

No Small Thing

Getting nanodevelopment right the first time

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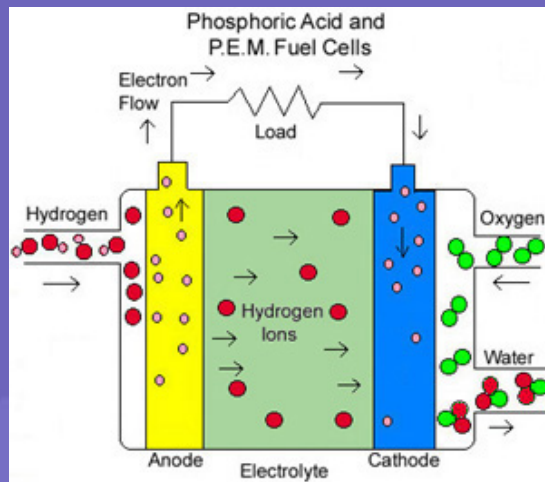
ENVIRONMENTAL DEFENSE

finding the ways that work

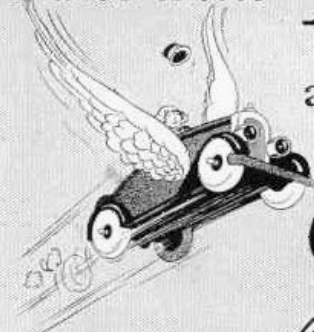
Introduction to Environmental Defense

- Founded in 1967
- 275 staff in 8 U.S. offices
 - Most PhDs of any environmental advocacy organization
- Funded by foundations, benefactors and 400,000 members

Our hopes for nanotech: environmental benefits



Ride with **ETHYL**



and get the benefits of
*High
Compression*



Knocks out that knock

MORE than a million motorists are now enjoying the benefits of high compression through Ethyl Gasoline. In two ways:

1 *Through high compression automobiles.* The advent of Ethyl Gasoline has at last given car manufacturers the opportunity mechanically to raise the compression of their engines. For cars now in use they can offer special high compression cylinder heads which greatly increase performance.

2 *Through carbon formation.* By letting carbon form in the cylinders of a car of ordinary compression, you automatically increase compression. And since Ethyl Gasoline is a high compression fuel, those deposits which heretofore have meant "knocking" and power loss become a source of *extra* power and driving satisfaction.

Ethyl Gasoline is motor gasoline

containing Ethyl brand of anti-knock compound, the ingredient which eliminates the "knocking" characteristics of ordinary gasoline and makes it a high compression fuel.

In terms of you and your car, high compression and Ethyl Gasoline mean a more powerful and flexible car, less gear-shifting, faster pick-up, less vibration and lessened depreciation. In short, a performance and economy impossible with ordinary compression and ordinary gasoline.

Ethyl Gasoline is distributed in the United States and Canada by responsible oil companies. *It has absolutely no ill effect on the motor or its parts.*

The first tankful will prove every claim. On sale at pumps which bear the "ETHYL" trademark shown on this page. There's one near you.

ETHYL GASOLINE CORPORATION
25 Broadway, New York City

ETHYL GASOLINE



<http://www.island-ikaria.com/multimedia/art40.htm>

Can't generalize risks, can't generalize safety

- Variety of nanomaterials
- Coatings influence toxicity
- Contaminants may convey toxicity



