



SNS COLLEGE OF TECHNOLOGY

Vazhiampalayam, Coimbatore-35

(An Autonomous institution)

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DEPARTMENT OF CHEMISTRY

**COURSE NAME : 19CHB102- ENGINEERING CHEMISTRY FOR
ELECTRICAL SCIENCES**

I YEAR / IISEMESTER

UNIT : 3. NANOCHEMISTRY

TOPIC : 4. NANOWIRES AND NANORODS

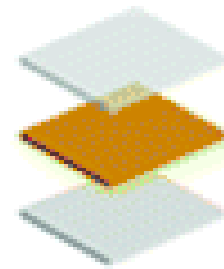


CLASSIFICATION OF NANOPARTICLES

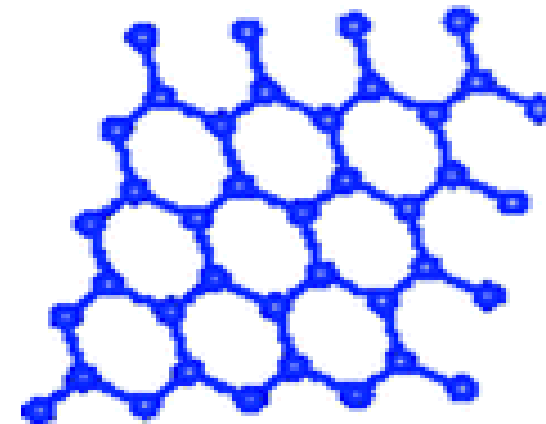


- Nano wires
- Nano rods
- Nano clusters
- Nano tubes

2D



**Nanosheets
Nanoplates**

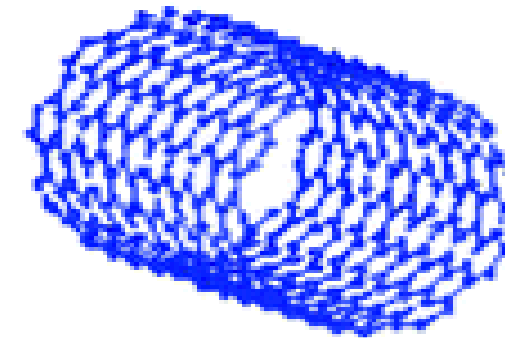


Graphene

1D

