

## Potential Health Effects (OSHA)

Damage liver (silver)

Trigger immune response in intestinal dendritic cells (TiO<sub>2</sub> and SiO<sub>2</sub>)

Cytotoxic to human intestinal cells (TiO<sub>2</sub>, SiO<sub>2</sub> and ZnO)

Damage DNA of human intestinal cells (ZnO)

Damage of genetic materials of liver and lungs.

Source: *Introduction to Nanomaterials and Occupational Safety and Health*.  
[https://www.osha.gov/dte/grant\\_materials/fy10/sh-21008-10/student\\_manual.pdf](https://www.osha.gov/dte/grant_materials/fy10/sh-21008-10/student_manual.pdf)

## Public Health Concerns

*Can nanomaterials also enhance the intake of other foreign / unwanted substances into our body?*

*On absorption do they cross other barriers such as blood-brain barrier, placental and blood – milk barrier and accumulate?*

*Are there any long-term health effects?*

*What are the effects on the ecosystem?*

## Recommendations

*Food industries must develop self-regulation policies and must be brought into action.*

*FDA guidelines and recommendations available*

*Call for more scientific research in assessing the risks.*

*Labeling of nanomaterials on the products for their potential applications.*

*Educating the public about nanotechnology and need of more safety data.*



### References:

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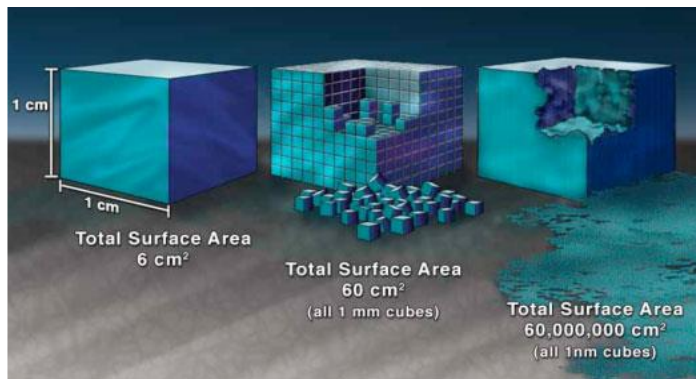
## Engineered Nanomaterials in Food Products: Public Health Implications



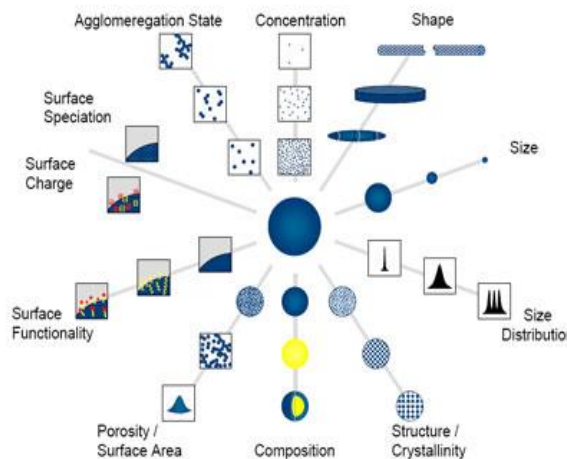
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**Properties at nanoscale**



## Nanomaterial synthesis, characterization & applications

### Nanotechnology & Nanomaterials

Nanotechnology involves the design, characterization, production, & application of structures, devices, and systems by controlling shape and size at the nanoscale (1nm = 10<sup>-9</sup>m).

Nanomaterials, have one or more dimensions of the order of 100 nanometers (nm) or less. They have unique or novel properties, due to the nano scale (nano metre- scale) structuring (nano.gov).

People are interested in the nanoscale because at this scale physical and chemical properties of materials differ significantly from those at a larger scale. Increased interaction and reactivity is one of the by products of materials that are nanoscale, which means potentially using less of the material or that even on the nanoscale the properties are so utterly different from that of the bulk scale.

Nanotechnology-based products that have already been marketed include medical products, pharmaceuticals, scratch-free paint, wrinkle and stain resistant fabrics and cosmetics such as sunscreen creams.

Nanomaterial is used in the food industry as an additive to enhance the color, flavor, taste, texture and consistency, to increase absorption and supplementation, and in packing materials of a variety of foods.

#### Examples

Titanium dioxide enhances white pigment. Silver oxide and zinc oxide, an antimicrobial and a pesticide, help reduce the growth of mold, fungus and bacteria in the lining of food-containing plastic containers.

**Some of the food and agricultural companies applying Nanomaterials in food products:**

#### Company

Altria (Kraft Foods)  
Associated British Foods  
Ajinomoto  
BASF  
Bayer  
Cadbury Schweppes  
Campbell Soup  
Cargill  
DuPont Food Industry Solutions  
General Mills  
Glaxo-SmithKline  
Goodman Fielder  
Group Danone  
John Lust Group Plc  
H.J. Heinz  
Hershey Foods  
La Doria  
Maruha  
McCain Foods  
Mars, Inc.  
Nestlé  
Northern Foods  
Nichirei  
Nippon Suisan Kaisha  
PepsiCo  
Sara Lee  
Syngenta  
Unilever  
United Foods

*Note: For display purpose companies are listed in alphabetical order.*