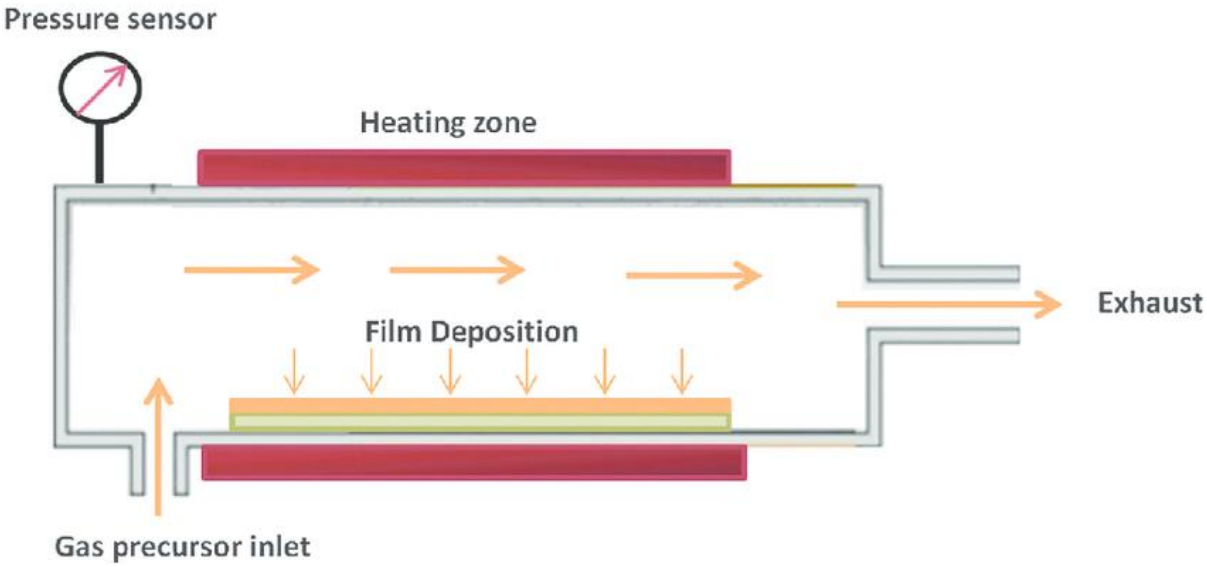
CHEMICAL VAPOUR DEPOSITION (CVD)

CVD PROCESS

Chemical vapor deposition (CVD) is parent to a family of processes whereby a solid material is deposited from a vapor by a chemical reaction occurring on or in the vicinity of a normally heated substrate surface. The resulting solid material is in the form of a thin film, powder, or single crystal.



APPLICATIONS

- CVD processes are used by many industries such as the aircraft and automotive industries.
- They are used to modify surfaces to promote adhesion. Through the CVD process, coatings increase the longevity of materials, such as making metals resistant to rust and corrosion.

ADVANTAGES

- Can be applied to a wide variety of base materials including ceramics, glass, metals and metal alloys.
- Can coat precision surfaces and intricate surfaces including seal areas and internal surfaces.
- Can withstand exposure to low and high temperature and extreme temperature variation.

