



Nano-enabled Products Manufacturing: Workplace Risks

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Lux Research profile

- We help clients capitalize on **science-driven innovation**
- We have practices in **Nanomaterials**, Solar, Energy Storage, Water and Biosciences
- We have clients on **five continents** – blue-chip corporations, government agencies and laboratories, universities, investors, and small/mid-cap companies
- We **source** our intelligence from the Lux Research Network: CEOs, CTOs, CSOs, and R&D execs at cutting-edge technology firms in our sectors of focus
 - Over 1,500 interviews last year
 - Site visits in 20 countries, China to Dubai
- We draw on **our network** to:
 - Continuously monitor emerging technologies
 - Assist with company and technology evaluation
 - Identify discontinuities in technology commercialization
- We have **global research reach**, with offices in New York, Boston, San Francisco, and Amsterdam with 50+ employees: 67% scientists, 33% business analysts



LR Director Josh Wolfe present in the Oval Office during the signing of the 21st Century R&D Act



LR President Matthew Nordan testifying before U.S. Congress

Agenda

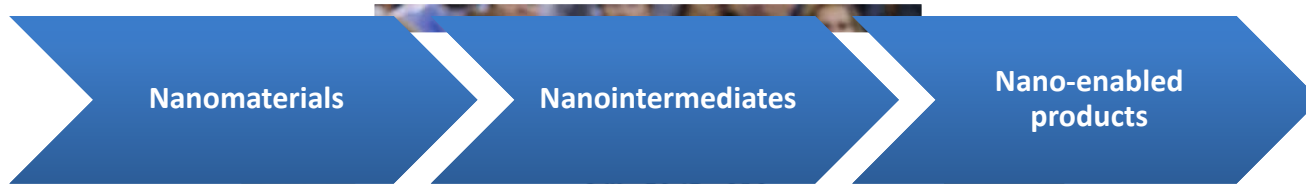
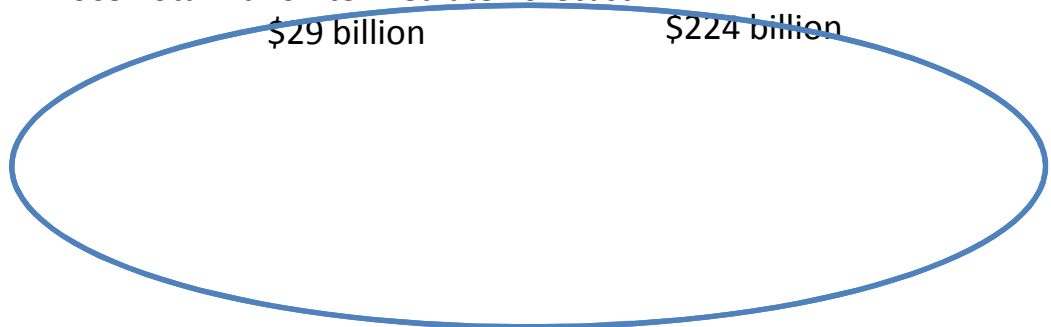
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- What nanomaterials and nano-enabled products should we worry about?
- What's the landscape of EHS research?
- What questions should we ask?

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The nanotech value chain example: carbon nanotube to tennis racket

