

Assignment 2

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Q: Enlist the applications of Nanomaterials in following

1. Electronics
2. Medical
3. Defence
4. Space

Ans: Nanoparticles are incredibly small, having one dimension that measures 100 nm or less.

Application of Nanomaterials in following:

① Electronics: Researchers have used nanoparticles called nanotetrapods studded with nanoparticles of Carbon to develop low cost electrodes for fuel cells. This electrode may be able to replace the expensive platinum for fuel cell catalysts.

② Silver nanoparticle ink was used to form the conductive lines needed in circuit boards.

③ Combining gold nanoparticles with organic molecules creates a transistor known as NOMFET (Nanoparticle Organic Memory Field-Effect Transistor).

④ Solar steam device are used in purifying water without electricity.

② Medical :-

a. Researchers are reporting results from a clinical study using of gold-silica nanoshells heated by near infrared laser.

b. The use of polymer coated iron oxide nanoparticles to breakup clusters of bacteria, for chronic bacterial infections

③ Researchers at MIT are developing nanoparticles designed to pass through the brain barrier and ^{de} tumors of a type of brain cancer called target glioblastoma.

d) The surface charge of protein filled nanoparticles has been shown to affect the ability of nanoparticle to stimulate immune response.

e) Nanodiamonds with protein molecules attached can be used to increase bone growth around dental or joint implants.

③ Defence :

a. A nanobattlesuit is being developed that could be as thin as spandex and contain health monitors and communications equipment.

b. A Mission Adaptive Rotor program, is focused on improving the performance of helicopter rotors.

c. NASA has developed a carbon nanotube polymer composite that bends when a voltage is applied in aircraft wings.

d. The Transformer vehicle developed by DARPA can travel on roads but is also capable of vertical take-off and landing.

④ Space :

a. Employing materials made from carbon nanotubes to reduce the weight of a spacecraft providing structural strength.

b. Using Carbon nanotubes to make the cable needed for space elevator.
c. Producing thrusters for spacecraft that use MEMS devices to accelerate nanomaterials. This should reduce the weight and complexity of thruster systems for interplanetary missions.

d. Working with nanosensors to monitor the levels of trace chemicals in spacecraft to monitor performance of life support systems.

e. Using Carbon nanotubes to build lightweight solar sails that use pressure of light from sun reflecting on mirrors like solar cell to propel a spacecraft.