

# *Nanotechnology in Canada*

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# *What is nanotechnology?*

- Manipulation of materials at the nanometre scale – one-billionth of a metre
- A nanometre is  $1/100,000^{\text{th}}$  of the width of a strand of human hair

# *Properties*

- A material at the nano-scale can exhibit novel properties different from that substance's properties at the macro or micro scales
- Strange changes in colour, conductivity, reactivity

## *Impacts of changed properties*

- Ultrathin coatings protect textiles from stains
- Invisible titanium oxide particles used in sunscreen block radiation
- Carbon nanotubes make hockey sticks and tennis rackets lightweight but very strong

# *Applications*

- Hundreds of applications of nanotechnology already in commercial use
- For example: used in medical applications, cosmetics and sunscreens, industrial coatings, and environmental remediation

# *Forestry*

- Better wood treatments:
  - UV protection, moisture and decay resistance, pesticides
- Innovative paper products
- Environmental benefits:
  - Nanofiltration
  - Reduction of emissions

# *Energy*

- Potential for efficient sources of renewal energy:
  - For example, nano-engineered materials may generate a tremendous amount of thermal and mechanical energy upon ignition

# *Water*

- Potential for nanotechnology to increase the effectiveness of existing water treatment solutions:
  - Water filtration technologies that better remove pollutants from water
- Some concerns about potential impacts of nano-engineered materials in water

# *Environmental and health impacts*

- Environmental and health effects of nanomaterials are largely unknown
- In some studies nanoscale particles have been found to be substantially more toxic and reactive biologically than larger particles of the same material

## *Lack of regulatory framework*

- Despite nanotechnology's immense significance and potential, in Canada has no formal regulatory or explicit public policy framework for managing its risks and benefits
- Lack of information and consultation with the public about issues related to nanotechnology

## *Other recent developments*

- Environment Canada has given notice that manufacturers and importers must treat nanomaterials as new substances under CEPA if they have a novel molecular structure and are not on the Domestic Substances List

## *Other recent developments*

- Health Canada is drafting a policy framework for addressing the products of nanotechnology
- International technical standards work (ISO) and collaboration on issues such as nomenclature (OECD)

# *CIELAP's approach*

- Great potential benefits for the environment, human health, and the economy from nanotechnology
- Canadian policy should emphasize a precautionary approach to potential nanotechnology risks to
  - protect human health and the environment
  - ensure public confidence in the many potentially valuable uses of the technology

## *CIELAP's work – 2007*

- March 16, 2007: CIELAP held a one-day multi-stakeholder workshop in Toronto to explore policy considerations for nanotechnology
- Based on workshop, CIELAP developed a proposed Canadian Nanotechnology Policy framework

## *CIELAP's work – 2008*

- February 22, 2008: CIELAP held its second workshop on advancing nanotechnology policy
- Produced a second discussion paper: Update on a Framework for Canadian Nanotechnology Policy

# *Policy Framework for Nanotechnology*

- Elements to address include:
  - Basic societal goals
  - Public education and engagement
  - An inventory of activities and information sources
  - Lead agencies
  - Technical issues such as terminology and metrology

# *Policy Framework for Nanotechnology*

- Regulatory approach, including science, risk assessment, and stakeholder involvement
- Labeling and consumer protection
- Liability and intellectual property regimes

# *Policy Framework for Nanotechnology*

- Science and research support
- Commercialization and social and economic benefits
- Training
- Security concerns

# *Broad Strategic Priorities for Government*

- Maintaining a sense of great urgency and a commitment to making recommended policy initiatives happen very quickly
- Increasing scientific research and addressing technical issues, along with building overall nano-related policy capacity within government
- Designating an institutional centre within government for overall policy leadership and coordination
- Developing a public engagement strategy with a strong commitment to government openness and transparency

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