



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 (SPECES)

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



Drishti IAS