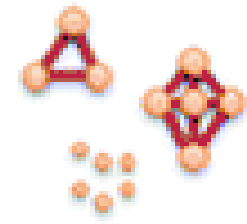


**Nanorods
Nanofibers
Nanotubes**

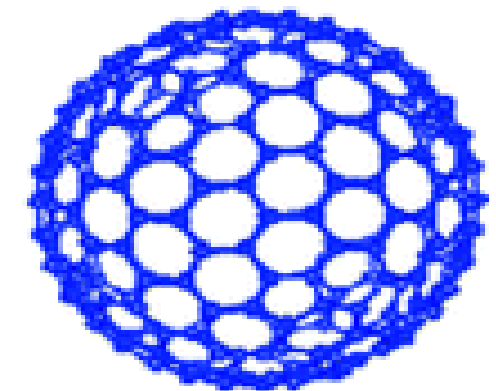


Nanotube

0D



**Spheres
Clusters**



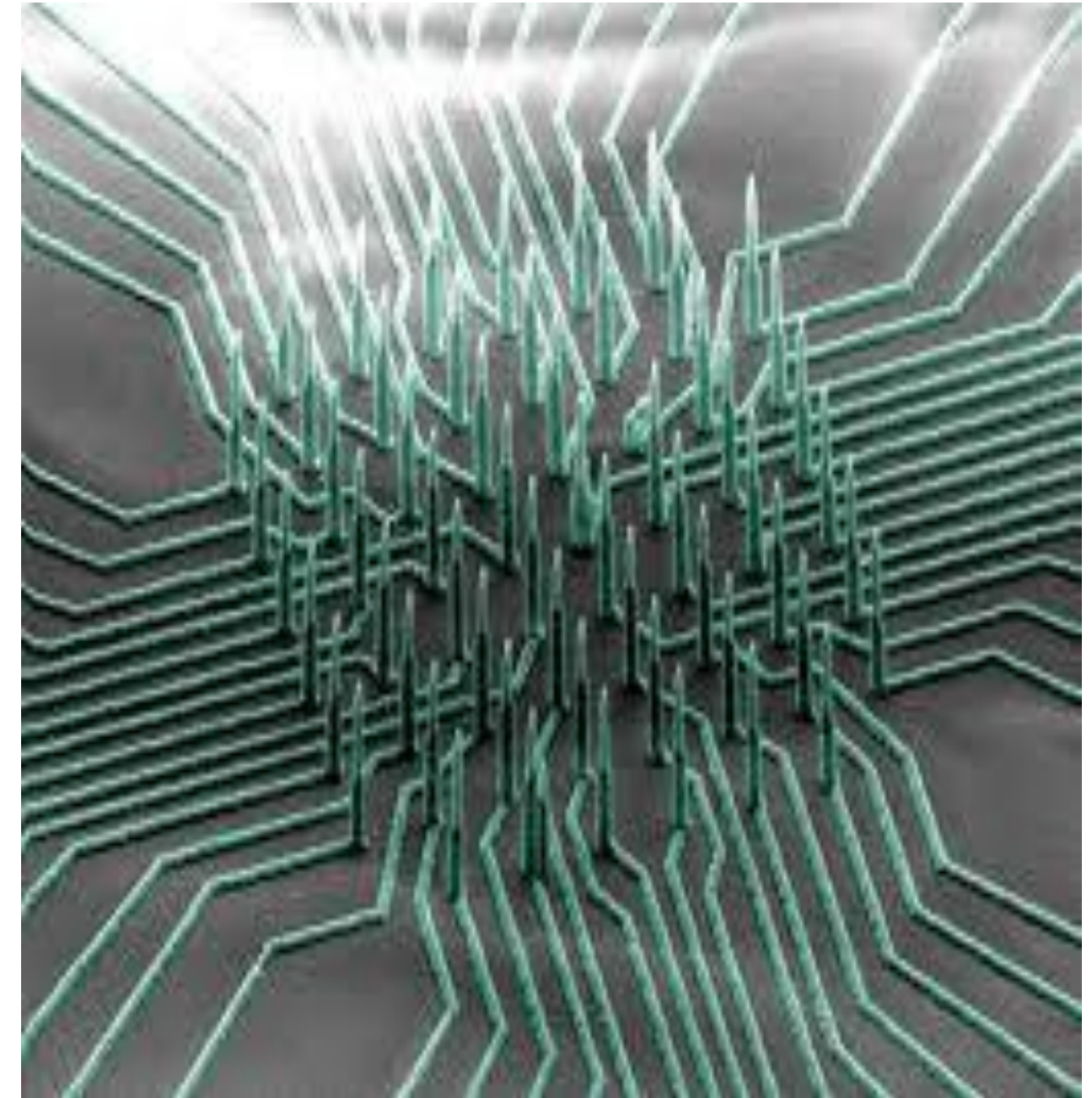
Fullerene



NANOWIRE



- They are one dimensional material.
- They have the dimensions in the **order of nm**.
- **Definition-** The structure that have lateral size constrained to tens of nm or less and unconstrained longitudinal size.
- Quantum mechanical effects are important hence these are also known as **quantum wires**.
- When two nanowires acting as photon cross each other, they act as **quantum dots**.





