Lithography – Basic technologies

The fabrication of micro- and nanostructures is the cornerstone of the modern semiconductor industry and the driving force behind new technological frontiers. This talk offers an overview of the main lithography techniques, exploring the physical principles, applications, and limitations of optical lithography, electron-beam lithography, and ion-beam lithography.

We will begin with optical lithography, we'll discuss its mechanisms, the challenges related to diffraction, and the solutions adopted to push resolution far beyond the micrometer limit.

Next, we will examine electron-beam lithography (EBL), a "direct-write" technique that uses a focused electron beam to achieve sub-10 nm resolutions. We will highlight its advantages in terms of precision and flexibility for research and development.

Finally, we will introduce ion-beam lithography (FIB), a versatile technique that uses focused ions for direct etching, selective deposition, or sample preparation.