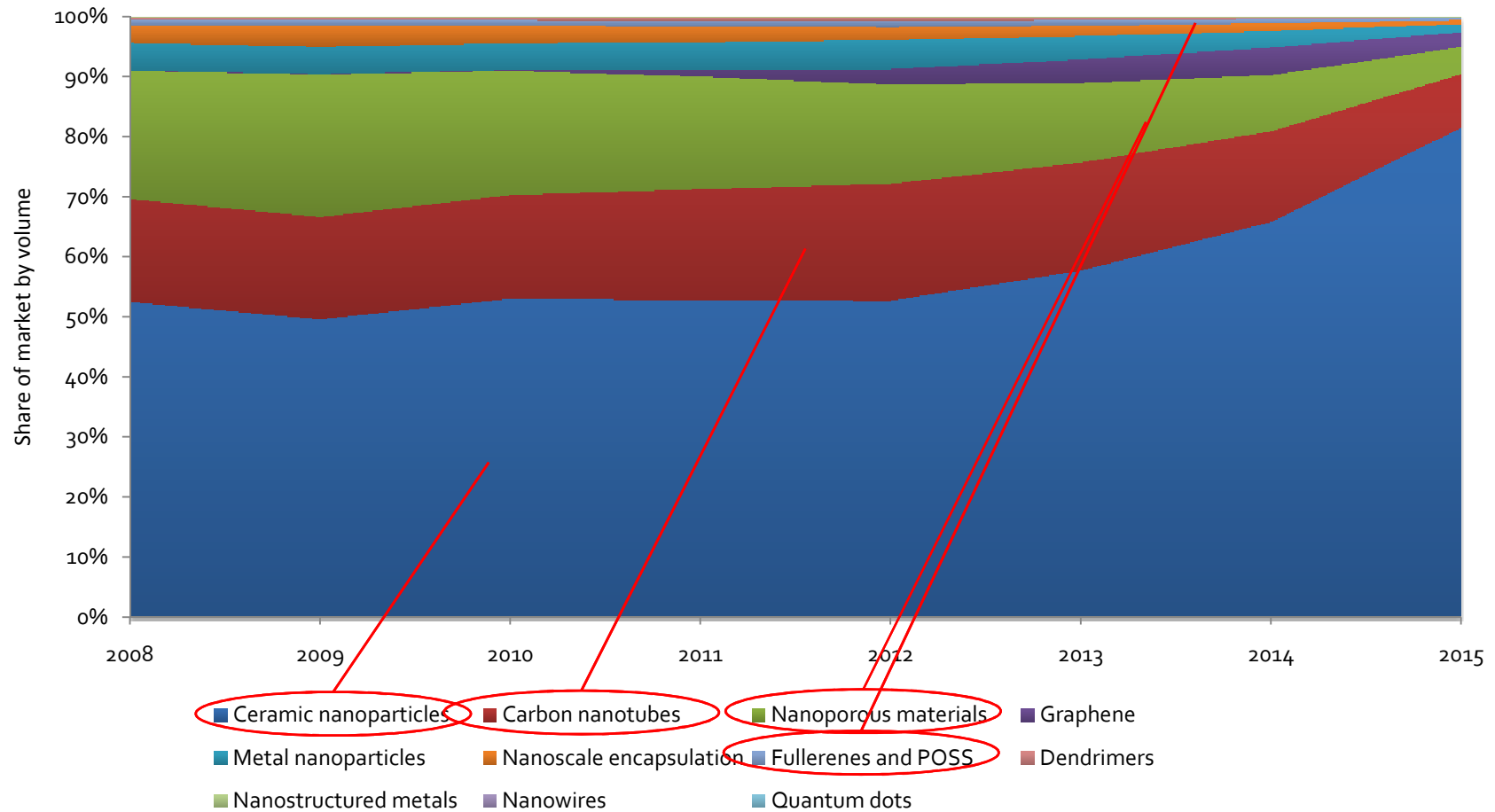
2009 Total Nanomaterials Forecast: \$1 billion 2009 Total Nanointermediate Forecast: \$29 billion 2009 Total Nano-enabled Products Forecast: \$224 billion



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Ceramic nanoparticles, carbon nanotubes, and nanoporous materials are produced the most



Personal care products



Personal Care

Concerns for workers

- Exposure to concentrated amounts of substances formulated to penetrate the skin quickly
- Exposure to ceramic nanoparticles (zinc oxide and titanium dioxide) and fullerenes
- Routes: inhalation and skin

Automobiles



Automobiles

Concerns for workers

- Exposure to carbon nanotubes, ceramic nanoparticles, metal nanoparticles via paints, coatings, fuel lines, body parts, catalysts
- Routes: inhalation, skin

