Nanotechnology Applications and Toxics Use Reduction Implications

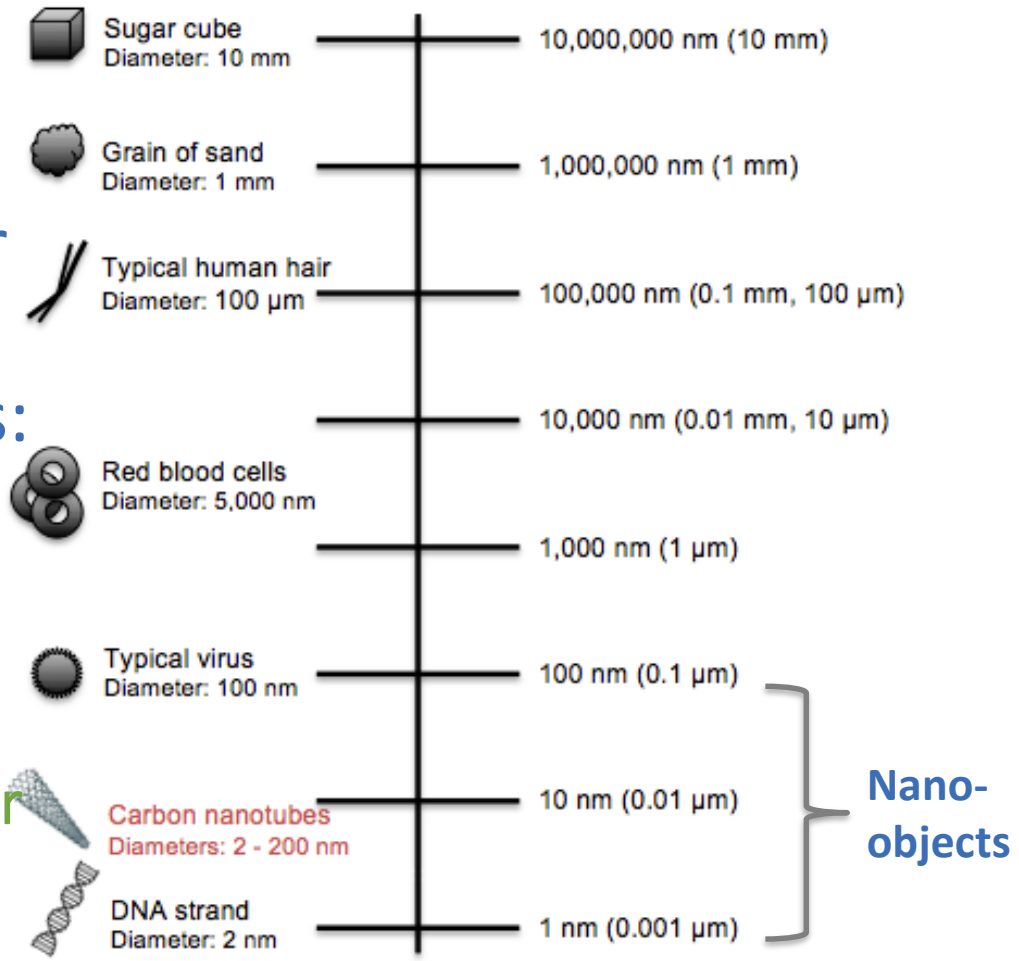
Molly Jacobs

Lowell Center for Sustainable Production, University of Massachusetts Lowell

TURI
TOXICS USE REDUCTION INSTITUTE
UMASS LOWELL

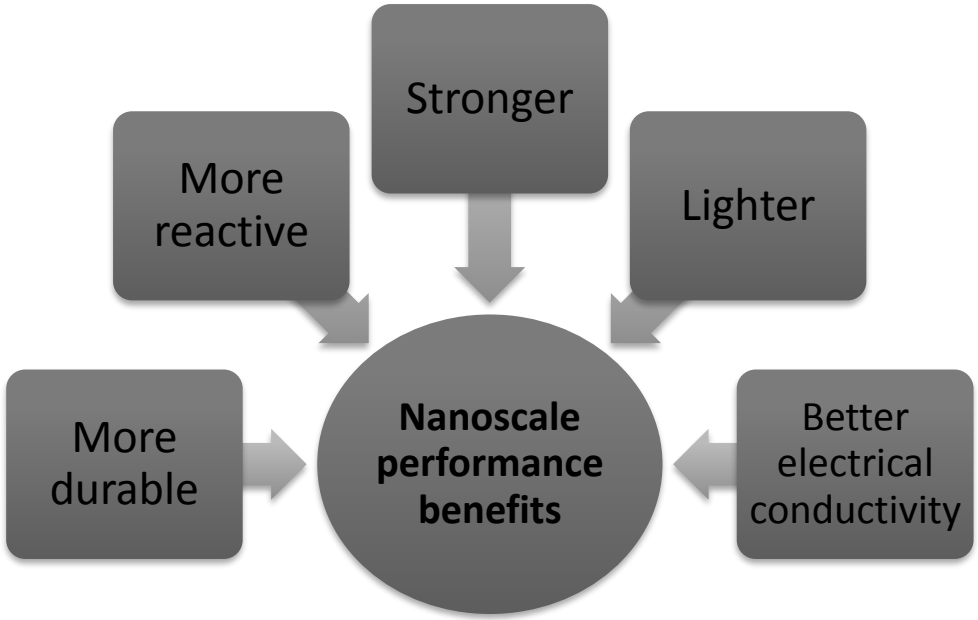
What is Nanotechnology