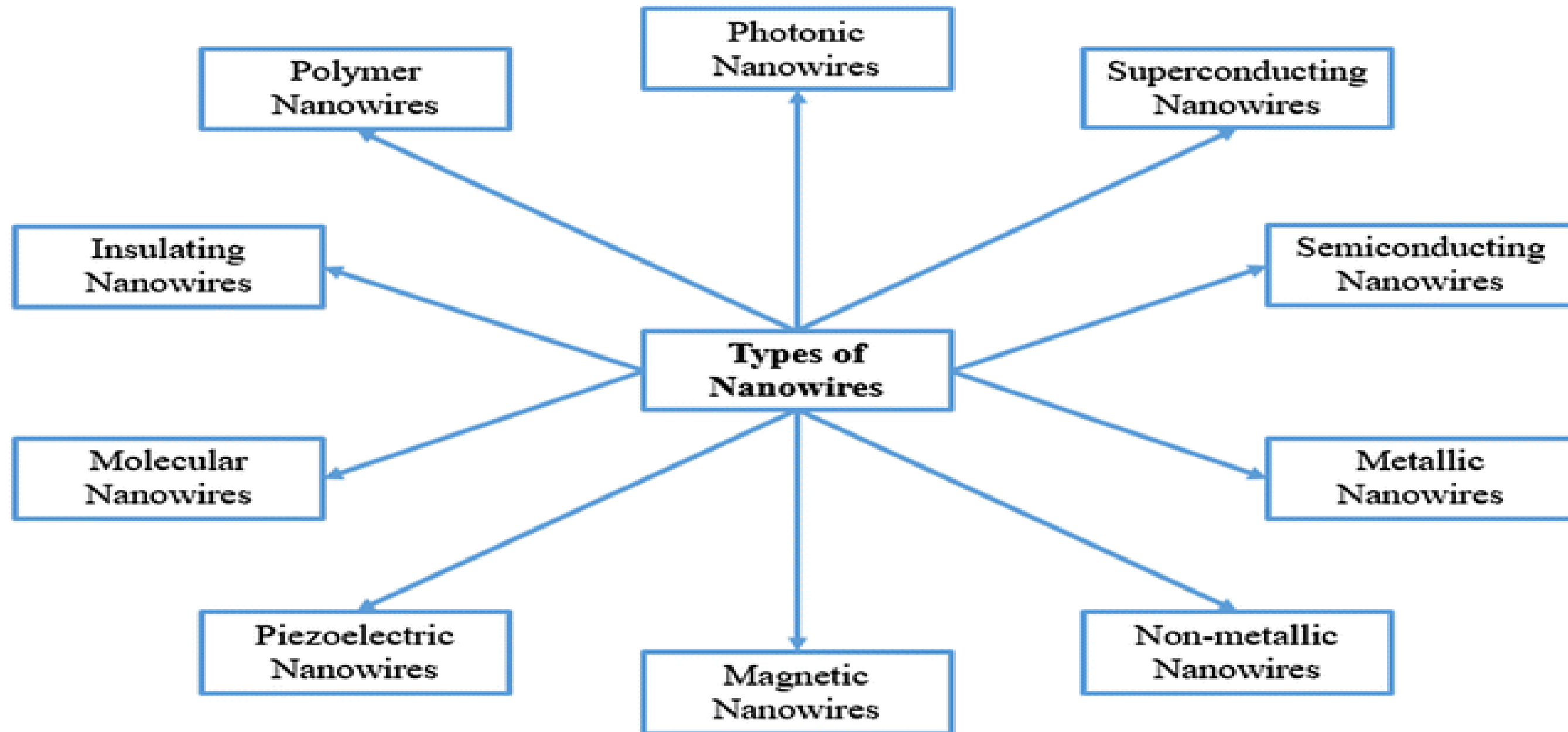
CHARACTERISTICS OF NANOWIRE

- Typical nano wires exhibit aspect ratio (length – width ratio) or 1000 or more.
- Conductivity will be less than bulk materials.
- Electrons in the nano wire are quantum confined laterally and occupied high energy level.
- It can be **synthesized by**
- **Solution phase**
- **Template assisted phase**