Construction



Construction

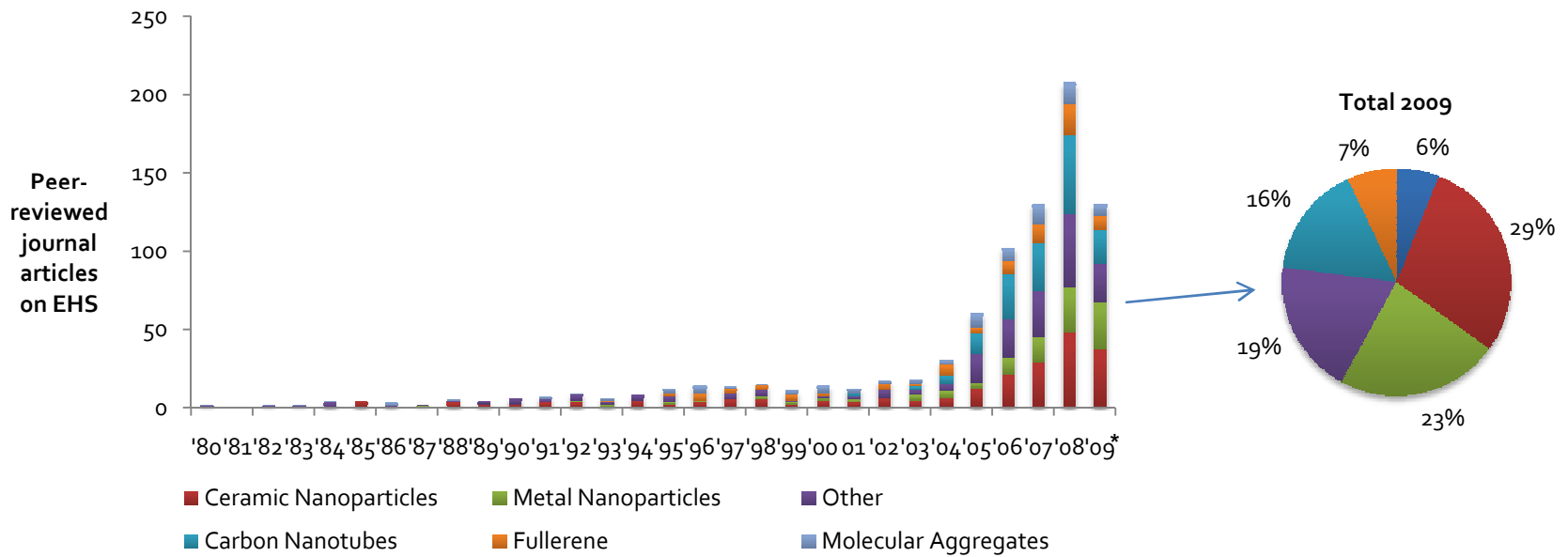
Concerns for workers

- Exposure to nanoparticle-enabled paints and coatings that are enabled with ceramic nanoparticles and metal nanoparticles
- Exposure to silica-based nanoporous insulation
- Routes: inhalation, skin

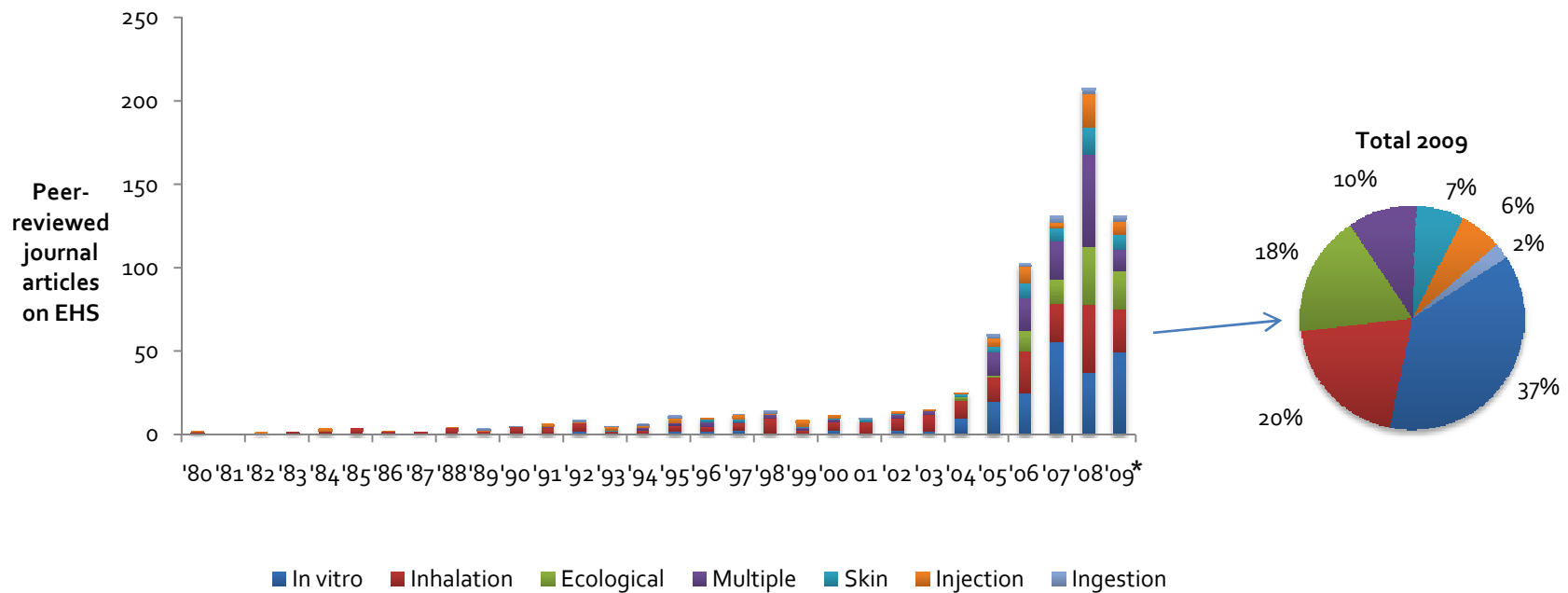
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Metal nanoparticle research grows



In vitro studies command the most attention



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Lots!

- Should we prioritize the nanomaterials and nano-enabled products?
 - If so, how?
- How do we handle the structural differences within the same material?
 - Does it matter?
- What are the gaps in research data?
- What are exposure limits?
- What are the proper techniques for handling nanomaterials?
- How do you dispose of waste?
- And the list goes on.....



Thank you

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