- The study of the controlling of matter on an atomic and molecular scale
- Engineered nano objects: at least one dimension between 1 to 100 nanometers (nm)
  - Roughly 100,000 times smaller than the diameter of a human hair

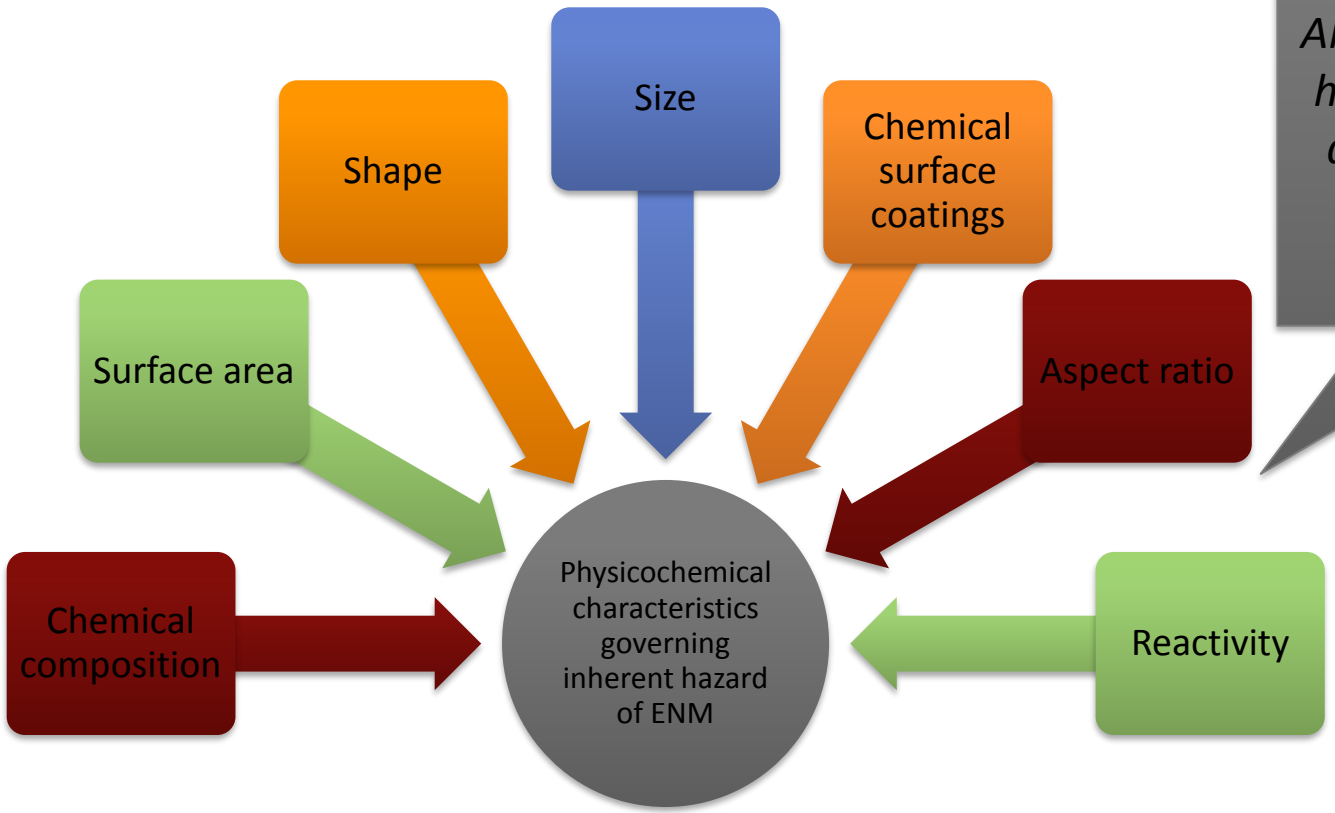


Engineered nanomaterials: enhanced performance compared to their bulk/larger-scale counterparts

