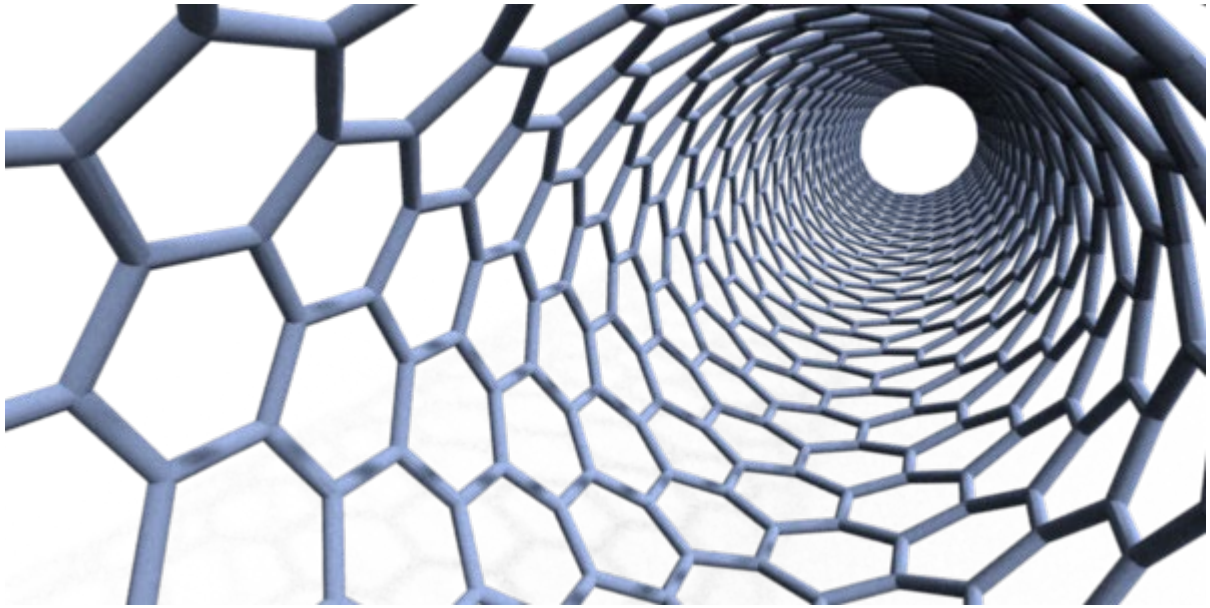
Introduction to Nanotechnology



What is Nanotechnology?

Nanotechnology is the creation of functional materials, devices, and systems through control of matter on the nanometer length scale by exploiting novel phenomena and properties (physical, chemical, biological) present only at that length scale.

“Nano”: How small is that, really?

