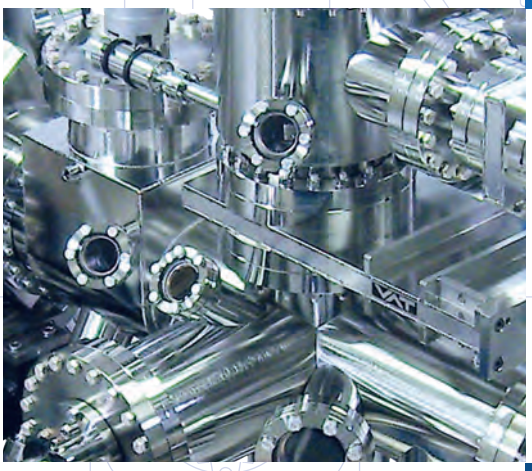
SVT Associates, Inc.

Engines for Thin Film Innovation



A Leader in the Innovation, Design and Production of MBE Technology

SVT MBE

SMART NanoFab MBE

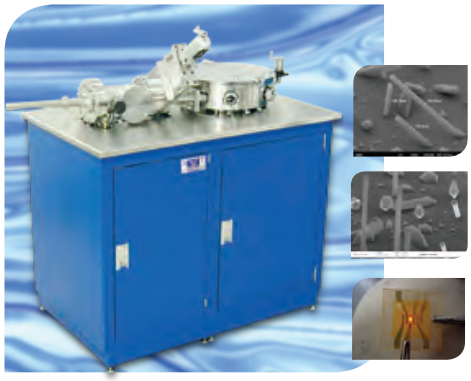
- The SMART NanoFab MBE system incorporates large capabilities with a minimized footprint.
- The table-top UHV chamber includes a series of ports to accommodate a wide selection of deposition sources and process monitoring tools.
- Complete process automation is available through the RoboMBE™ software suite.

Standard Materials MBE System

- A versatile MBE system for research applications.
- The most complex compound semiconductor materials can be grown with 12 source ports.
- Designed to incorporate process monitoring tools.
- Up to 200 mm wafers.

NorthStar™ ALD

Versatile research deposition tool for thermal or energy enhanced ALD.



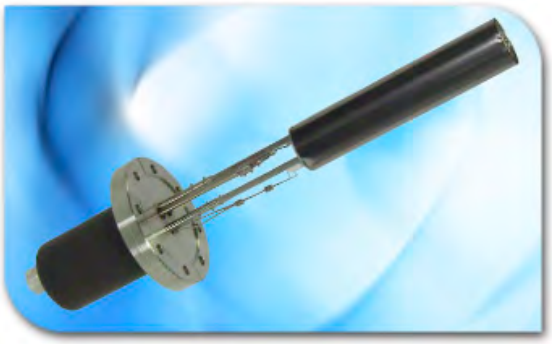
SMART NanoTool PLD

Versatile Research Pulsed Laser Deposition

Multiple Material Nitride & Oxide MBE Configuration

SVT MBE

SVT Associates offers a variety of versatile, cost effective thin film deposition tools, backed by in-house experts.



Effusion Cells	Temperature	Sizes
Hot-Lip Effusion Cell	0 ºC – 1,400 ºC	40 – 300 cc
Cold-Lip Effusion Cell	0 ºC – 1,400 ºC	40 – 300 cc
High Temperature Effusion Cell	0 ºC – 1,800 °C	10 – 20 cc
EXCEL Series Effusion Cells	0 ºC – 600 ºC	40 – 300 cc
Viking Effusion Cell	0 ºC – 1,400 ºC	40 – 300 cc
Dual Filament Effusion Cell	0 ºC – 1,400 ºC	40 – 300 cc

Contact SVT Associates for custom in-vacuum lengths.
Other crucible materials are available.

Deposition Sources

RF Plasma Sources

SVT Associates' RF Plasma Sources are used in a variety of applications including Nitride MBE, Oxide MBE, and other plasma processing techniques. Typically used to produce low energy beams of atomic nitrogen, oxygen, and hydrogen; the RF Plasma Source enables growth and processing of today's most advanced materials.

Valved/Cracke Sources

For high vapor pressure materials such as As, P, Te, Sb, Se, S, and others. SVT Associates' Valved Evaporation Sources have the advantage of integrating a mechanical valve to limit the conductance from the evaporation (sublimation) reservoir to the growth chamber. A constant temperature may be maintained and the valve position is used to control the flux, allowing for a stable and reproducible deposition rate.

Atomic Hydrogen Source

Used for substrate cleaning in III-V or II-VI MBE Systems. This UHV compatible source can produce temperatures up to 2,600 °C. Hydrogen gas is introduced and thermally as well as catalytically cracked to produce atomic hydrogen with high efficiencies. An integral flux monitor allows replication of operating parameters. The source mounts on a 2.75" or 4.50" CF flange.

Photovoltaic Deposition Sources

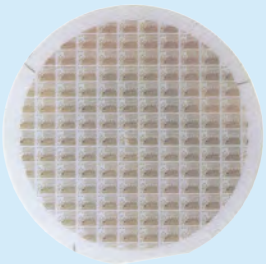
Thermal Linear Deposition Sources

SVT Associates' unique Linear Evaporation Sources are engineered for in-line deposition processes to uniformly coat large area samples in a single pass. Each Linear Evaporation Source is engineered and fine tuned for the customer's specific application.

Valved Deposition Sources for Photovoltaic Applications

SVT Associates' Valved Deposition Sources enable instantaneous control of selenium and sulfur as well as other high vapor pressure materials. The proprietary valve design provides reproducible and precise flux profiles for the most demanding growth processes.

III-Nitride Wafers



High Quality III-Nitride Wafers by MBE

- Custom epitaxial thin films and structures on sapphire, SiC, and Si substrates.
- Low defect insulating or highly n-doped or p-doped GaN templates.
- InGaN and AlGaN films in a wide range of compositions and doping levels.
- Ultrathin and hyper-abrupt heterostructures
- Very high performance device structures
- Wide range of growth capabilities

Thin Film Process Monitoring

AccuTemp™ *In-Situ* 4000 Process Monitor

The AccuTemp (*In-Situ* 4000) Process Monitor is an ideal solution for monitoring and control of substrate temperature, film thickness, and growth rate in multilayer thin film growth applications such as MBE, MOCVD, and deposition of CIGS layers. The instrument combines optical pyrometry and reflectometry data at multiple wavelengths to provide repeatable information.

An optional Bandgap Module allows for monitoring of low substrate temperatures, and easy calibration of the pyrometer.

AccuFlux™ Deposition Flux Monitor

The AccuFlux Process Controller, is a real-time Deposition Flux Monitor in thin film deposition processes. Based on Atomic Absorption Spectroscopy, the system measures the atomic vapor flux density originating from solid and gas sources. This optical technique provides a nonintrusive *in-situ* flux monitor with high accuracy for excellent composition control better than 0.3%.

Process Software

RoboMBE™ is a powerful software package that gives you the ability to automate and control the various hardware components of a semiconductor growth system. Using RoboMBE, you can ensure run-to-run reproducibility by monitoring and adjusting growth parameters. This software automates repetitive tasks such as ramping of temperature profiles and sequencing of source shutters. All growth parameters are logged during recipe execution so a complete record of the process is maintained.

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