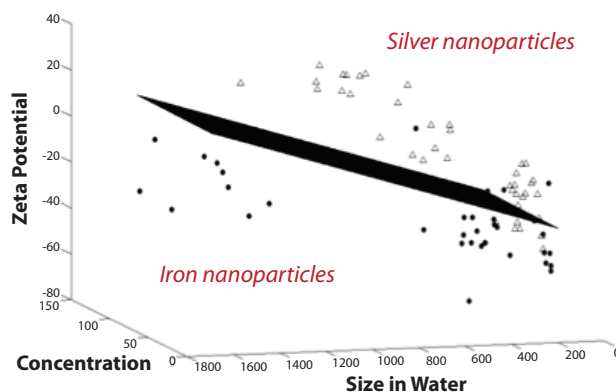


Nanotoxicology and Nanopharmacology



The unique properties of nanomaterials are being exploited by commercial, government, and academic laboratories to add value to existing products and enable new product development. These technical advances must be balanced with the potential human health and environmental adverse effects. RTI International offers the necessary tools and expertise to responsibly assess the benefits and risks of nanotechnology and related emerging technologies.

Researchers in RTI's Nanotoxicology and Nanopharmacology Program (NTNP) work in collaboration with academic centers, government departments, and commercial entities to provide critical data for informed decision making. Laboratory personnel specialize in the preparation, functionalization, characterization, and biological/toxicological responses of novel particles and fibers on the nanometer- and micrometer-size scale. Our mission is to correlate the physicochemical properties of nanomaterials with their biological responses at the molecular, acellular, tissue, and whole animal level.



Data are combined to conduct a nanoparticle-specific risk assessment, build predictive mathematical models, and compile a cost-benefit analysis.

Capabilities

The NTNP laboratory is well equipped to characterize the physicochemical properties of materials relevant for biological applications and toxicological assessments. Selected capabilities include the following:

Material Characterization

- Morphological assessments: size, surface area, shape
- Chemical nature: composition, reactivity, charge, solubility

Environmental Health and Safety

- In vitro toxicology: primary cells, carcinoma cells, co-cultures
- In vivo toxicology: hepatic, pulmonary, dermal, circulatory, gastrointestinal effects

Environmental Assessments

- Mobility, fate, transport
- Transformation over time

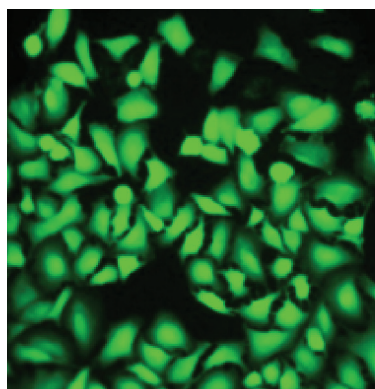


Core Competencies

RTI specializes in understanding the behavior of nano-scale materials (particles, composites, and films) in the dry state, in solution or suspension, and in biological and ecological systems. Our material characterization expertise includes complete analyses of morphology and chemical reactivity. Our environmental health and safety expertise includes analysis of whole animal, tissue, and cell toxicology; mechanistic analyses of toxicity; ecotoxicology; and public policy and regulatory analysis. Core competencies include

- Expertise in particle synthesis, characterization, hazard identification, and exposure assessment
- Research endeavors in nanotoxicology and nanopharmacology applicable to nanomedicine
- Understanding of the structure-activity relationships of advanced materials, translating into potential applications, and implications of nanotechnology.

The experimental design is the key to any successful scientific evaluation. Data obtained from the laboratory can help define the scope of the analytical work appropriate for characterizing a particular material, setting personal protective equipment guidelines for worker protection, and knowing proper remediation and disposal methods for the materials. Our experience in a variety of laboratory settings (small, large; academic, industrial; chemistry, toxicology) has provided for the development of diverse skills and differentiates RTI from others working in this field. In addition, because our interest is primarily in nano-scale materials, we can suggest the most appropriate characterization tests for any specific problem.



RTI's NTNP laboratory is a fully operational cell and tissue culture lab capable of imaging morphology and assessing biochemical changes at molecular, acellular, and tissue levels after exposure to a variety of particles, fibers, and other advanced materials.

Project Snapshots

- Nanoparticle characterization relevant to toxicological and eco-toxicological evaluations
- In vitro to in vivo validations
- Ecological testing
- Imaging the bio-nano interface
- Material functionalization density and composition dependencies
- Properties of particle mobility in biology and in the environment

Analytical Expertise

- Dry-state analyses of nanopowders
- Wet-phase analyses of particle solutions and suspensions
- Particle imaging
- Particle imaging, in-life
- Trace metal analysis to parts-per-trillion concentrations
- Elemental analyses of air, soil, and water
- Analysis of aerosols and powders
- Hazard assessments and analyses

More Information

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