PVD (PHYSICAL VAPOUR DEPOSITION METHOD)

PVD:

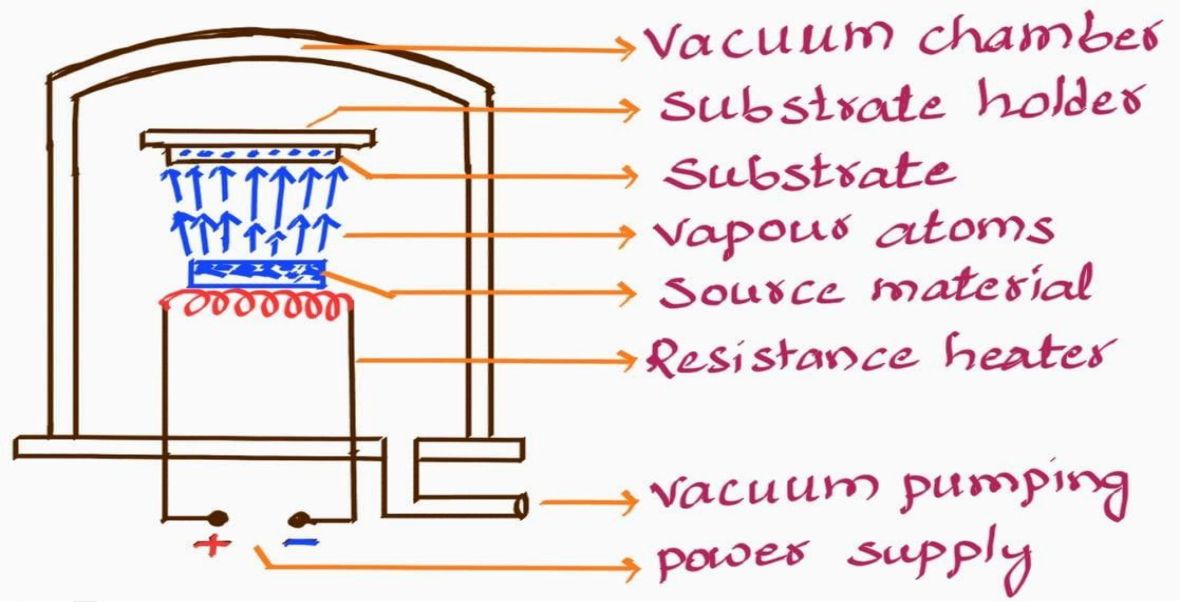
- PVD is a vapour deposition technique on a solid raw material (substrate). This technique deposits thin films onto a solid surface by converting a source material into vapour and then condensing it on the surface.

Principle:

- It works on the principle of deposition/migration of atoms/molecules/ions on a substrate.

Construction/ Chamber setup:

- Connect the vacuum chamber to a vacuum pumping system.
- Load the cleaned substrate into a vacuum chamber.
- Place the source material on a resistance and give the power supply.



WORKING PROCESS:

- The steps involved in this working process are as follows:

Vaporization:

- Once the power supply is given, the source material is heated to a temperature at vacuum and turns to vaporize.

Transport:

- The vaporized atoms/ions from the source material move to the substrate to be coated.

Reaction:

- The transported atoms react with appropriate gas in the transportation stage.

Film Deposition:

- The vaporized material condenses onto the substrate surface, forming a thin film.
- This film grows gradually by the condensation of more deposition of atoms or molecules or ions.

Control and Monitoring:

- By controlling the deposition rate, temperature, pressure to achieve the desired thickness, composition, structure of the deposited film.
- The deposition process continues until the **desired film** thickness is achieved, observed by spectroscopy.

Cooling and Post treatment:

- After getting desired film thickness, substrate & deposited film are allowed to **cool down** at room temperature, further to induce specific microstructures by **annealing** or modification of the surface.

Advantages:

- All types of organic & inorganic materials can be used.
- Environmentally friendly process with High quality films
- High deposition rate, strength & durability.
- Less heating & damage to substrate surface.

Disadvantages:

- Control of film deposition is very difficult.
- Cleaning of the substrate surface is not possible.
- High capital cost & required skilled operators.
- Operates at high vacuum & temperature.