



## **19CH201 – ENGINEERING CHEMISTRY FOR CIRCUIT BRANCHES**

### **Unit-3 NANO CHEMISTRY**

#### **APPLICATIONS OF NANOPARTICLES**

##### **1. Nanoparticles applications in medicine**

- Nanoparticles are used for early diagnosis of infectious disease. The nanoparticles attach to molecules in the blood stream indicating the start of an infection. When the sample is scanned for Raman scattering the nanoparticles enhance the Raman signal, allowing detection of the molecules indicating an infectious disease at a very early stage.
- Researchers are developing a nanoparticle intended to make very early detection of cancer tumors easier. When the nanoparticles attach to a cancer tumors the nanoparticles release “biomarkers”, molecules called peptides. The idea is that since each nanoparticle carries several peptides a high concentration of these biomarkers will occur even at very early stages of cancer, allowing early detection of the disease.
- Quantum Dots (crystalline nanoparticles) that identify the location of cancer cells in the body.
- Nanoparticles that deliver chemotherapy drugs directly to cancer cells.
- Gold nanoparticles that allow heat from infrared lasers to be targeted on cancer tumors.
- Porous silica nanoparticles used to deliver chemotherapy drugs to cancer cells.

##### **2. Biomedical**

- Biosensitive nanomaterials are used for tagging of DNA and DNA chips.
- In the medical field, nanomaterials are used for disease diagnosis, drug delivery and molecular imaging.
- Nanocrystalline silicon carbide is used for artificial heart valves due to its low weight and high strength.
- A nanoparticle cream that releases nitric oxide gas to fight staph infections.
- Nanoparticles called micelles used to carry and deliver a chemotherapy drug called paclitaxel to bladder cancer cells.



### 3. Information technology

- Nanoscale fabricated magnetic materials are used in data storage
- Nano computer chips reduce the size of the computer.
- Nanocrystalline starting light emitting phosphors are used for flat panel displays.
- Nanoparticles are used for information storage.
- Nanophotonic crystals are used in chemical optical computers.