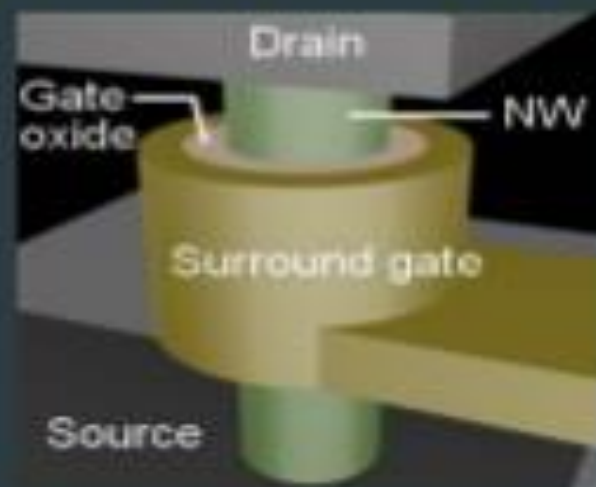
TYPES OF NANOWIRES



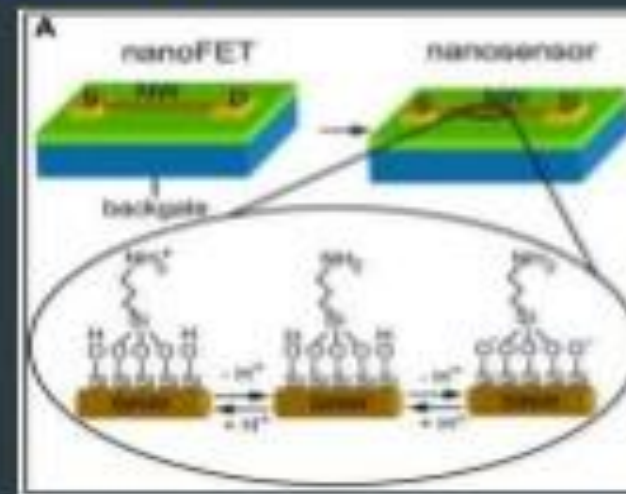


APPLICATIONS OF NANOWIRES

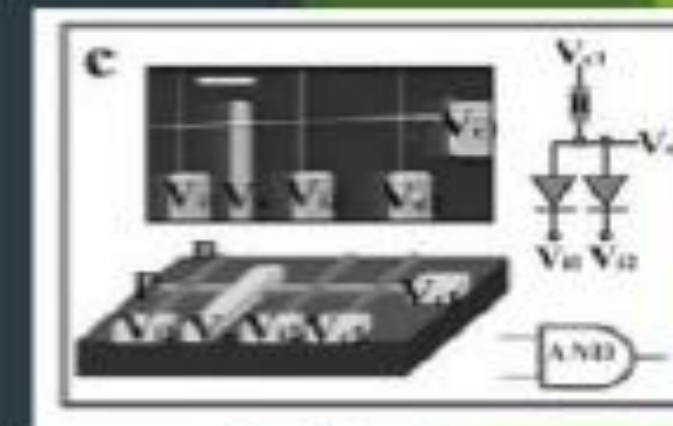
Nanowires : Applications



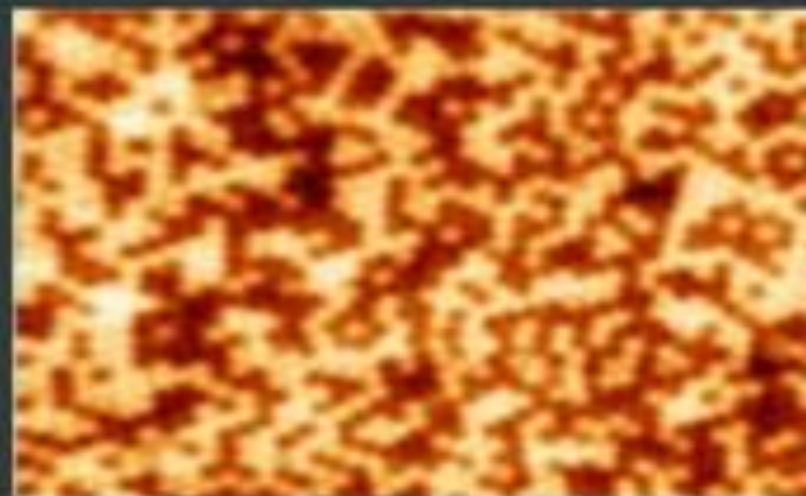
