



## 19CH103- ENGINEERING CHEMISTRY

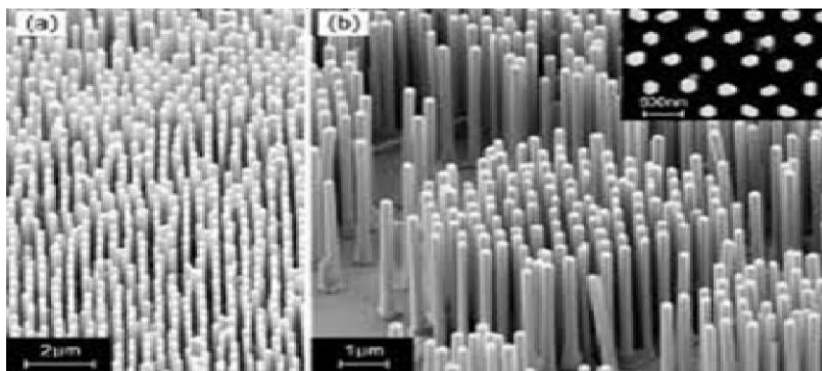
### Unit-3 NANOCHEMISTRY

## NANORODS

Nanostructures shaped like long sticks or dowels with a diameter in the nanoscale but having a length that is very much longer.

### Description

- In nanotechnology, nanorods are one morphology of nanoscale objects. Each of their dimensions range from 1–100nm. They may be synthesized from metals or semiconducting materials. Standard aspect ratios (length divided by width) are 3-5.
- Nanorods are produced by direct chemical synthesis. A combination of {ligands} act as shape control agents and bond to different facets of the nanorod with different strengths. This allows different faces of the nanorod to grow at different rates producing an elongated object.



### Applications

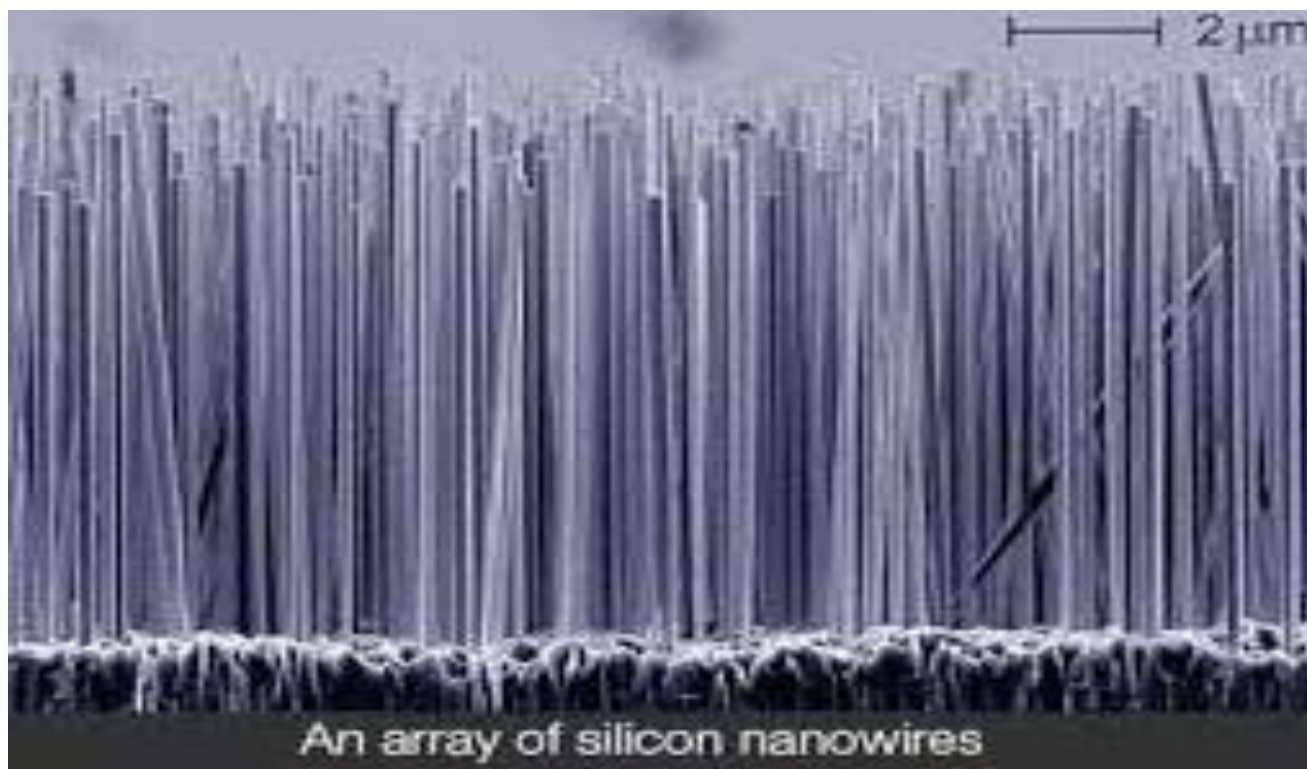
The applications of nanorods are diverse, ranging from display technologies (the reflectivity of the rods can be changed by changing their orientation with an applied electric field) to microelectromechanical systems (MEMS), optical, sensing, solar cells, magnetic, and electronic device applications.



## NANOWIRE

A nanowire is a nanostructure, with the diameter of the order of a nanometer ( $10^{-9}$  meters). Alternatively, it can be defined as structures that have a thickness or diameter constrained to tens of nanometers or less and an unconstrained length.

At these scales, quantum mechanical effects are important — which coined the term “quantum wires”. Many different types of nanowires exist, including metallic (*e.g.*, Ni, Pt, Au), semiconducting (*e.g.*, Si, InP, GaN, etc.), and insulating (*e.g.*, SiO<sub>2</sub>, TiO<sub>2</sub>).





## SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore - 641 107

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### Characteristics of Nanowires

- Silicon nanowires exhibit strong photoluminescence characteristics.
- Nanowires are dimensional material.
- It shows distinct optical, chemical, thermal and electrical properties due to this large surface area.