# LECTURE-17

# STEPS FOR FABRICATION ON SI WAFER

- Cleaning (Acid process, Dry cleaning)
- Oxidation
- Photolithography
- Diffusion
- Metallization

# OXIDATION

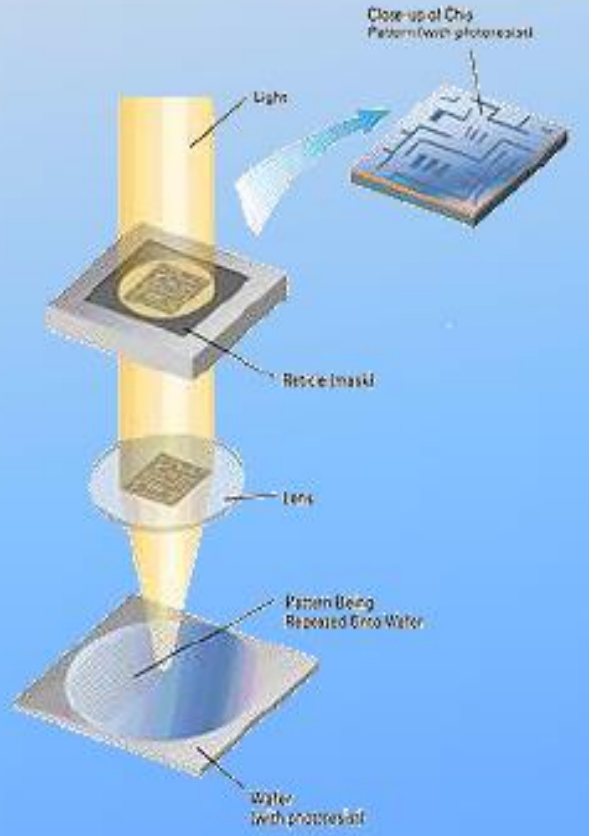
- It protects the junction from moisture, and also serves as an insulator on the wafer surface.
- It is extremely necessary for the designing and fabrication during diffusion and metallization.

In oxidation:

- Wafer is exposed to oxygen & Oxygen molecules diffuse into the wafer.
- A chemical reaction occurs between oxygen and silicon & a layer of oxide grows on the wafer surface.
  - **$Si(solid) + 2H_2O \longrightarrow SiO_2 (Solid) + 2 H_2$**

# PHOTOLITHOGRAPHY

Photolithography, also termed optical lithography or UV lithography, is a process used in microfabrication to pattern parts of a thin film or the bulk of a substrate. It uses light to transfer a geometric pattern from a photomask to a light-sensitive chemical "photoresist", or simply "resist," on the substrate.




Materials used:

Mask, Photo resist, Developer, 10% HF, Acetone

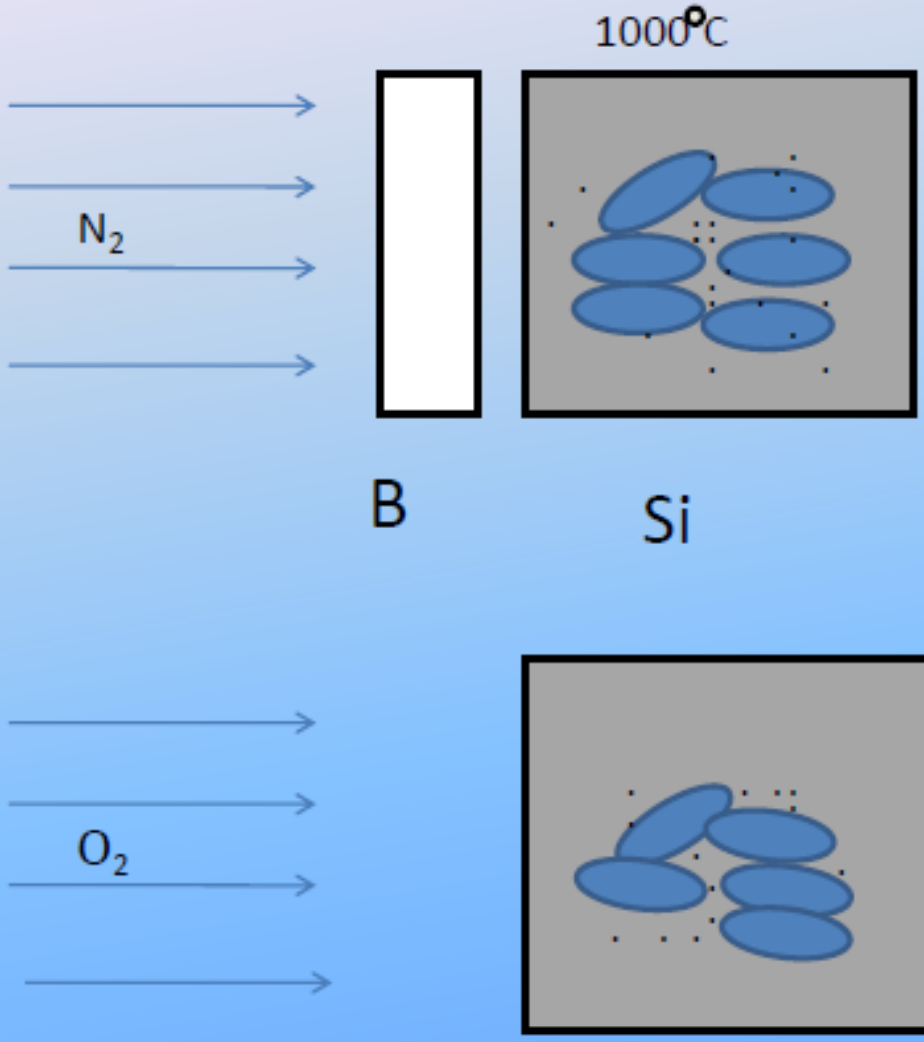
# DIFFUSION

**Requirements for diffusion:**

- Temperature: $1000^0C$
- Gas : $N_2$= 1 L/minute,
  $O_2$= 1L/minute.
- Boron nitride
- Time :

  Pre-dip- 15 minutes

  Driving – 3 hours.
- 10%HF.




Nitrogen is blown over Si, forming a layer of B.

Now B layer is removed, and Oxygen is blown over the sample. Since Si reacts well with $O_2$, so B penetrates.

$$[O_2+Si+B] \longrightarrow BSiO_3$$