



HIGH VACUUM DEPOSITION SYSTEMS

Highly flexible R&D system for co-sputtering, co-Evaporation and/or Laser Ablation of up to 4 materials on substrates from 10 to 100 mm diameter.

V1

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The V1 unique features:

PVD of up to 4 materials.

Substrate size up to 100 mm diameter or 100x100 mm².

Price competitive, open architecture system.

Multi technique system for sputtering or evaporation (resistive, electron gun, knudzen cell or pulsed laser deposition).

Many options available with on-site upgradability.

Pumping system adapted to budget and application.

Optional introduction chamber.

The highest quality components from world leading companies.

Assembled in North America.

The Intercovamex V1 high vacuum system is a smaller and more economic version of the V3 which has proven to be a competitive tool for R&D on new materials and coatings. Some successful applications include Nanotechnology, MEMS, hard and TCO coatings, photovoltaic and many semiconductors. It is optimized for the Physical Vapor Deposition (PVD) of up to 4 materials by sputtering or evaporation (sequential or simultaneous) and is recommended for substrates of up to 100 mm diameter or 100x100 cm².

HIGH VACUUM CHAMBER: The 300 mm inside diameter stainless steel chamber is water cooled and opens from the top flange with a hinge (Chiller offered as an option). This flange is used for the exchange of targets or for reloading evaporation crucibles. It is used also for loading the substrate(s) when no optional introduction chamber is installed. The large quantity of available ports allows mounting of various options like pulsed laser, ellipsometer, plasma analyzer, gas analyzer, thickness monitor or controller. It is compatible with 10⁻⁸ Torr range. Exact vacuum achieved depends on the selected pumping system.

BAKE-OUT: The chamber can be baked out up to 150° C with heating tapes. Optionally one or several UV or IR lamps can be installed to speed up water vapor removal from inside the chamber.



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CHASSIS AND GABINET: All the mechanical components are integrated on an Aluminum chassis. The electrical and electronics components are integrated on a 1.60 m height cabinet. This flexible configuration allows the user to choose the position of the cabinet relative to the chassis for comfort of use or to adapt to laboratory space.



INTRODUCTION and PREPARATION CHAMBER: This chamber is optional to allow loading substrate while keeping the process chamber near Ultra High Vacuum condition. It can be used also for substrate preparation before deposition when equipped with options like an etching ion gun, a resistive evaporator, a heater. As a standard it is evacuated by an 80 l/s turbo pump backed by a rotary vane pump. Other pumping systems are available like larger capacity turbo, water trap, dry backing pump. A glove box can be placed in front of the loading door to manipulate the substrate in controlled atmosphere.

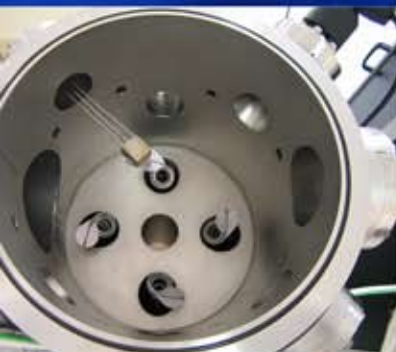
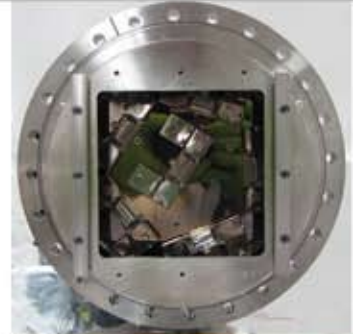
PUMPING SYSTEM: The system is equipped with a robust 100 l/s turbo molecular pump backed by a rotary vane pump for routine 10^{-6} Torr range operation. For 10^{-7} Torr range operation an introduction chamber must be installed to keep process chamber in vacuum as long as possible. Dry backing pumps (free of oil) are also available. For processes where high amounts of Oxygen have to be evacuated, special versions of the pumps have to be selected. Small ion pumps, getters and cryotraps can be also added to improve ultimate vacuum. Standard vacuum system operation is manual.