Field Effect Transistors



Chemical, biological sensors



Logic gates



Magnetic devices



Nanogenerators



Nanowire Batteries

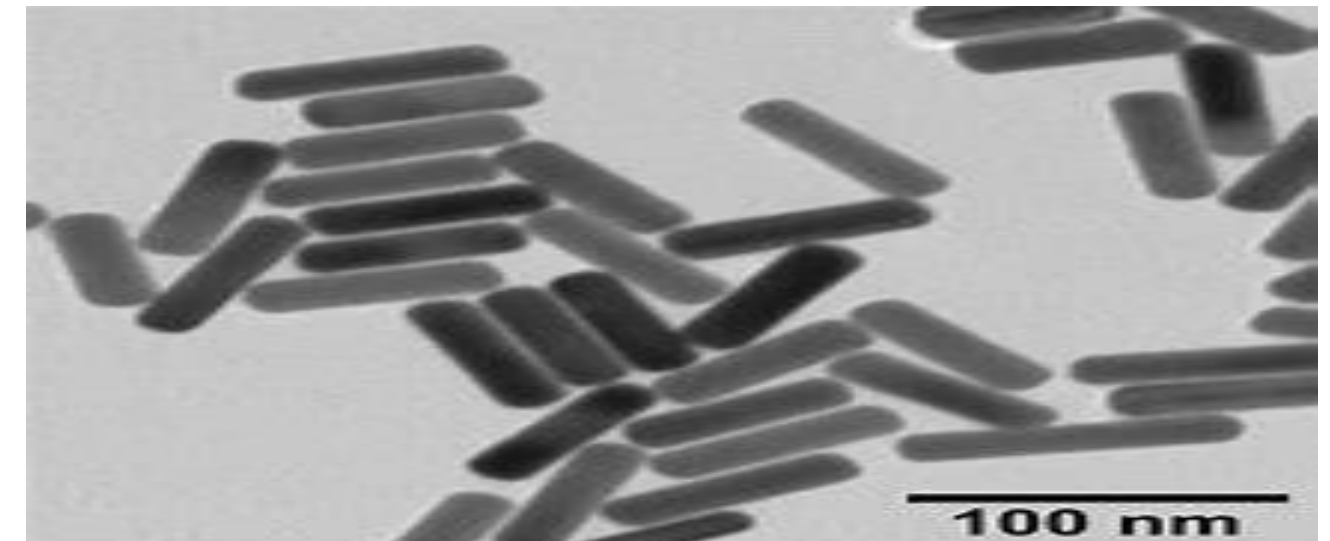
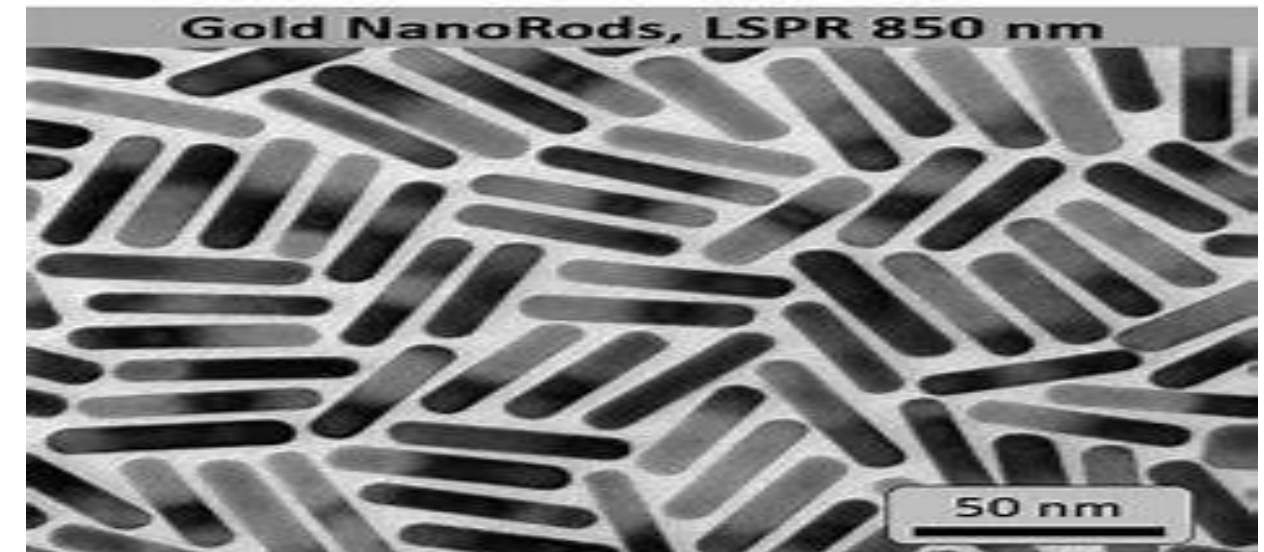




