

# Nanotechnology

The design, characterisation, production and application of structures, devices and systems by controlling shape and size at “nanometre” scale.

# Nano Science

The study of phenomena and manipulation of materials at atomic, molecular and macromolecular scales, where properties differ significantly from those at a larger scale.

# Bottom-up Approach

The fabrication of nanoparticles and nanostructures starting from the bottom (the atoms), and building them atom-by-atom through spontaneous assembly.

## Top Down Approach

Building nanostructures by starting with larger ones and removing and adding pieces bit by bit until a small structure is formed.

## Colloid

A chemical mixture in which one substance is dispersed evenly throughout another. However, the particles of the dispersed substance are only suspended in the mixture, whereas in a solution they are completely dissolved.

## Atomic Force Microscopy [AFM]

A technique for imaging surfaces of a material right down to the molecular scale. It is used a lot for imaging biomolecules like DNA.

## Fullerene

“Giant” molecules made of pure carbon. They can be in the form of spheres, tubes or ellipsoids. The smallest stable fullerene sphere is composed of 60 atoms of carbon.

## Nanometre

A size meaning one billionth (1/1,000,000,000) of a metre, or a millionth of a millimetre.

## Nanomaterial

A material with at least one of its dimensions in the nanometer scale, meaning between 1-100 nm. If the material has one dimension in the nanometers scale is called nanolayer or nanocoating; if it has two dimensions in the nanometer scale it is called a nanowire (or nanofibre); if the material has three dimensions in the nanometer scale it is called nanoparticle.

NANO - Memory Game

Terms And Definitions – Basic Knowledge

## Quantum Dot



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A nanoscale crystal. They are known as artificial atoms, and their electrical and optical properties can be tuned simply by changing their size. They are larger than atoms and molecules, and typically consist of several hundred atoms.



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## Semiconductor



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A material whose electrical properties lie between those of a metal and an insulator. These properties can be very easily modified by a process known as doping. Semiconductors are the foundation of the modern computer and radio age.



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## Scanning Tunnelling Microscope (STM)



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A device with which we image surfaces down to the single atom level. We can also use this microscope to move atoms around on a surface to build structures atom by atom. The invention of this microscope in 1982 kick-started the field of nanotechnology.



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# Atom



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The smallest unit of any chemical element, about a tenth of a nanometre in diameter. Atoms are the building blocks of matter.



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# Molecule



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Group of atoms held together by chemical bonds.



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# Electrons



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A constituent of atoms (they are known as subatomic particles). They are charged, and can be moved around a conductor or semi-conductor by using voltages – this is what we call an electric current.

