Toxicological Assessment and Physico-Chemical Characterization

**Government Resources** *(Toxicological Assessment)*

- U.S. Air Force, Air Force Research Laboratory (AFRL), Human Effectiveness Directorate, Biosciences and Protection Division
  
  **Applied Biotechnology Branch** *(in vitro* toxicology engineered nanomaterial research, etc.)*

- Army Corps of Engineers (ACE) Engineering Research and Development Center (ERDC).
  
  **Environmental Laboratory** *(Engineered Nanomaterial Risk Assessment: Environmental Behavior and Ecotoxicological-Related Research)*

- U.S. Army Public Health Command (Provisional) Directorate of Toxicology
  
  - Health Effects Research Laboratory
  
  - Toxicology Evaluation Program

- Environmental Protection Agency
  
  1. Harmonized Test Guidelines

- NCI Cancer NanoLab (caNanoLab) Wiki – biomedicine
  
  caNanoLab Portal

- NCI Nanotechnology Characterization Laboratory
  
  - Assay Cascade Protocols: In Vitro and In Vivo Characterization
  
  - Three ASTM nanotoxicology standards were part of a inter-laboratory study using a nanoscale colloidal gold reference material

**External Resources** *(Toxicological Assessment)*

- ASTM E56 Nanotechnologies
  
  - ASTM E2524 - 08 Standard Test Method for Analysis of Hemolytic Properties of Nanoparticles


- Dupont and Environmental Defense

- ISO TC 229 Nanotechnologies (published documents)
  - ISO 29701:2010 Nanotechnologies -- Endotoxin test on nanomaterial samples for in vitro systems -- Limulus amebocyte lysate (LAL) test

- ISO TC 229 Nanotechnologies (projects under development)
  - ISO/FDIS 10801 Nanotechnologies -- Generation of metal nanoparticles for inhalation toxicity testing using the evaporation/condensation method
  - ISO/FDIS 10808 Nanotechnologies -- Characterization of nanoparticles in inhalation exposure chambers for inhalation toxicity testing
  - ISO/TR 16196 Nanotechnologies – Guidance on sample preparation methods and dosimetry considerations for manufactured nanomaterials
  - ISO/TR 16197 Nanotechnologies – Guidance on toxicological screening methods for manufactured nanomaterials

- Organization for Economic Cooperation and Development (OECD)
  - OECD Guidelines for the Testing of Chemicals
  - Sponsorship Programme for the Testing of Manufactured Nanomaterials
1. **Countries and Stakeholders**

2. No. 6 - ENV/JM/MONO(2008)13/REV, List of Manufactured Nanomaterials and List of Endpoints for Phase One of the OECD Testing Programme


• **Literature**

  - Oberdorster et al., *Toxicology of nanoparticles: A historical perspective*, Nanotoxicology, 1:1, 2 – 25, March 2007


• **Presentations**

2. Society of Toxicology, Nanotoxicology Specialty Section, Presentations, October 2009

**Government Resources (Physico-chemical characterization)**

- NCI Cancer NanoLab (caNanoLab) Wiki – biomedicine
  
  caNanoLab Portal

- NCI Nanotechnology Characterization Laboratory
  

- Army Corps of Engineers (ACE) Engineering Research and Development Center (ERDC)
  
  Environmental Laboratory (Engineered Nanomaterial Risk Assessment: Environmental Behavior and Ecotoxicological-Related Research), Characterization of surface area, particle size distribution, particle charge, spectroscopy, and composition

**External Resources (Physico-chemical characterization)**


- ISO (projects under development)
  
  1. ISO/AWI TR 13014 Nanotechnologies - Guidance on physico-chemical characterization of engineered nanoscale materials for toxicologic assessment
  
  2. ISO/NP TS 14101, Surface characterization of gold nanoparticles for nanomaterial specific toxicity screening: FT-IR method

- The Minimum Information for Nanomaterials Characterization (MINChar) Initiative

- Organization for Economic Cooperation and Development (OECD)
  
  - No. 6 - ENV/JM/MONO(2008)13/REV, List of Manufactured Nanomaterials and List of Endpoints for Phase One of the OECD Testing Programme


• Literature


4. Powers, et. al., Characterization of the size, shape, and state of dispersion of nanoparticles for toxicological studies, Nanotoxicology, 1:1, 42 – 51, March 2007


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