- At nano-scale:
  - material **properties change** - melting point, fluorescence, electrical conductivity, and chemical reactivity
  - **Surface size is larger** - more material comes into contact with surrounding materials and increases reactivity

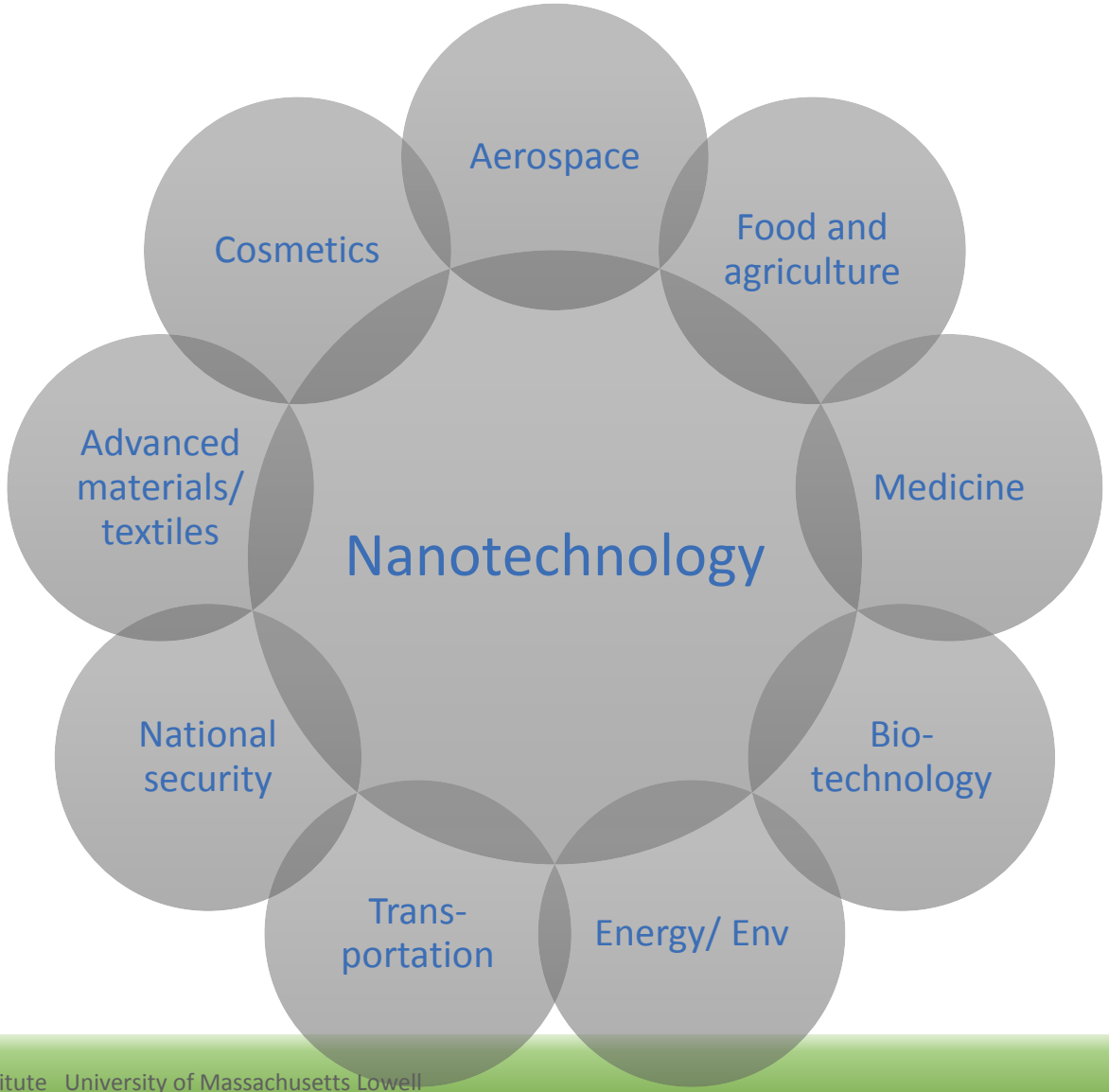


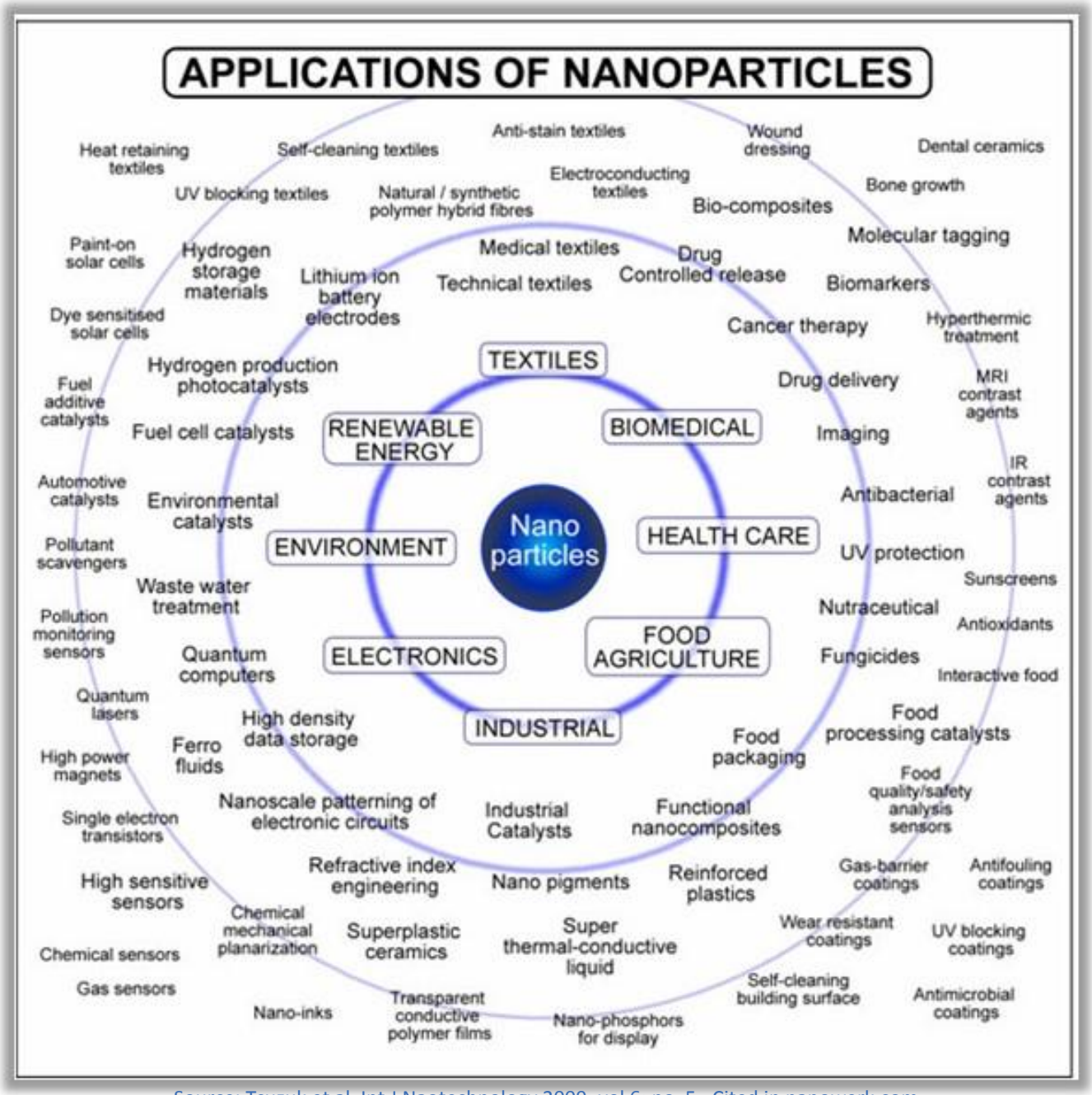
Physical-chemical properties: key to performance AND inherent hazard



Can we tune these properties to enhance their technological benefit AND reduce their potential hazard to ensure the safe development and use of engineered nanomaterials?

R&D and Use – Spanning multiple technology sectors





Source: Tsuzuk et al. Int J Naotechnology 2009; vol 6; no. 5., Cited in nanowerk.com

Today's session

Goal: To understand opportunities and challenges for using nanotechnology/engineered nanomaterials as a toxics use reduction strategy

Presenters:

- Barbara Karn, Sustainable Nanotechnology Organization
- Mark Falinski, Yale University
- Tom Cronin, Cabot

Additional Panelists:

- Mike Ellenbecker (TURI), Angelos Kyrlidis (Cabot)