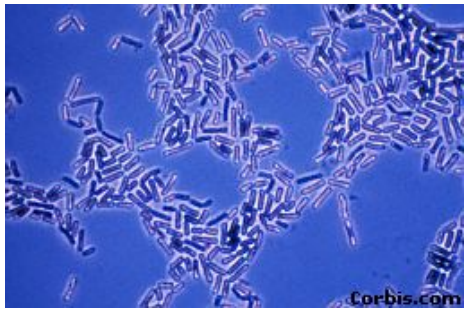
Mountain
1 km
1000 m

0.001 km = 1 m

Child
1 m

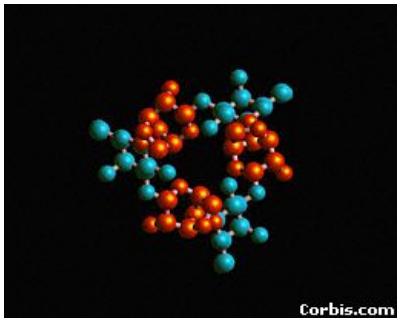
Ant
1 mm
0.001 m

1,000 mm = 1 m



Bacteria
1 μm
0.000001 m

1,000,000 μm = 1 m



Sugar molecule
1 nm
0.000000001 m

1,000,000,000 nm = 1 m

km = kilometer
m = meter

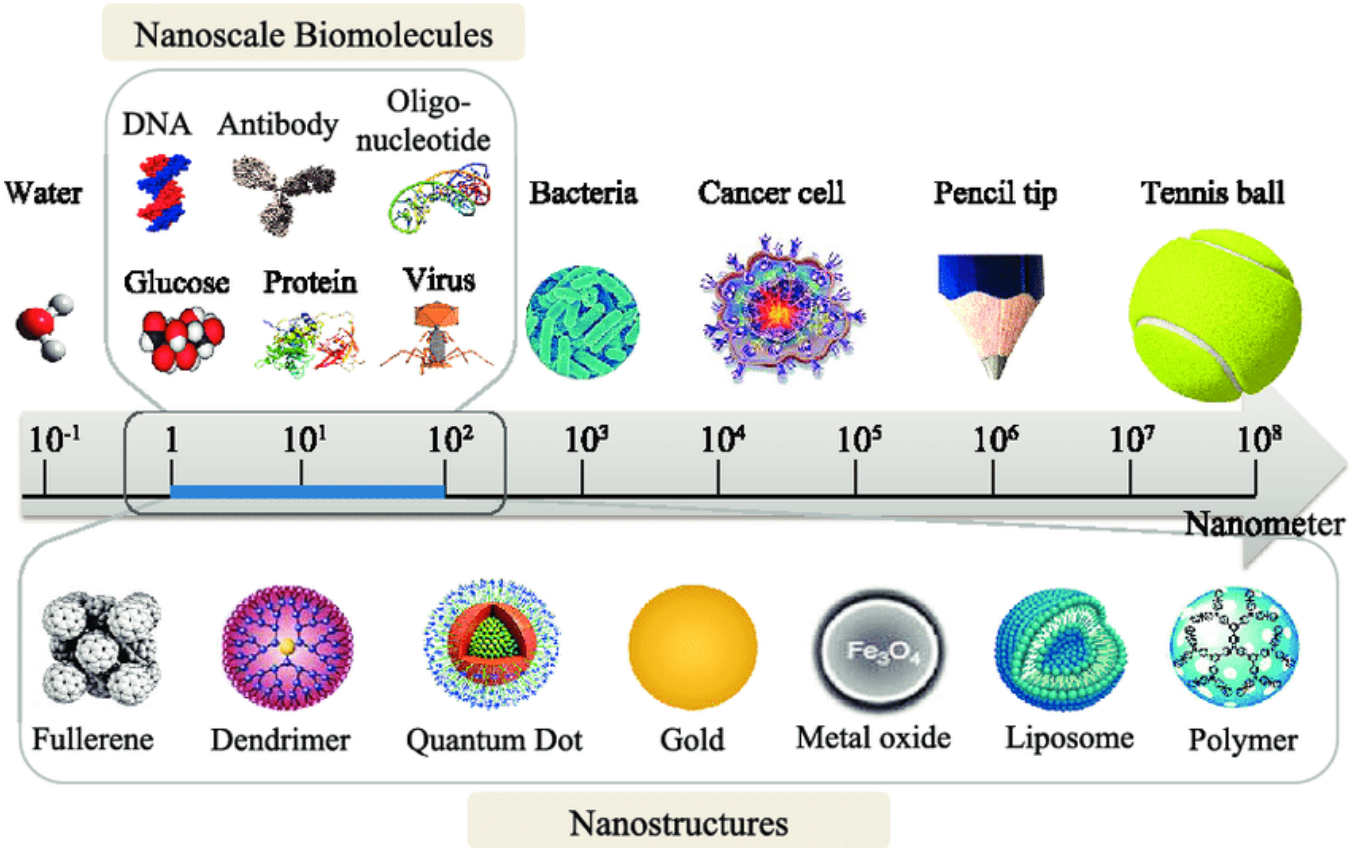
μm = micrometer
nm = nanometer

The Scale of the Universe

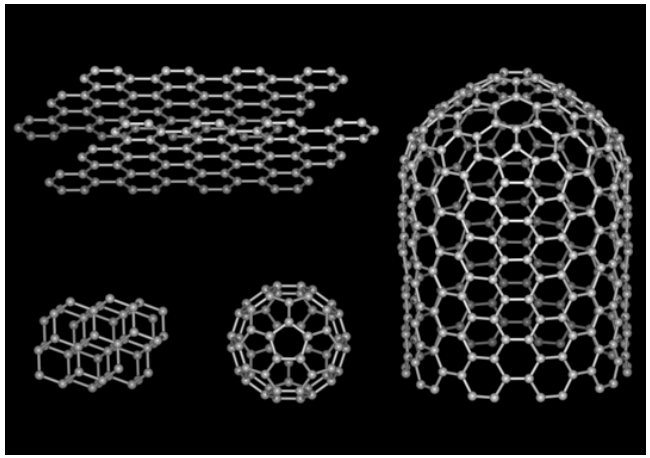
Micro to Macro: perspectives from a Planck length to a Gigaparsec.

- http://scaleofuniverse.com/

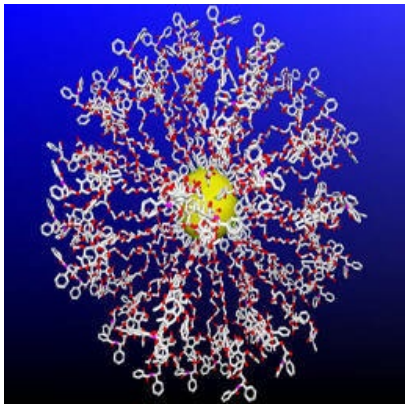
Nanoscale


Nanoscale Biomolecules
DNA
Antibody
Oligo-nucleotide
Water
Bacteria
Cancer cell
Pencil tip
Tennis ball
Glucose
Protein
Virus
10^{-1}
1
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
10^{7}
10^{8}
Nanometer
Fe_3O_4
Fullerene
Dendrimer
Quantum Dot
Gold
Metal oxide
Liposome
Polymer
Nanostructures

