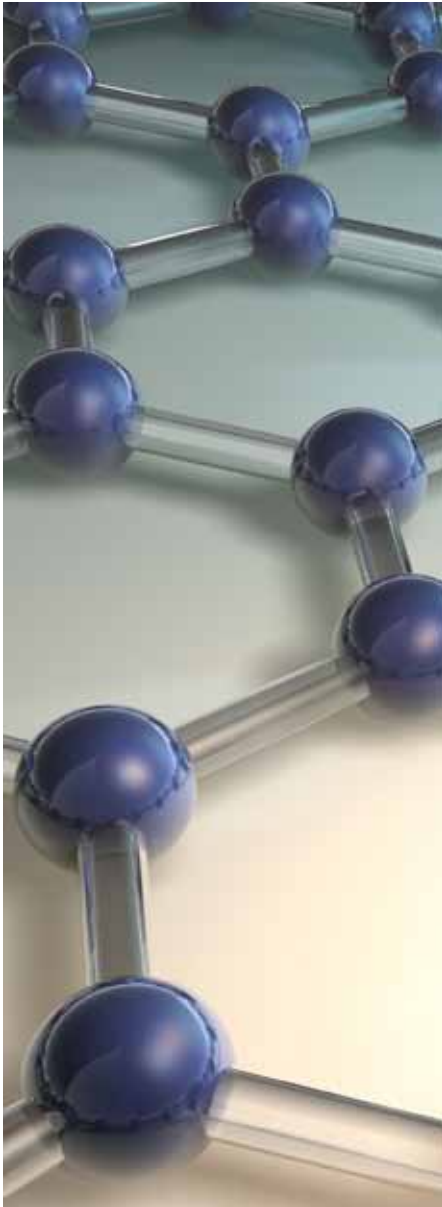
ARCADIS helps our diverse client base to understand and manage the liabilities of nanotechnology. Our work ranges from developing programmatic approaches for the stewardship of nanomaterials to strategic, science-based support for development of specific products. This work helps our clients to manage the real or perceived risks so that they can realize the benefits of nanotechnology.



The distinct properties of nanomaterials can convey added value to a wide range of commercial products, and as a result new applications are reaching the market rapidly. The same properties that make nanotechnology useful, however, may also affect human health and the environment in ways that differ from those of bulk materials. News reports have compared the risks from carbon nanotubes to those from asbestos and other reports suggest that nanomaterials may harm wastewater treatment plants. Such reports have the potential to cause consumer backlash against nano-enabled products unless the possible risks are accurately assessed, controlled, and clearly explained.

To counter such concerns, our scientists and engineers have:

- Helped a multinational client to develop a life cycle framework to integrate risk management planning and procedures for nanomaterials into their product research and development process
- Evaluated, for specific commercial products, the releases of nanomaterials during manufacture, assessed the risks, and developed recommendations for worker protection
- Assessed the possible releases of nanomaterials from commercial products during use, developed in vitro testing programs, and evaluated the possible risks
- Compiled toxicological data and classified nanomaterials under the United Nations' Global Harmonization System for developing Safety Data Sheets
- Prepared a REACH compliance strategy for a nanomaterial undergoing registration in bulk form. Analyzed regulatory requirements for "opting out" and ongoing developments in REACH applicability to nanomaterials. Evaluated fate and transport and toxicity characteristics of



nanomaterial relative to bulk material to determine similarities and differences that would affect regulatory strategy. Developed alternative response approaches and associated cost estimates to support decision making.

- Identified potential health and environmental issues, for a client considering the manufacture of a product containing nanosilver as an antibacterial agent. Provided insight to inform a risk-management decision on how to proceed with this product.
- Assisted client in product design of nano-enabled products to deliver optimum performance benefits. The products required clinical and non-clinical safety assessments and related global registrations. ARCADIS developed and executed a robust scientific and technical external communications program, with the term “Nanotechnology” an intentional part of the product branding and marketing, to proactively mitigate supply chain concerns and illustrate the environmental benefits of the nano-enabled product over other technologies.
- Developed a draft white paper for USEPA on the environmental health and safety impacts of nanotechnology, with an assessment of research needs

- Taught courses on the environmental implications and applications of nanotechnology to Fortune 50 companies and professional organizations, with a central theme of focusing on the science behind or beyond the news headlines
- Applied nano-enabled environmental remediation techniques, combining a sophisticated understanding of hydrogeology and fate and transport processes with practical expertise in the field

What's the bottom line?

This new material science offers exciting possibilities for products that are more efficient and effective than could ever be possible using bulk materials. But the use of these new nanomaterials may carry real and/or perceived risks. ARCADIS helps our clients to navigate through the developing science and regulations to maximize the benefits and minimize the risks.

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