

Thermal and E-Beam Evaporator



Instrument used to apply very thin films of metals in a high vacuum environment. Three different processes can be used to achieve the material deposition:

Thermal evaporation

This is the simplest method for thin film deposition of materials with melting points less than 1500°C. The material to be evaporated is placed on a conductive tungsten vessel which is intensely heated within a high vacuum chamber until it vaporizes. The evaporated particles travel directly in straight lines until they strike a surface, where they accumulate to form a thin film.

Thermal evaporated films have a poor ability to cover structures with vertical walls because a discontinued film is formed on the surface of the structure. Nevertheless, this problem

could be used to your advantage when using these films for lift-off processes.

Electron beam evaporation

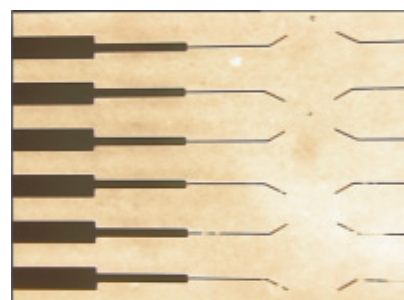
This is a versatile method that allows the deposition, with great adherence, of almost all kinds of metals. The necessary vapours for the production of the thin film are obtained by focussing an energetic electron beam on the vessel containing the material, and heating it above the material boiling/sublimation temperature.

The advantage of this method over thermal evaporation is the possibility to use higher energies into the material to be evaporated, which leads to the formation of thin films with a higher density and consequently with an increased adhesion to the substrate. This method is also good for posterior lift-off processes, and is the way to obtain thin films with the highest purity.

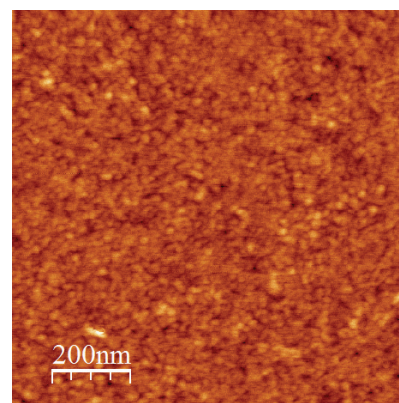
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Dielectrophoresis chip with a deposit of gold.



AFM image of a 50 nm gold thin film on mica deposited by thermal evaporation.

Manufacturer

Oerlikon Leybold
Vacuum

Model

Univex 450B

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Sputtering

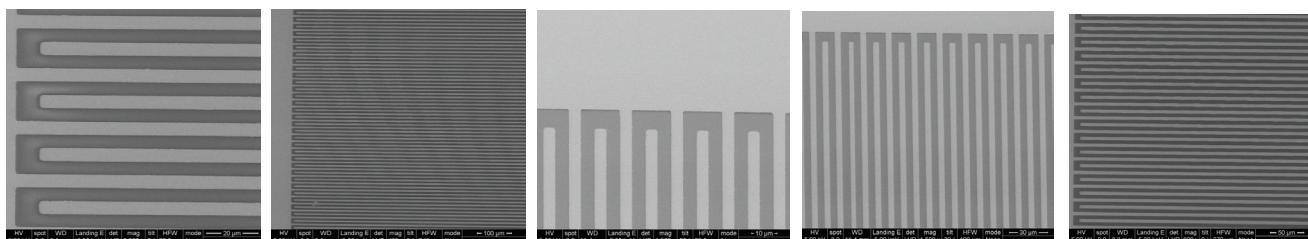
In the sputtering method, high energy ions, in plasma of an inert gas, strikes a target containing the material to be deposited. The atoms ejected from the target will be deposited on all surfaces they strike, forming a thin film.

Technical specifications

- Physical vapour deposition processes available: evaporation; e-beam evaporation, sputtering DC for conducting materials (up to 1000W) and sputtering RF for dielectric materials (up to 600W).
- Substrates requisites:
 - Type: metals, plastics, semiconductors, ceramics and glass
 - Size: diameters from 1mm up to 254 mm
- Source materials available: gold, aluminium, titanium, chrome and silicon oxide
- The system contains up to four material pockets for deposition of single and multilayers depending on the process used.
- Vacuum range: from 3.5×10^{-5} to 3.5×10^{-7} mbar



SEM image of 5 μm gold electrodes. The 100 nm gold layer was applied with thermal evaporation process



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