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Nanotechnology

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MSc. Nano-biotechnology

Lab. 1: Lab. Safety

Nanotechnology is the study of materials with very small dimensions, in the range of nanoscale, ***nano*** means **10^{-9}** (**one billionth of a meter**). The word itself is a combination of *nano* from the Greek “nanos” (or Latin “nanus”) and **technology**. Nanotechnology or nanoscience study objects dimension in the size range of **1 to 100 nm**, so they are **too small** to be seen with naked eye.

- **Millimeter** **10^{-3}**
- **Micrometer** **10^{-6}**
- **Nanometer** **10^{-9}**
- **Angstrom** **10^{-10}**
- **Picometer** **10^{-12}**
- **Femtometer** **10^{-15}**

NNI Definition of Nanotechnology

Research and technology development at the:

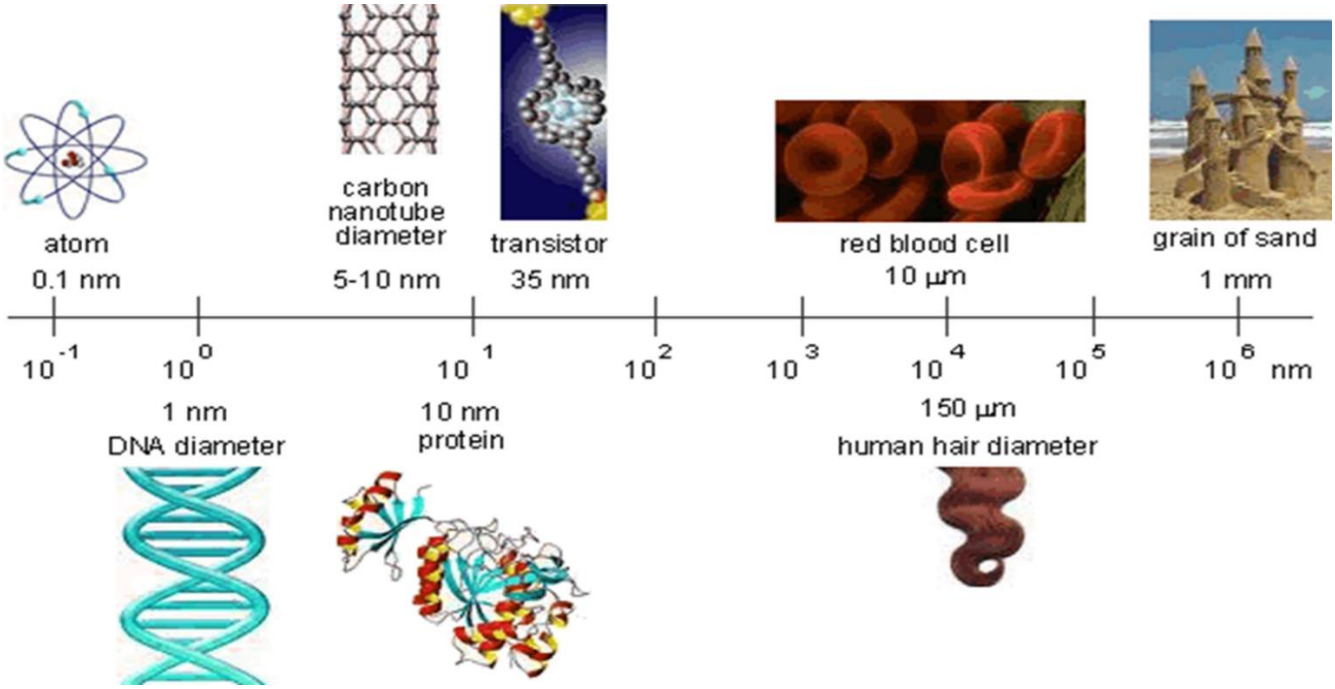
Atomic, molecular (from small to nano level **or** Macromolecular Levels (from large to nano level) in the length scale of approximately 1 - 100 nanometer range, to provide

1- A fundamental **understanding** of phenomena and materials at the nanoscale.

2- **Create and use** structures, devices and systems that have **novel properties**.

3- **Functions** because of their small and/or intermediate size.

► **NNI = National Nanotechnology Initiative**



• Nanomaterials characterized by Greater surface area to volume ratios leading to A greater amount of a substance comes in contact with surrounding material.

Best laboratory works for Handling Nanomaterials

S.N	**Do Not**	**Do**
1	Ingest any Reagent Always	wear lab coat in lab
2	Use mouth suction for pipetting or siphoning.	**Wash hands** frequently to minimize potential chemical or nanoparticle exposure through ingestion and dermal contact.

3	Consume or store food and beverages, or apply cosmetics where chemicals or nonmaterial	**Remove gloves** when leaving the laboratory
4	Pour solution directly from containers on to slides or into tubes rather use dropper	Keep your work area neat, clean and organized
5	Use any solution without being sure of its nature	Throw solid wastes in **special wastebaskets** and chemical liquids in **sinks using tap water**
6	Taste any solid/liquid chemicals	Return materials to their original benches, and clean up your work area before leaving the lab**.**

Labeling and Signage:

• Store in a well-sealed container, preferable one that can be opened with minimal agitation of the contents.

• Label all chemical containers with the identity of the contents (avoid abbreviations/ acronyms); include term "nano" in descriptor (e.g., "nano-zinc oxide particles" rather than just "zinc oxide." Hazard warning and chemical concentration information should also be included, if known.

• Use cautious judgment when leaving operations unattended:

i) Post signs to communicate appropriate warnings and precautions,

ii) Anticipate potential equipment and facility failures, and

iii) Provide appropriate containment for accidental release of hazardous chemicals.