NANORODS

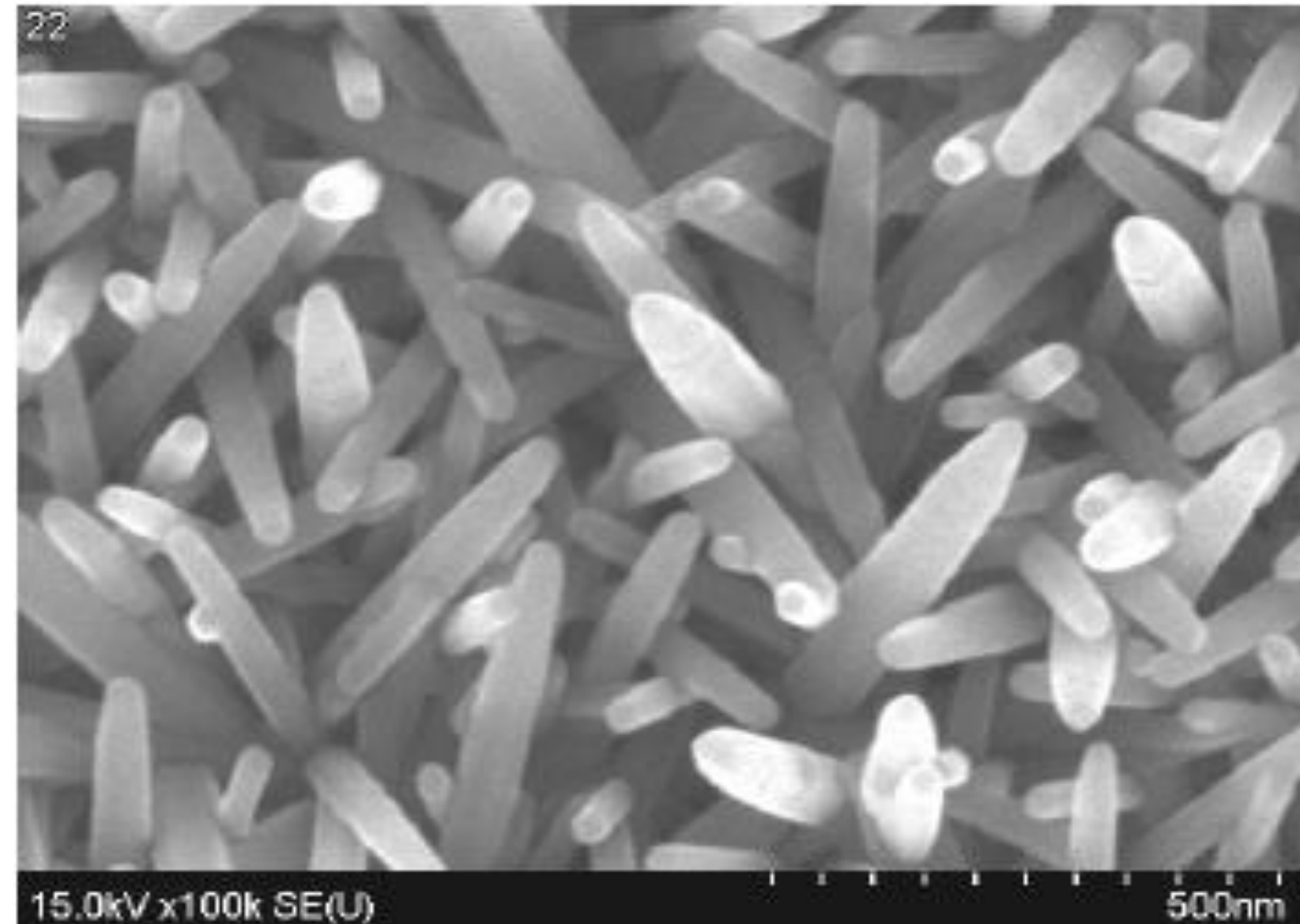


- Nanorods are solid nano structures morphologically similar to nano wires with aspect ratio (length – width ratio)~ 3- 5.
- Each of their dimensions range from 1–100 nm.
- They may be synthesized from metals or semiconducting materials.
- Nanorods are produced by direct chemical synthesis.