Two sides of getting small

<http://www.ambientlight.co.uk/portfolio/pages/nanobots.htm>

NanoRobot Surgery
www.ambientlight.co.uk

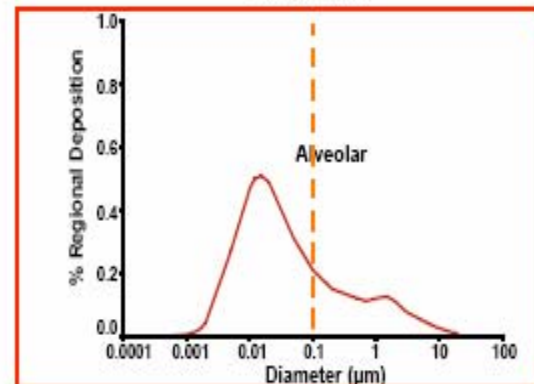
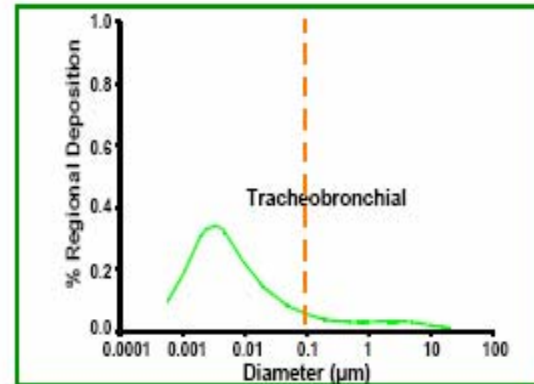
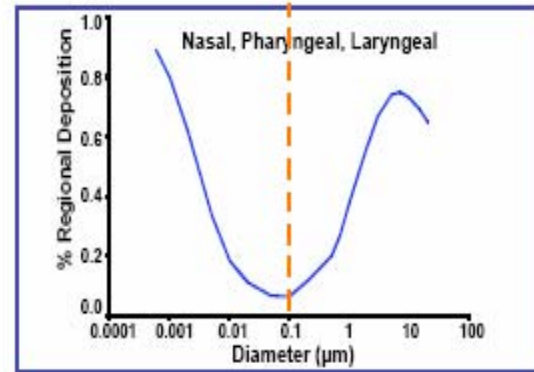
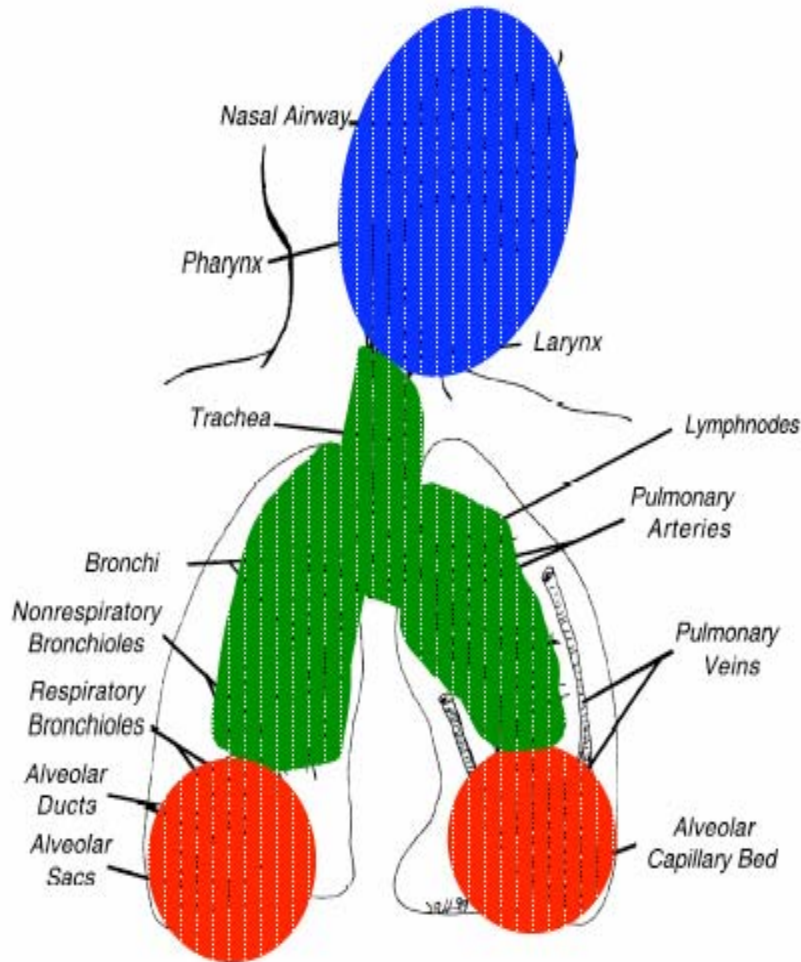
Why else are nanomaterials different?

