CVD (CHEMICAL VAPOUR DEPOSITION) METHOD

CVD:

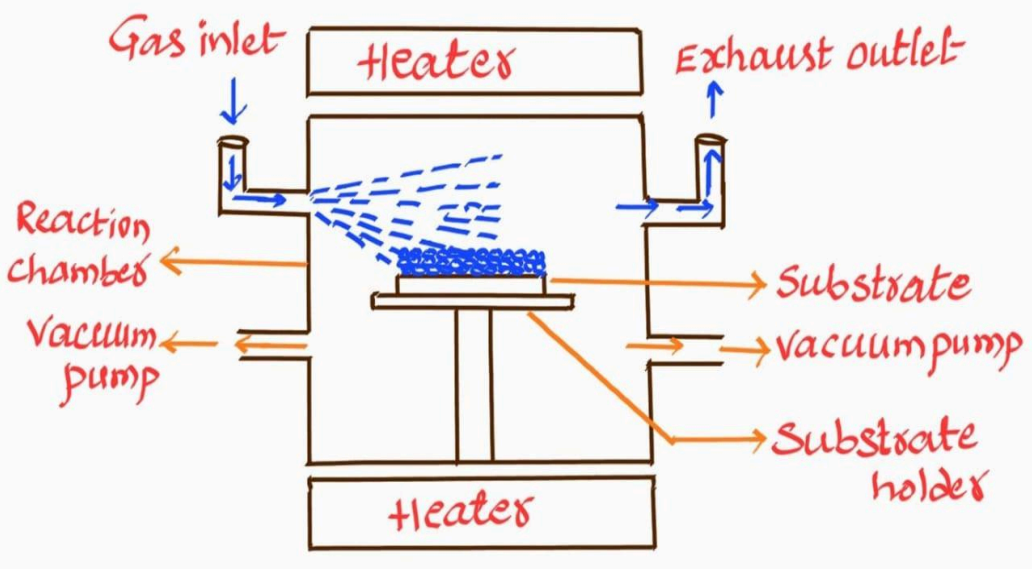
- CVD is a vapour deposition technique for growing a solid material (substrate).This fabrication technique deposits thin films onto a solid surface (substrate) by volatile gases (precursors) due to a chemical reaction between substrate & precursors.
- The product of the reaction self-assembles and coats the substrate.

Principle:

- It works on the principle of depositing volatile precursors on a substrate by chemical reaction at high temperature.

Construction/ Chamber setup:

- Place the reaction chamber (muffle furnace) which contains a gas inlet and exhaust outlet at both ends also fixed by a vacuum pump.
- Now set up the substrate holder inside the reaction chamber.



WORKING PROCESS:

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

Heating substrate:

- Arrange the substrate on a substrate holder and heat it up to a temperature of a few thousand degree Celsius.

Introducing precursors:

- Now introduce the precursor gases into the reaction chamber and allow the gases to flow over the heated substrate.

Chemical reactions:

- Then the chemical reaction takes place between precursor gases and the heated substrate. This reactions involve various processes such as decomposition, reduction, oxidation or chemical vapor transport.

Film deposition:

- Due to the above chemical process, a thin film is deposited on a substrate.

Growth and Control:

- The thickness of deposition film is controlled by the flow rates of precursor gases, the temperature of substrate, the pressure inside the chamber and the duration of deposition process.

Post treatment:

- Sometimes the process of annealing or some other additional process may be required for the modification of thin film.

Advantages:

- High purity & Scalability
- Uniformity & Fine grained
- Hardness/High density & Forms alloys
- Versatile element/compound deposition
- Economical in production
- Easily modified into desired shapes
- Creep into fibers performs and foam structures

Disadvantages:

- High deposition temperature
- Restriction on the kind of substrate
- High equipment & precursor gas cost
- Potential hazards associated with precursor gases
- Contaminated exhaust gases