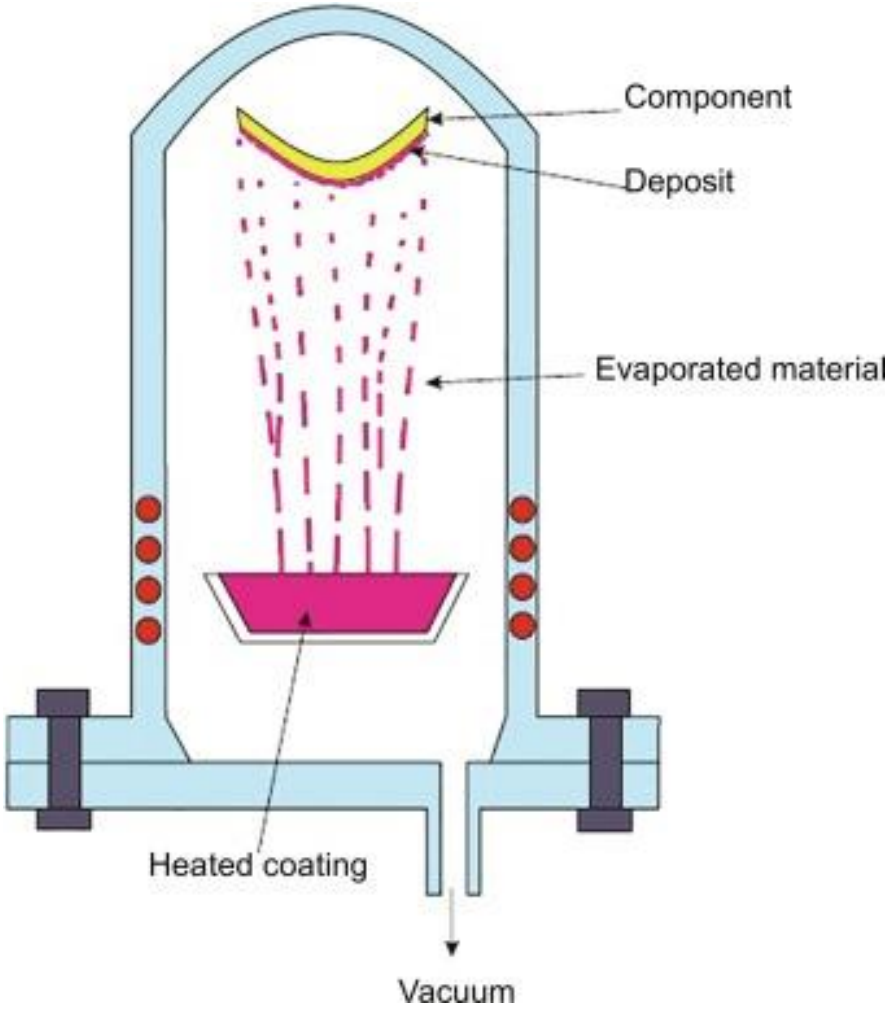
DISADVANTAGES

- Typically applied at higher temperatures (depending on the precursor).
- Difficult to mask surface. Usually an all or nothing coating.
- Size limited to reaction chamber capacity.
- Parts must be broken down into individual components
- Not an "on site" process, parts must be shipped to a coating center.

PHYSICAL VAPOUR DEPOSITION (PVD)

PVD PROCESS

Physical vapour deposition (PVD) is a process used to produce a metal vapour that can be deposited on electrically conductive materials as a thin, highly adhered pure metal or alloy coating.



APPLICATIONS

PVD is used in the manufacture of a wide range of goods, including

- Semiconductor devices
- Aluminized PET film for balloons
- Snack bags
- Optical coatings
- Filters
- Coated cutting tools for metalworking and wear resistance
- Highly reflective films for decorative displays.

ADVANTAGES

- It does not require the use of chemical reagents or cleaning post-treatments, so it has a very low environmental impact.
- PVD can be applied to any type of inorganic material.
- The coatings obtained by PVD have great adhesion, resistance and durability.

