

Measurement of: Fabrication via Electron Beam Lithography / FIB milling
Deposition via FIB-GIS deposition

Equipment: Focused Ion beam (FIB) Microscope

Property Measured: Electron beam writer (for e-beam lithography),
Nano patterning using FIB milling
Superconductor/metal deposition using gas injection system (GIS)

Photograph (small size)



A combined focused ion beam microscope

Basic Principle: This system is a nano-patterning lab as it can generate desired patterns either by ion milling or electron beam lithography (EBL). For milling it use a finely focused beam of ions (usually Ga^+) that can be operated at low beam currents for imaging or high beam currents for localised patterning. In EBL, e-beam is controlled to write by modification of a chemical compound called electron sensitive resist.

Capabilities:

- **Electron Beam Lithography:** Electron-beam lithography (EBL) is a technique used for the fabrication of micro- and nanostructure with minimum feature size depend upon exposure parameters.
- **FIB Milling:** A beam of energetic particles like Ga ions with strikes a solid surface, it loses kinetic energy through interactions with the sample atoms that can easily disrupt the placement and alignment of the atoms causing lattice damage and create a sputtering effect. This leads to localised sputtering and the formation of trenches in the specimen surface that allows the user to modify the material surface, create cross sections, and carve materials into any shape.
- **FIB Deposition:** The FIB system can be easily converted from a nano milling system to a deposition system by adding a gas injection system (GIS), in order to supply a chemical compound, called precursor, just above the sample and directly in the path of the ion beam. The chemical gas consists of a organic-metallic molecule which upon interaction with gallium ion beam, decompose locally and deposit Metallic and superconducting films.

Sample Requirement: Semiconducting / Conducting (Application dependent)