



# Uttarakhand First Nanofabrication Facility

## Why in News?

[IIT-Roorkee](#) has established a **cutting-edge nanofabrication facility** in Uttarakhand to advance [India's semiconductor manufacturing mission](#).

## Key Points

- **International Collaboration:**
  - IIT-Roorkee collaborated with **Taiwan's premier semiconductor institutions** to exchange expertise.
  - [The Department of Science and Technology \(DST\)](#) funded the project, which began in 2019.
- **State-of-the-Art Infrastructure:**
  - The facility features cutting-edge instruments, including:
    - 50 kV **Electron Beam Lithography (EBL)** system with 10nm resolution.
    - **Inductively Coupled Plasma RIE (ICP-RIE)**, a key etching technology for semiconductor manufacturing.
  - Equipped with ultra-clean rooms featuring controlled environments:
    - Class 100 space (300 sq ft) and Class 1000 space (600 sq ft) for precision research.
- **Research Applications:**
  - The facility supports cutting-edge research in:
    - [Quantum sensors](#)
    - [Spintronics](#)
    - Memory devices
    - Thin-film devices
    - [Photodetectors](#)
    - [Quantum optics](#)
    - [Photonic crystals](#)

## Department of Science and Technology

- The **foundation of DST was laid on 3rd May 1971** along the model of National Science Foundation (NSF), USA.
- It provides **funding and also makes policies** and co-ordinates scientific work with other countries.
- It **empowers scientists and scientific institutions** and also works with a highly distributed system permeating stakeholders ranging from school college, PhD, Postdoc students, young scientists, startups and NGOs working in Science & Technology.
- DST's budget has increased over the years by 100%, which has allowed initiation of new programmes in a wide range of areas.

# SEMICONDUCTORS

Semiconductors are materials having conductivity between conductors and insulators

## EXAMPLES

- **Pure Elements:** Silicon and Germanium
- **Compounds:** Gallium Arsenide and Cadmium selenide

## SIGNIFICANCE

- Essential to almost all sectors of the economy – **aerospace, automobiles, communications, clean energy, information technology** and **medical devices** etc.

## SEMICONDUCTORS AND INDIA

- **India Imports from:** China, Taiwan, USA and Japan
- **Indian Semiconductor Market:** Expected to reach **USD 55 bn** by **2026**

### SCHEMES

- ↳ **Production-Linked Incentive (PLI) scheme**
- ↳ **Design Linked Incentive (DLI) Scheme**
- ↳ Scheme for Promotion of Manufacturing of Electronic Components and Semi-conductors (SPECs)

### OBJECTIVES

- ↳ Encourage semiconductor and display manufacturing in the country.
- ↳ Nurture >20 domestic companies in semiconductor design  
Achieve a turnover of > Rs.1500 crore in next 5 years
- ↳ Manufacture electronics components and semiconductors

## INDIA'S SEMICONDUCTOR MISSION (ISM)

### VISION

- Build a **vibrant semiconductor and display design and innovation ecosystem**

### LAUNCHED

- 2021

### NODAL MINISTRY

- Ministry of Electronics and Information Technology (MeitY)

### TOTAL FINANCIAL OUTLAY

- Rs 76,000 crore

### COMPONENTS

- Scheme for setting up of Semiconductor Fabs
- Scheme for setting up of Display Fabs
- Scheme for setting up of Compound Semiconductors/Silicon Photonics/Sensors (including MEMS) Fabs/ Discrete Semiconductors Fab and Semiconductor ATMP/OSAT
- DLI Scheme

