

Nanotechnology

Nanotechnology, shortened to 'nanotech', is the study of the control of matter in an atomic and molecular scale.

Generally, nanotechnology deals with structure of the size 100 nanometer or small, and involves developing materials or devices within that size.

Nanotechnology is very diverse.

The ideas and concepts behind nanoscience and nanotechnology started with a talk entitled “There’s Plenty of Room at the Bottom” by physicist **Richard Feynman** at an American Physical Society meeting at the California Institute of Technology (Cal Tech) on December 29, 1959. In his talk, Feynman described a process in which scientists would be able to manipulate and control individual atoms and molecules.

Some applications of nanotechnology are:

- Everyday Materials
- Medical and Healthcare
- Electronics and IT
- Environmental
- Transportation

Everyday Materials

- Nanoscale additives to or surface treatments of fabrics can provide lightweight ballistic energy deflection in personal body armor, **or can help them resist wrinkling, staining, and bacterial growth.**
- Clear nanoscale films on eyeglasses, computer and camera displays, windows, and other surfaces can make them **water and residue-repellent, antireflective, self-cleaning, resistant to ultraviolet or infrared light, antifog, antimicrobial, scratch-resistant, or electrically conductive.**
- Nanoscale materials are beginning to enable washable, durable “smart fabrics” equipped with flexible nanoscale sensors and electronics with capabilities for health monitoring, solar energy capture, and energy harvesting through movement.
- Light weighting of cars, trucks, airplanes, boats, and space craft could lead to significant fuel savings.
- Nanotechnology is already being used to develop many new kinds of batteries that are quicker-charging, more efficient, lighter weight, have a higher power density, and hold electrical charge longer.
- Nano-bioengineering of enzymes is aiming to enable conversion of cellulose from wood chips, corn stalks, unfertilized perennial grasses, etc., into ethanol for fuel.

Electronics and IT

- Transistors, the basic switches that enable all modern computing, have gotten smaller and smaller through nanotechnology
- Using magnetic random access memory (MRAM), computers will be able to “boot” almost instantly. MRAM is enabled by nanometer-scale magnetic tunnel junctions and can quickly and effectively save data during a system shutdown or enable resume-play features.