- Deposition
- Translocation
- Dose response
- Food chain threats

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Figure 8

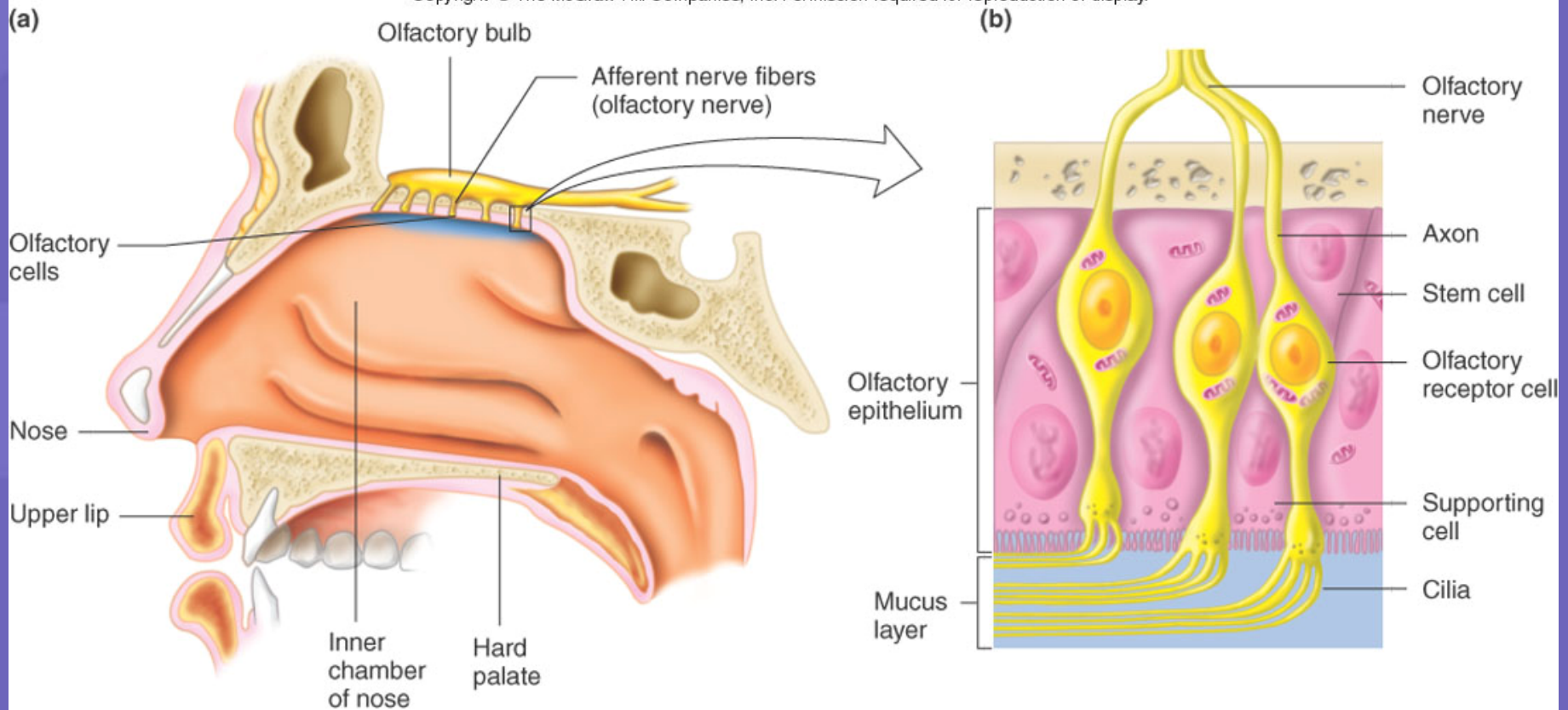


Why else are nanomaterials different?

