***Nanotechnology:***

Nanotechnology has become a topic of widespread discussion amongst researchers, in the media, among the investment community and elsewhere. Nanotechnology is about a new ways of making things. It promises more for less: smaller, cheaper, lighter and faster devices with greater functionality, using fewer raw materials and consuming less energy.Nano technology and nano science are concerned with materials science and its application at, or around, the nanometer scale (1 billion of a meter).Manufacturing can reach the nanoscale either from the top dawn, by machining to ever smaller dimensions, or from the bottom up, by exploiting the ability of molecules and biological system to self-assembly tiny structure.

***Nanomaterials:***

Nanomaterial's are defined as those which have structure components with at least one dimension less than 100nm. In quantum mechanics the particle confinement can be classified as :

1. Materials that are confined in one dimension i.e has a nanoscale one dimension (freedom in two dimension) like thin film is called two dimension (2D) quantum well.
2. Materials that are confined in two dimensions i.e have a tow nanoscale dimensions (freedom in one dimension or 1D) is called one dimension (1D) nanowire.
3. Materials that are confined in three dimension i.e have a three nanoscale dimensions (no freedom in any direction or zero dimension) is called zero dimension quantum dot or nanoparticles. For example precipitates ,colloids and quantum dots (tiny particles of semiconductor materials).Nanocrystalline materials, made up of nanometer-sized grains, also fall into this category.

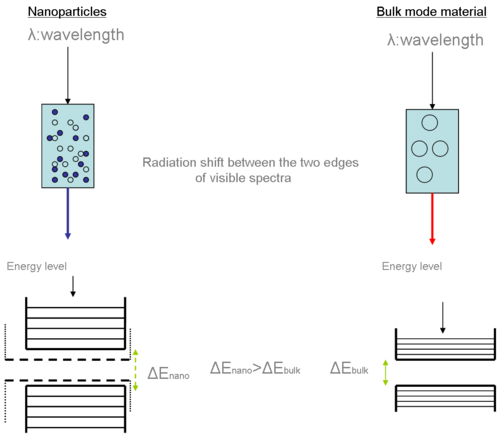
***Quantum confinement in nano particles:***

Nanotechnology an emerging technology which has gained fame in every field of life from an excellent sunscreen to an electronic chip. This emerging technology has given excellent properties to even those elements which at one time were thought of being useless For example Carbon is a nonmetal but when considered at the nano scale the carbon nano tubes are the best conductors .

But what is the enigma beyond size if this size can make a nonconductor an insulator what is the basic physics beyond it .Well the answer is simple and that is Quantum confinement.

The quantum confinement effect is observed when the size of the particle is too small to be comparable to the wavelength of the electron. To understand this effect we break the words like quantum and confinement, the word confinement means to confine the motion of randomly moving electron to restrict its motion in specific energy levels (discreteness) and quantum reflects the atomic realm of particles. So as the size of a particle decrease till we a reach a nano scale the decrease in confining dimension makes the energy levels discrete and this increases or widens up the band gap and ultimately the band gap energy also increases. Since the band gap and wavelength are inversely related to each other the wavelength decrease with decrease in size and the proof is the emission of blue radiation.

Comparison of a bulk material and nano particle reveals that too from the diagram the blue wavelength and the red wavelength.

**