Nitride Material Research MBE Systems

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

SVT MBE

Engines for Thin Film Innovation

Nitride MBE

SVT Associates has been innovating Molecular Beam Epitaxy (MBE) technology for more than 18 years. MBE is a key enabling research and manufacture technology for semiconductor materials and devices. Our MBE systems provide an UHV environment for precision fabrication of a wide variety of nitride thin film structures including high powered communication devices, optoelectronics and other applications. In addition, SVT Associates has been leading the way in the development of nitride materials and has received numerous research grants for our on-site growth laboratory. SVT Associates end goal is to continue to provide the MBE market with new and improved products and discover new opportunities working with revolutionary materials.

SVT Associates commitment to quality begins with supplying you, our customer the most technological advanced MBE instrumentation available backed by our experienced laboratory and engineering staff. Our delivered performance is met by stringent manufacturing standards, continued research and equipment development as well as comprehensive quality controls. SVT Associates expert team of engineers provide world-class customer support to keep instrumentation performing at optimum levels and to help customers with system operation and maintenance issues.

35-N-C Compact Nitride MBE

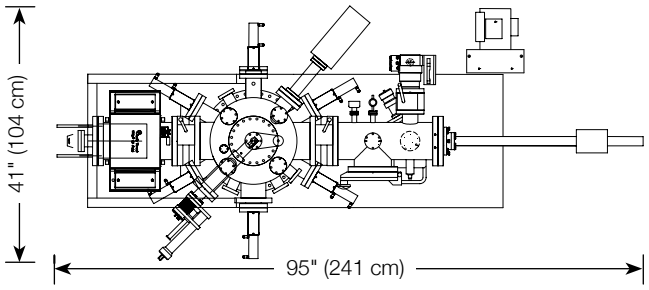
The Compact MBE System incorporates full MBE capabilities with a minimized footprint. Multiple nitride materials can be deposited by the Compact MBE System outfitted with a combination of up to 8 gas and solid sources.

SPECIFICATIONS

Maximum Sample Size	3" (76 mm) Diameter
Maximum Sample Temperature	1,000 °C
Source Ports	Eight 4.5" (DN63) CF Ports
Growth Chamber Pumping	1,500 l/sec Cryo Pump
Deposition Sources	(4) 40 cc Capacity Cells
(Other Configurations Available)	(2) 16 cc Capacity Cells
	RF-4.5 Plasma Source

ADDITIONAL FEATURES

RoboMBE Process Control Software
Sample Loadlock
Integrated Thermal Bake



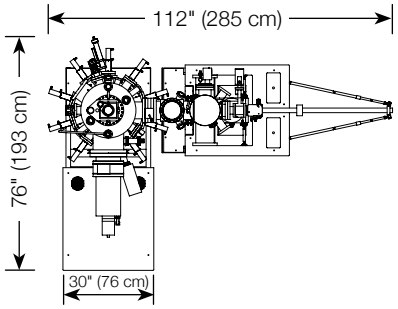
Serving the MBE needs of our customers through a commitment to innovation and quality.

35-N-V Nitride Materials MBE

The 35-N-V MBE System is a versatile MBE system for research applications. The most complex nitride materials can be grown with 12 source ports as well and full capabilities to incorporate SVT Associates' wide range of process monitoring tools.

SPECIFICATIONS

Maximum Sample Size ..... 4" (101 mm) Diameter
Maximum Sample Temperature ..... 1,000 °C *(1,200 °C optional)*
Source Ports ..... Ten 4.5" (DN63) CF Ports
..... Two 2.75" (DN40) CF Ports
Growth Chamber Pumping ..... 1,500 l/sec Cryo Pump
..... 400 l/sec Ion Pump
Deposition Sources ..... (5) 40 cc Capacity Cells
(Other Configurations Available) (2) 16 cc Capacity Cells
RF-4.5 Plasma Source



ADDITIONAL FEATURES

RoboMBE Process Control Software
Sample Loadlock
Sample Preparation Station
Integrated Thermal Bake

35-N-6 Large Sample Nitride MBE

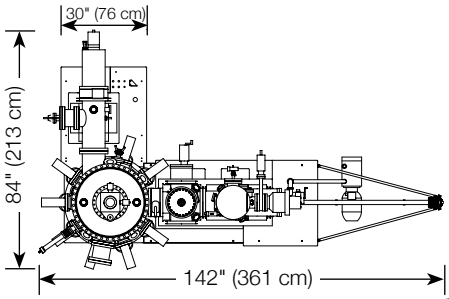
The 35-N-6 Large Sample MBE System is ideal for large scale proof of concept for the first step to production processes. The 35-N-6 is capable of depositing uniform films onto samples up to 8" in diameter with large capacity effusion cells and SVT Associates RF-6.0 production Plasma Source.