- Deposition
- **Translocation**
- Dose response
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Olfactory Nerve Translocation Pathway:

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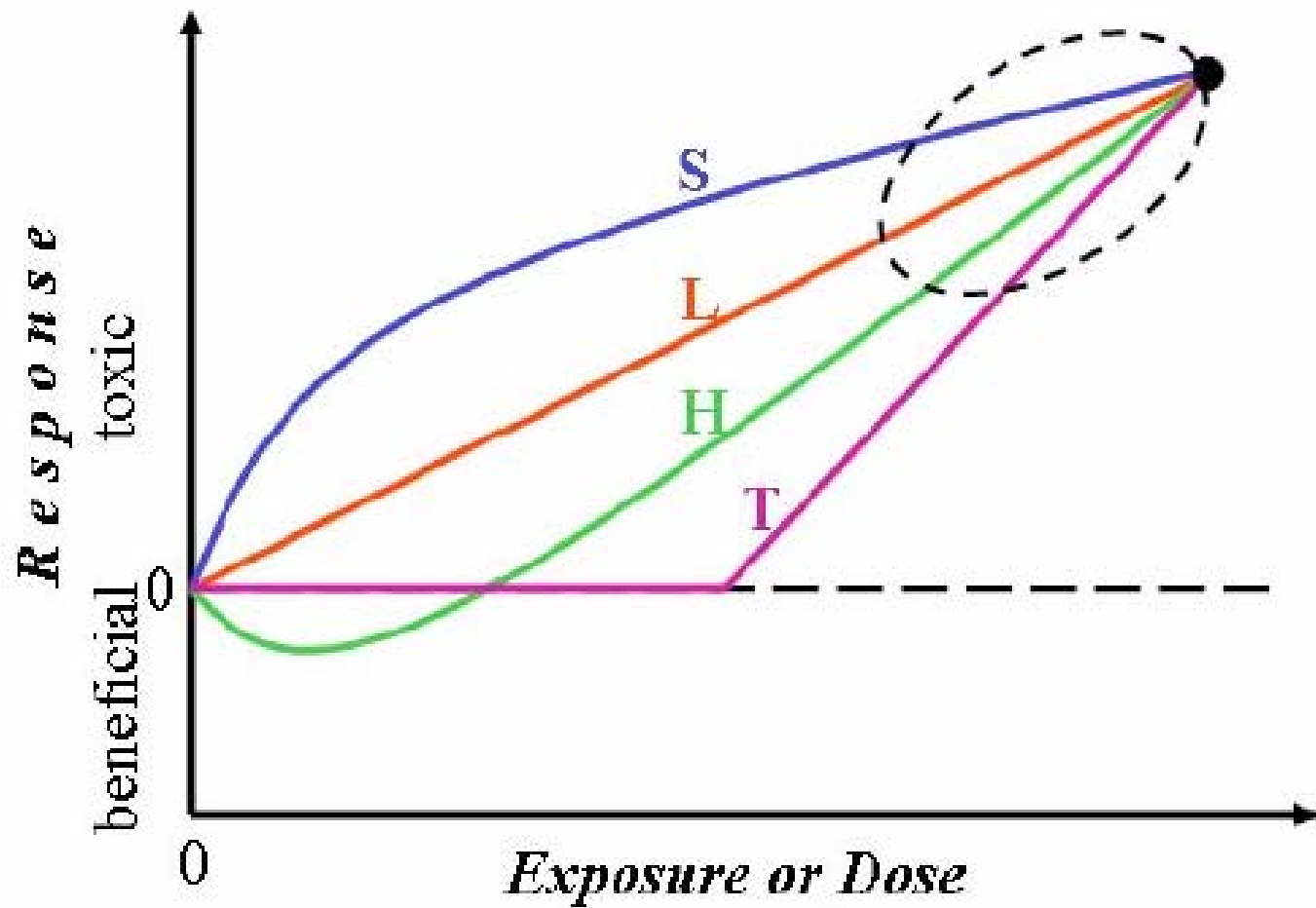


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Slide courtesy Dr. Eva Oberdorster

