

Engineered Materials (SC221)

Instructor

Anil K. Roy

Class Timings

Tuesday (9:00-9:55)

Wednesday (11:00-11:55)

Friday (10:00-10:55)

LT-3

■ Watch this video



■ Discussion

■ Watch this video



■ Purpose

- Material science has been advancing in tandem with technologies
- Sports, Avionics, Robotics, Biomedical devices may be the most visible market drivers
- Upcoming needs for lighter, tougher materials, in lighting, heat resistant material, water resistant material, various implants (inside the body), communication, strategic applications ...

■ Purpose

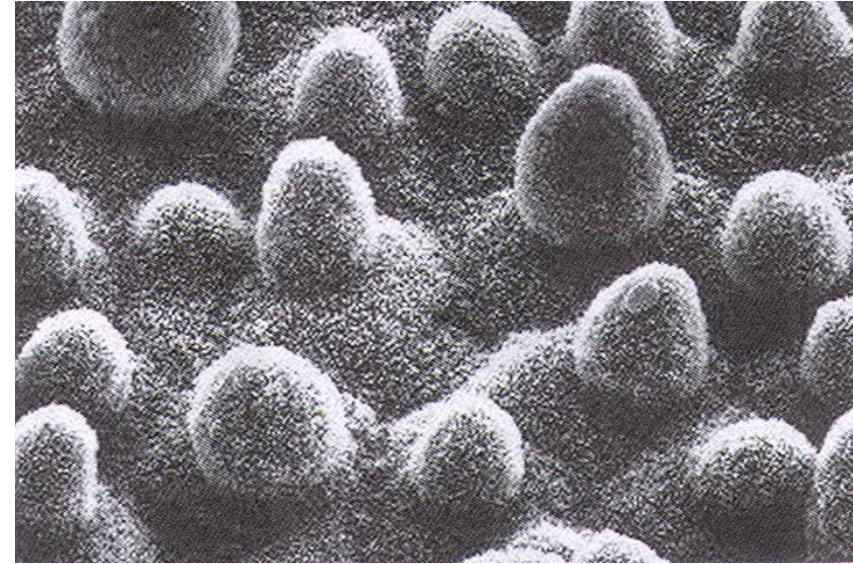
Some examples are:

- Graphene
- Nanocarbon
- High speed semiconductor device materials, viz., GaAs, GaN
- ...

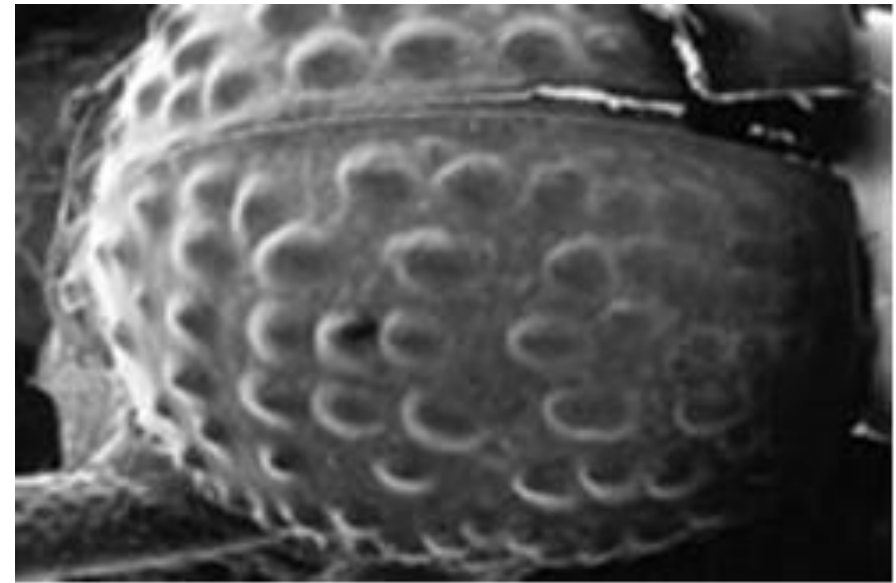
■ Example from nature



■ Example from nature



■ Example from nature



The thirsty beetle of the Namib deserts of southwest Africa drinks water because of some special property of its body material.

■ Watch this video



■ Purpose

There is a wide range of smart materials such as

- Piezoelectric,
- Ferromagnetic alloys,
- Shape memory alloys,
- Electro-active polymers,
- Spintronics ...

These have revolutionized smart material sensors and actuators

■ Purpose

These are materials which show strong couplings between the applied stimuli such as

electrical, magnetic, optical or thermal field

with their mechanical properties, viz.,

elasticity, viscosity etc.

Such couplings provide built-in mechanisms for sensing and actuation. In particular, they provide promising solutions in emerging areas such as

biomanipulation, prosthetics, implantable drug delivery systems, wearable devices, and scanning probe microscopy.

■ Purpose

Objective is to make you familiar with most of these materials and their properties, as far as possible, which you will be using all through your professional career as engineers or as educators.

Some Scenarios

■ Find out Yourselfes



Course Content, Evaluation & Grading

■ Course Content

- Piezoelectric materials,
- Semiconductor materials,
- Nano materials,
- Some special materials:
 - Graphene
 - Quantum Dots
 - GMR (Giant Magnetoresistive material)
 - ...