SPECIFICATIONS

Maximum Sample Size ..... 8" (203 mm) Diameter
Maximum Sample Temperature ..... 1,000 °C *(1,200 °C optional)*
Source Ports ..... Ten 6.0" (DN100) CF Ports
..... Two 2.75" (DN40) CF Ports
Growth Chamber Pumping ..... 3,000 l/sec Cryo Pump
..... 400 l/sec Ion Pump
Deposition Sources ..... (5) 40 cc Capacity Cells
(Other Configurations Available) (2) 16 cc Capacity Cells
RF-4.5 Plasma Source

ADDITIONAL FEATURES

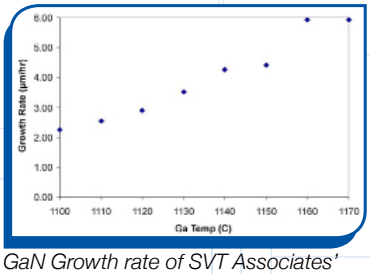
RoboMBE Process Control Software
Sample Loadlock
Sample Preparation Station
Integrated Thermal Bake



Nitride MBE Components

RF Plasma Sources

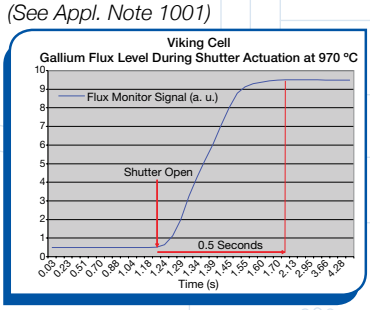
All four of SVT Associates RF-Plasma Source models include active charge suppression to minimize substrate damage during deposition. The cracking and atomic excitation efficiency of the RF Plasma Source delivers a high level of activated particles while maintaining vacuum.



GaN Growth rate of SVT Associates' RF-4.53 Plasma Source in a SVT Associates III/V MBE System (See Appl. Note 1001)

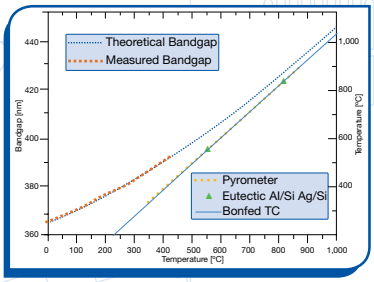
Effusion Cells

A wide range of SVT Associates effusion cell models ensure that there is an appropriate cell to evaporate the materials needed for your application. The Viking Effusion Cell provides high flux stability to eliminate shutter transient and fluctuation as material is depleted. The fully encased filament provides the best longevity in ammonia MBE.



AccuTemp Process Monitor

The AccuTemp Process Monitor incorporates a dual wavelength pyrometer and reflectometer. This unique combination delivers emissivity corrected wafer temperature as well as real-time film thickness measurements. An optional band gap monitor enables accurate temperature monitoring as down to room temperature. SVT Associates' innovative software can be integrated into the process control software to be used for automated growth systems.



Pyrometer and Bandgap Module Temperature Data for GaN Substrate

Ammonia Gas Injector

SVT Associates Ammonia gas injector is constructed of high purity, corrosion resistant materials for longevity and reliability. A maximum operating temperature of 1000 °C provides optimum molecule cracking. The changeable distribution nozzle allows for the source to direct the activated ammonia and delivers a tailored flux pattern to maximize uniformity and wafer coverage.

Selected Publications Performed on SVT Associates Nitride MBE systems:

1. "Effect of template morphology on the efficiency of InGaN/GaN quantum wells and light-emitting diodes grown by molecular-beam epitaxy" H. Tang, S. Haffouz, A. Powell, J. A. Bardwell, and J. Webb, Applied Physics Letters 86, 121110 (2005)
2. "Very high channel conductivity in low-defect AlN/GaN high electron mobility transistor structures" A. M. Dabiran, A. M. Wowchak, A. Osinsky, J. Xie, B. Hertog, B. Cui, D. C. Look, and P. P. Chow, Applied Physics Letters 93, 082111 (2008)
3. "Thermally stimulated current spectroscopy and photoluminescence of carbon-doped semi-insulating GaN grown by ammonia-based molecular beam epitaxy" Z-Q. Fang, D.C. Look, B. Claflin, S. Haffouz, H. Tang, J. Webb, Phys. Stat. Sol. (c), vol. 2, 7, 2757–2760 (2005).

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