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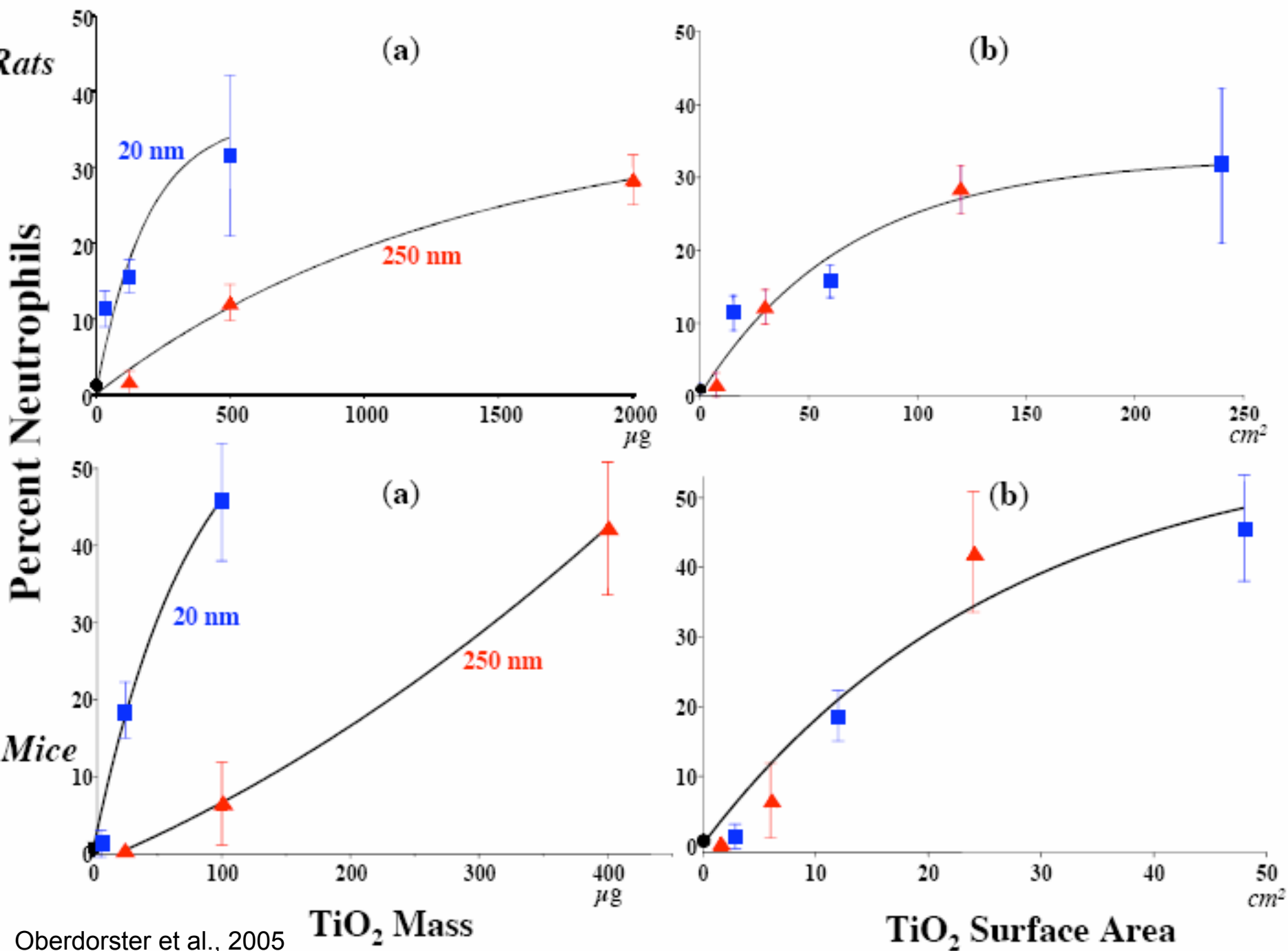
L – linear no threshold

S – supralinear

T – threshold

H – hormetic
(biphasic)

Figure 4



Why else are nanomaterials different?