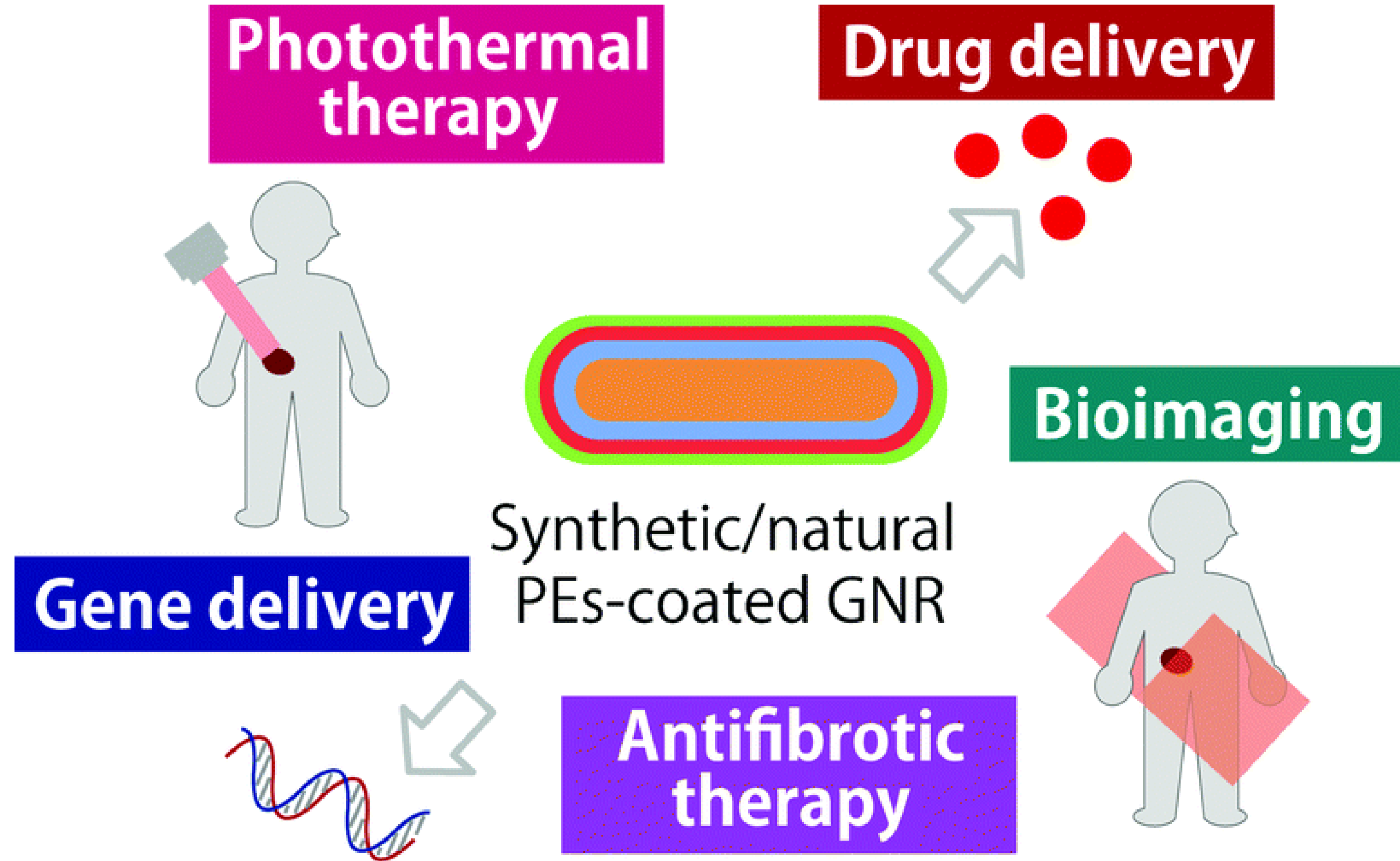


- They are 1 D materials
- They exhibit good optical and electrical properties
- Exhibits surface plasmon resonance
- Quantum confined





APPLICATIONS OF NANORODS





ASSESSMENT

1. List out any two applications of nanowires.

2. Paste the images of Nanorod and Nanowire



SUMMARY



REFERENCES

1. Dr. V. Veeraiyan, "Engineering Chemistry-II" VRB Pub. Co. Ltd, Chennai. 2016..
2. Wiley, "Engineering Chemistry", John Wiley & Sons. Inc, USA.
3. P.C. Jain & Monicka Jain, "Engineering Chemistry", Dhanapat Rai Publishing Company Pvt. Ltd. 2017.

THANK YOU