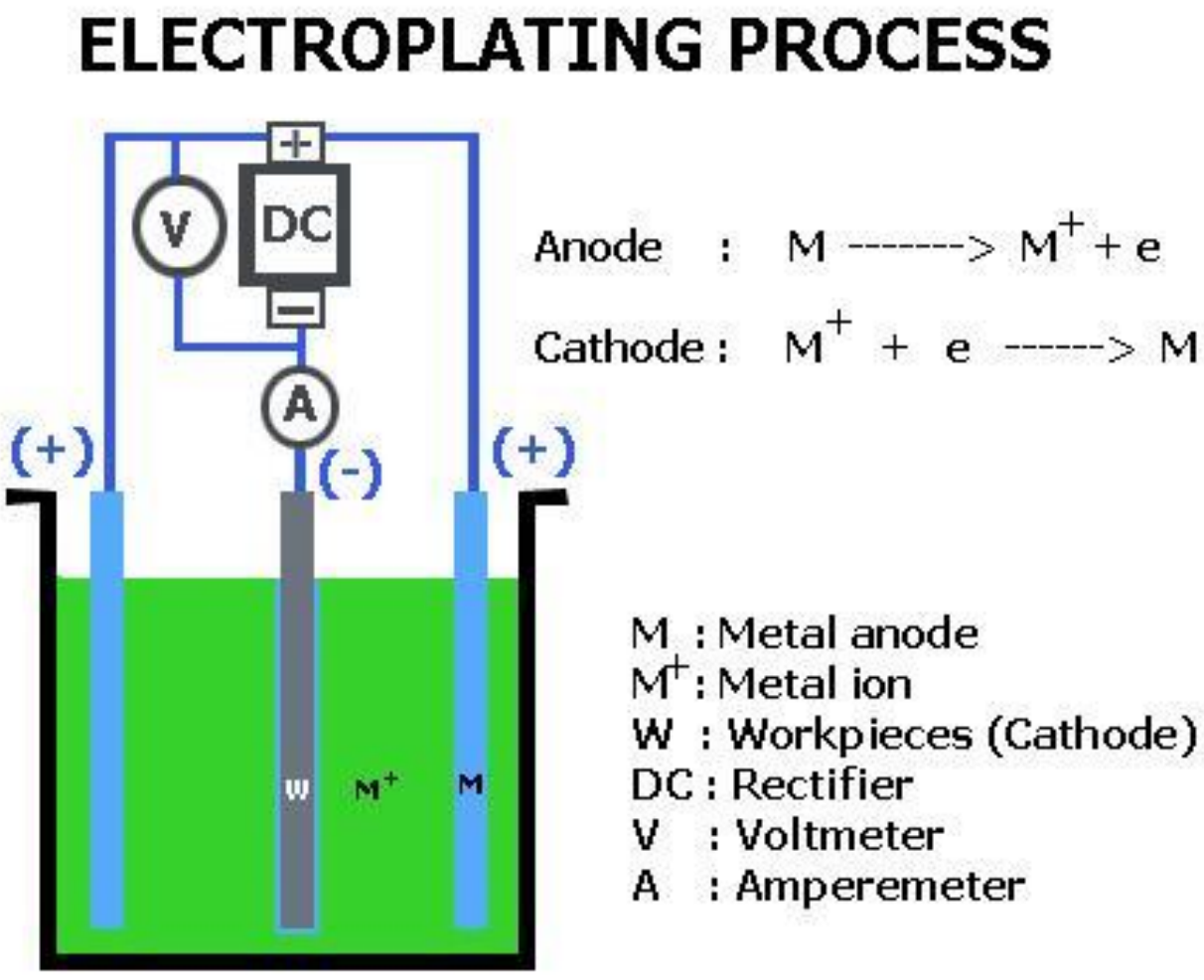
DISADVANTAGES

- **High cost**
  The PVD coating process can be expensive, especially for large surfaces or complex shapes.
- **Limited thickness**
  PVD coatings are thin, usually less than a few microns thick. As a result, they may not provide adequate protection for some applications.
- **Special Equipment**
  The PVD coating process requires specialized equipment, which can be expensive and requires trained personnel.

ELECTROPLATING

ELECTROPLATING PROCESS

Electroplating is basically the process of plating a metal onto the other by hydrolysis mostly to prevent corrosion of metal or for decorative purposes. The process uses an electric current to reduce dissolved metal cations to develop a lean coherent metal coating on the electrode. Electroplating is often applied in the electrical oxidation of anions on a solid substrate like the formation of silver chloride on silver wire to form silver chloride electrodes.



APPLICATIONS

- Aesthetics
- Commercial applications
- To prevent corrosion
- Conduction of Electricity
- Reduce friction
- To protect from radiation

ADVANTAGES

1. **Improved aesthetics** – Electroplating can be used to enhance the appearance of a variety of objects by adding a decorative or functional finish.
2. **Enhanced durability** – Electroplating can improve the durability of an object by adding a layer of protection against wear and corrosion.
3. **Increased conductivity** – Electroplating can be used to improve the conductivity of an object, making it more suitable for use in electrical applications.

DISADVANTAGES

1. **Cost** – Electroplating can be a costly process, particularly for large or complex objects.
2. **Limited thickness** – The thickness of the electroplated layer is limited by the thickness of the substrate and the plating process itself.
3. **Complexity** – Electroplating can be a complex process that requires specialized equipment and expertise.
4. **Potential for defects** – Electroplating can result in defects such as blisters, cracks, and uneven coverage if not done properly.