- Deposition
- Translocation
- Dose response
- **Food chain threats**

Effects on bacteria and filter feeders

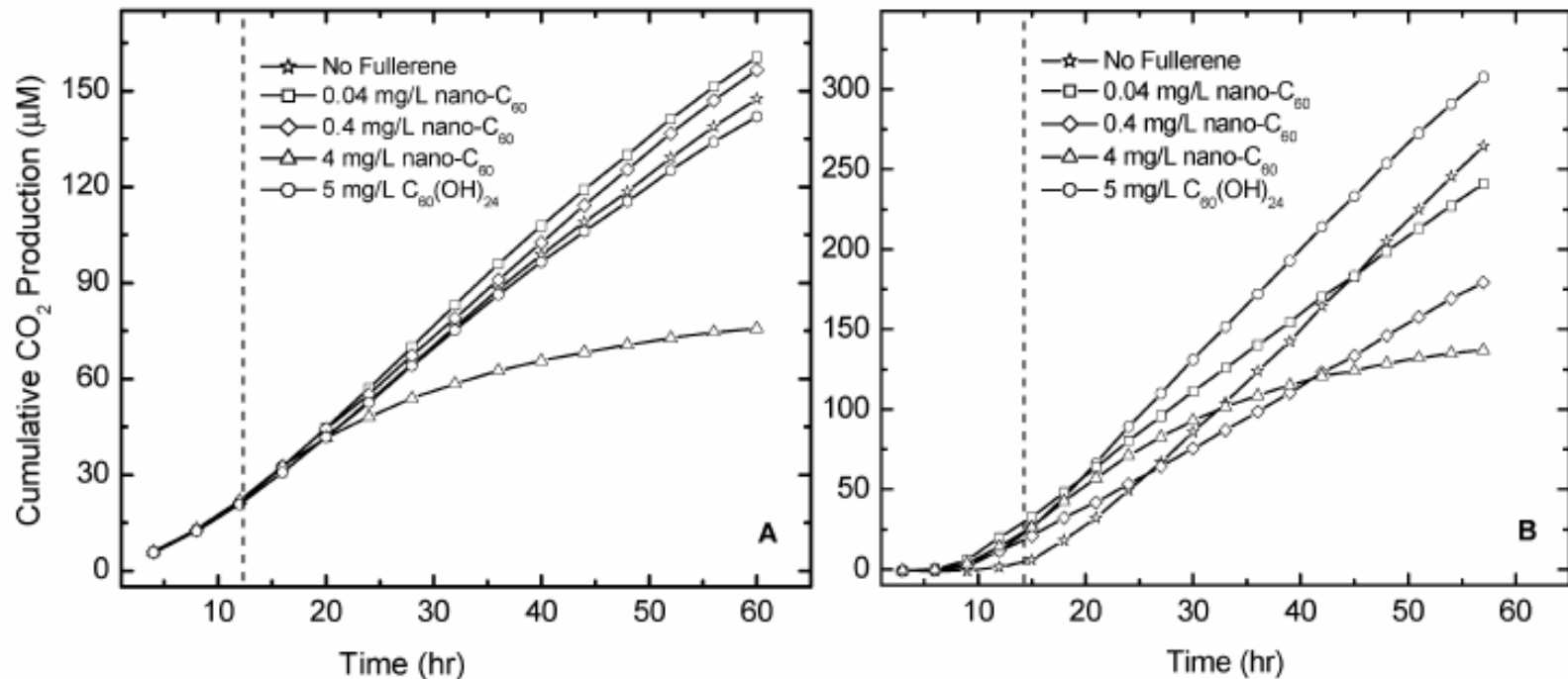


FIGURE 7. Response of Gram-negative *Escherichia coli* (A) and Gram-positive *Bacillus subtilis* (B) to nano-C₆₀ as measured by aerobic respiration rates. Nano-C₆₀ was administered to the cultures early in the exponential growth phase indicated by the dotted line. Respiration is shown as average (run in duplicate) production of CO₂ expressed as total accumulation, rates correspond to the slope.

Traps to avoid

- Analogy to bulk material
- Over-generalizing studies
- Short-term studies
- Assumptions based on current markets/amounts

Summary:

Nanotech in a Nutshell

New technology

+

- Atomic engineering
- New materials
- New properties

Significant benefits

+

- Clean energy
- Improved efficiency
- Better waste treatment

Potential risks

- High mobility?
- Novel toxicity?
- Corporate liability?

**Careful development
to achieve benefits
and manage risks**

- Clear regulations
- Risk identification research
- Risk management standards