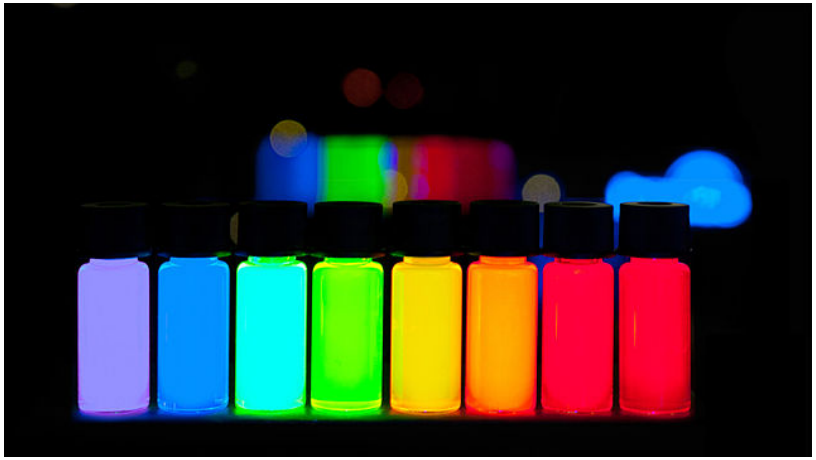
Types of Nanomaterials



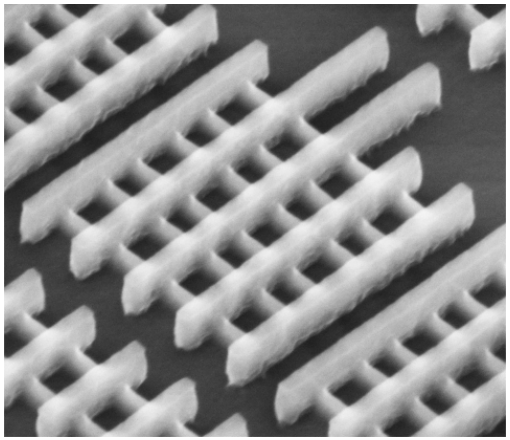
Carbon allotropes



Gold nanoshells

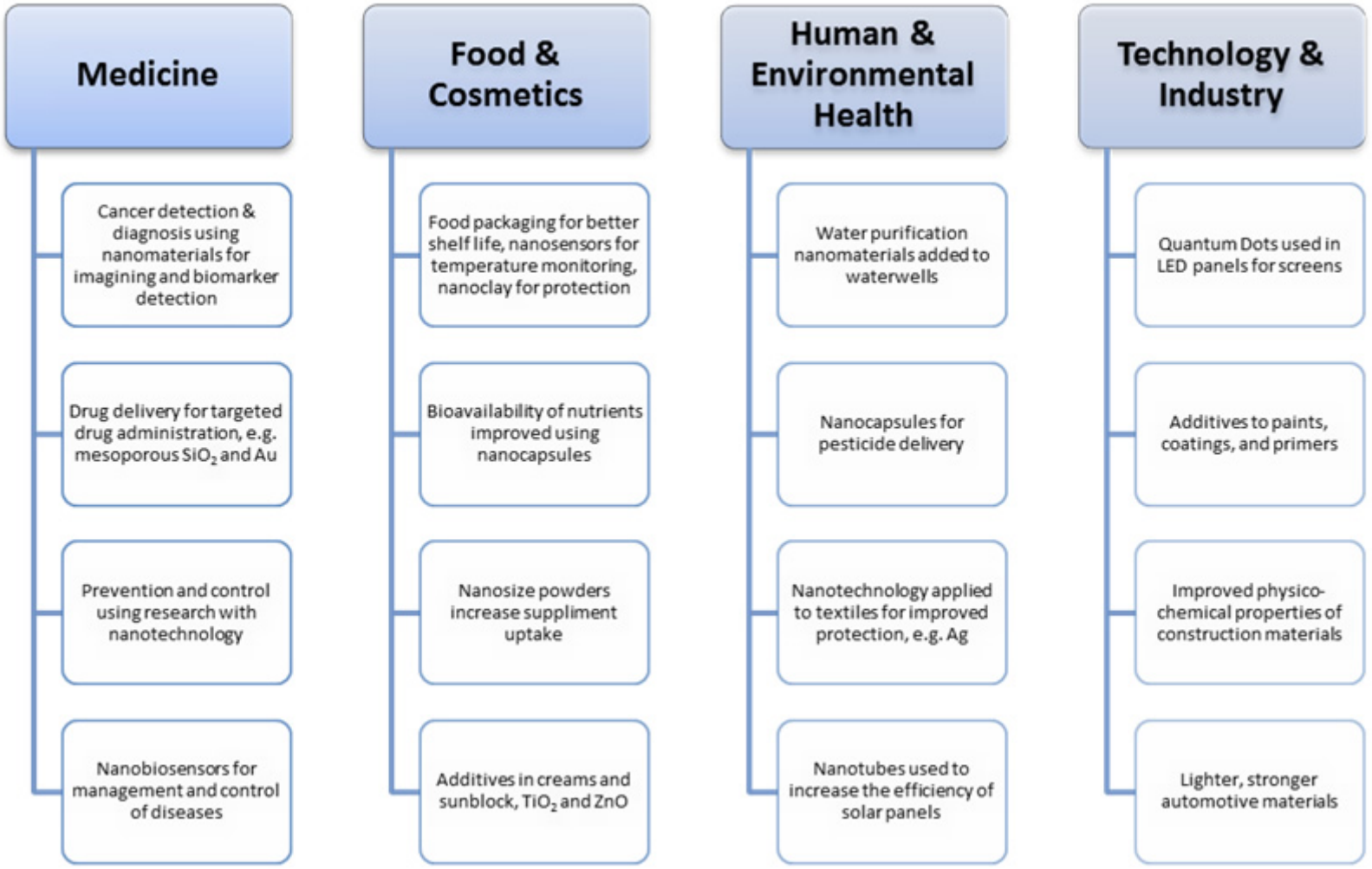


Quantum dots



Nano-silicon transistors

Applications of Nanotechnology



Source: http://www.gaeu.com/item/this-is-nanotechnology-one-of-the-fastest-growing-markets-in-the-world

Create Your Own

- In groups of three, your job is to research a specific field of nanotechnology and create your own scavenger hunt.

    - Construction
    - Water treatment
    - Medicine
    - Environmental health
    - Electronics
    - Sports and kinesiology
    - Information technology
    - Food & cosmetics