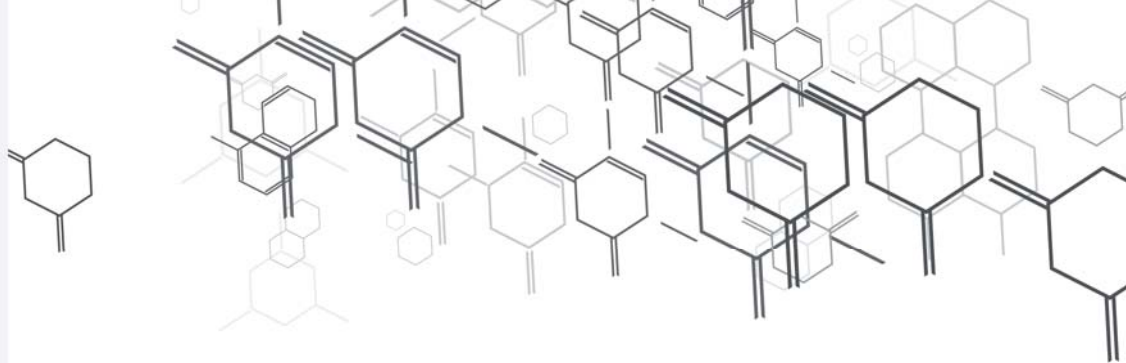


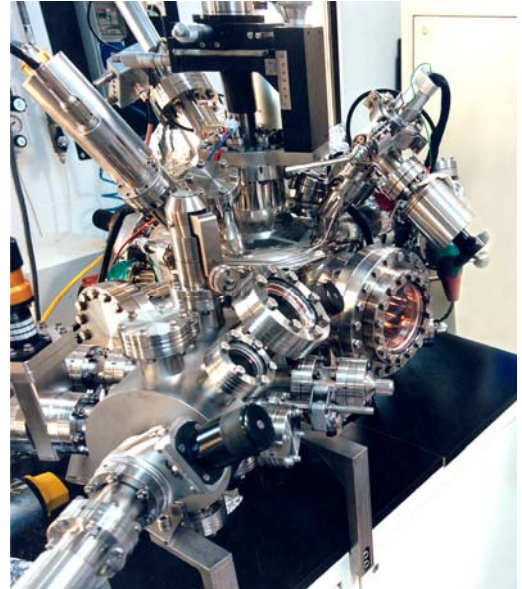
Solutions for Laboratory Equipment



A large number of laboratory techniques, both in academic and industrial research, do require UHV or even XHV conditions to carry out experiments and analysis on the basic properties of matter and materials. Such stringent vacuum conditions may require the use of NEG pumps. These experimental techniques are used in

A few of them are listed below:

- Surface Science and Analytical Techniques
- Vacuum Processing Systems
- Thin Film Deposition



Surface Science analysis systems (e.g. Auger Electron Spectroscopy (AES), X-ray Photoemission Spectroscopy (XPS), or Photo Electron Emission Microscopy/Low Energy Electron Microscope (PEEM/LEEM)) are devoted to the detailed investigation of the elemental composition of the outermost atomic layer in a solid to determine the chemical binding state, the precise sites of atoms in relation to the crystal structure, the surface morphology and the states of adsorbates.

Critical to the success of surface analysis is the maintenance of ultra high vacuum (UHV) conditions during the experimental studies. This is because the superficial layers of the materials to be analyzed are easily contaminated by the outgassing of the chamber and of the equipment installed in it (gauges, RGAs) and also by leaks coming from the load-lock chamber.

Other analytical techniques requiring UHV conditions include the following experimental systems:

- Atom trapping
- Molecular beam epitaxy (MBE)
- Argon dating
- Mass spectrometry
- Atomic clocks

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Another important application of UHV equipment is for Vacuum Processing. Great part of the Vacuum Processing Systems is dedicated to the manufacturing of vacuum sealed devices, a category which encompasses various applications ranging from lamps to the wide area of electron and image tubes.

Thin Film Deposition systems are characterized by the need to reach UHV conditions in the shortest time possible to improve the deposition and productivity rates as well as a very clean environment to increase the impurity control.

Some of the Vacuum Thin Film Deposition systems working in UHV level are listed below:

- Chemical Vapor Deposition
- Ion Beam Deposition
- Physical Vapor Deposition
- Sputtering

In general, the evacuation process in such applications is usually performed with the use of heavy duty Ultra-High Vacuum pumps, such as diffusion, turbomolecular or cryo pumps. However, the addition of SAES Getters Non Evaporable Getter (NEG) pumps gives a further boost in terms of ultimate vacuum, especially to remove excessive hydrogen and shorten pump-down time.

These UHV conditions are usually achieved and maintained with the use of "Capture" type UHV pumps, such as Sputter-Ion pumps. Pumping efficiency of sputter ion pumps, especially for H₂, the main residual gas in UHV systems, decreases at lower pressures. The use of NEG pumps, highly efficient for hydrogen pumping, allows dramatically improving the achievable ultimate vacuum level.

SAES Getters NEG pumps represent the ideal solutions to boost the vacuum performance and to achieve overall lower pressures and cleaner test conditions. Thanks to their compact size and to the availability of different configurations, they can be easily retrofitted on general UHV systems and provide a longer and more stable pumping effect. In addition, the NEG pumps do not require power during operation (power ranging between tens and hundreds watts are required only during the activation of the NEG material for 1 h), do not produce magnetic interference with the closer tools and do not produce vibration and particle release.

SAES NEG pumps, such as CapaciTorr, SORB-AC and NEXTorr, are particularly suited in providing additional pumping very close to the sample area. This is due to the fact that, unlike Titanium Sublimation pumps, they do not require any sublimation or evaporation of material which can contaminate the sample.

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In particular, the NEXTorr pump combines in a suitable design NEG and ion pumping technology. In the NEXTorr design a NEG pump is integrated with a comparatively small size ion pump. The getter element provides very large pumping speed and capacity and acts as the main pump for the active gases, leaving to the ion pump the task of removing noble gases and methane which are not pumped by the NEG. Being methane and rare gases a very small percentage of the gas composition of UHV-XHV systems, generally dominated by hydrogen and oxygenated gases, just a small pumping speed is required for the ion pump. The ion pump also provides a pressure reading, which can be used for vacuum and process monitoring. This approach radically removes the main limitations of NEG pumps, providing in a very compact design a superior product in terms of pumping speed, capacity, power consumption, reliability.

Boost your product performance with SAES Getters solutions:

- **NEXTorr Pumps**
- **CapaciTorr Pumps**
- **SORB-AC Pumps**
- **Wafer Modules**

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