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SUBSTRATE HOLDER AND HEATER: Many options are offered according to budget and end-user application. The most common sizes are for a circular substrate with diameter of 50, 75, 100 mm. Intercovamex offers also a very useful size among photovoltaic developers: 10x10 cm.² Heaters options are: 500° C, 700° C or 1000° C. Upon the specific model, some heaters are compatible with UHV pressure and several torr of oxygen. Substrate biasing is also available (optional). Intercovamex engineers will help you define the best available option or will develop a new one adapted exactly to your needs. Optionally a manual or electro-pneumatic substrate shutter is offered.



SPUTTERING: Up to 4 magnetrons for 1" targets or 3 magnetrons for 2" or 3" targets can be mounted on the bottom flange (sputter up geometry). Each magnetron is equipped with an electro-pneumatic shutter with flap type motion. Swing type motion is optional. Each magnetron can be operated with a DC, pulsed DC or RF plasma power supply from 300W to 3 KW. For RF a low cost manual impedance matching networked is offered. An automatic one is recommended for unattended deposition. A re-circulating water chiller is necessary to cool the magnets of the magnetrons and is offered as an option if not available in the laboratory.

PULSED LASER DEPOSITION: Pulsated laser deposition is available with an optional YAG or Eximer laser, the inclined flanges of the chamber are designed for this purpose.

EVAPORATION: The bottom flange can be equipped with up to 4 resistive evaporators or with an electron gun with up to 4 crucibles. A configuration with 4 Knudsen cells has proven to be very successful for CIGS photovoltaics. Many Knudsen cell models are available according to the material to be deposited as well as Power supplies (1 to 10 KW) and temperature controllers.

ION GUN: In this option, the ions produced can be accelerated toward the substrate for cleaning purpose previously to deposition. They can also be used during the deposition (ion beam assistance) resulting in better adhesion of deposited layers.

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CONTROL OF PROCESS GASES: The standard gas introduction is done with a manual needle valve. For better reproducibility or when a mixture of gas is used, 1 to 4 Mass flow controllers can be mounted.

PROCESS PRESSURE CONTROL: In the basic version, the end user adjusts the rotation speed of the turbo for low gas consumption and controls pressure by reading the vacuum gauge and adjusting manually a gas introduction needle valve. For unattended processes and highly reproducible results, an automatic downstream pressure control system is offered. It consists of a motorized variable conductance valve (installed between the turbo and the process chamber), a high precision capacitance manometer and a controller. This latest will adjust the valve opening to maintain precisely the process pressure selected by the operator.

THICKNESS MONITORS AND CONTROLLERS. Several options are available for measuring growth rates and thickness deposited (monitor only) or to Control deposition sources according to these parameters (controller). The controller permits programming of unattended multilayer's deposition. Up to 2 quartz balances can be mounted inside the chamber. In Sputtering configurations, space available is usually much more restricted and only one movable quartz balanced is positioned in place of substrate to calibrate rates and then removed during process. Each balance can be equipped with an individual shutter. A re-circulating water chiller is recommended to cool each quartz balance for reproducible measurements.



EXAMPLE OF SYSTEM CONFIGURATIONS:



1: V1 with 50 mm rotative substrate holder and heater.

2: V1 with Dry pumping system and 2 RF generators with automatic matching

3: V1 with rotary vane pump for corrosive gas pumping, one RF generator with manual matching, magnetron selector and fixed heater 80x90 mm heater.

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ABOUT INTERCOVAMEX:

Since 1994, INTERCOVAMEX assembles high vacuum deposition system with only high quality components from world leading companies. Hundreds of scientific papers have been published using INTERCOVAMEX systems such as Sputtering, Thermal Evaporation, Pulsed Laser Deposition and CVD. Configurations are often specially adapted to customers technical and budget needs.

Intercovamex distributes also in Latin America, Scientific Instruments for materials characterization as well as a very broad range of high vacuum components.

In the Industry, Intercovamex also offers smart solutions to manufacturing processes involving high vacuum such as special pumping systems, vacuum coaters and automated leak detection systems.

Intercovamex R&D systems are manufactured in the city of Cuernavaca in the state of Morelos, Mexico where more than 20 research centers are established. This region has the highest number of researcher per inhabitants in all Mexico.

Cuernavaca is also known internationally as "the city of eternal spring" where the nature offers beautiful scenarios with tropical vegetation and several volcanoes above 5000 m.

Intercovamex also assembles industrial vacuum and leak detection systems near the city of Monterrey, in the north east of Mexico in a very industrial region only 200 km from Texas border.

We always welcome our customers to visit us for discussing their new projects and for trainings.



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