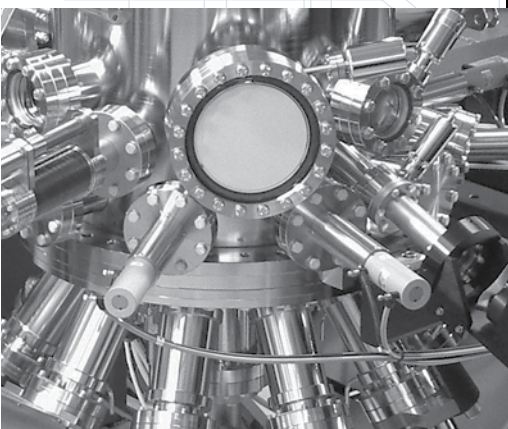


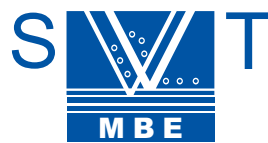
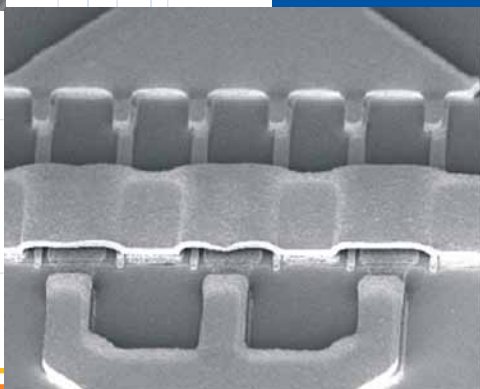
# Oxide Material Research MBE Systems



*2" Sample Heater for Oxide MBE. The Oversized Filament Ensures Uniform Heating even to the Edges of the Substrate up to 1,000 °C*



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



*Engines for Thin Film Innovation*

## Oxide 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 oxide thin film structures including ultra high-k dielectric films, optoelectronics and other applications. In addition, SVT Associates has been leading the way in the development of oxide 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.

## 26-O-6 Large Sample Oxide MBE

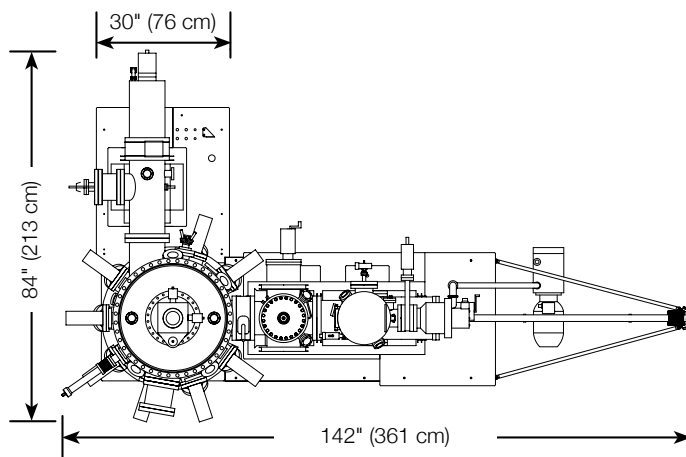
The 26-O-6 Large Sample MBE System is ideal for large scale proof of concept for the first step to production processes. The 26-O-6 is capable of depositing uniform films onto samples up to 8" in diameter with large capacity effusion cells and the SVT Associates RF-6.0 production Plasma Source.

### SPECIFICATIONS

Maximum Sample Size .....8" (203 mm) Diameter  
Maximum Sample Temperature .....1,000 °C (1,200 °C *optional*)  
Source Ports .....Seven 4.5" (DN63) CF Ports  
.....Two 10" (DN200) CF Ports (e-Beam)  
Growth Chamber Pumping .....3,000 l/sec Turbo Pump  
.....400 l/sec Ion Pump  
Deposition Sources .....(5) 60 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

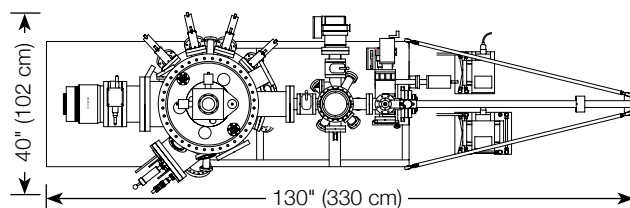


## 26-O-V Oxide Materials MBE

The 26-O-V Oxide MBE System is engineered for advanced materials research while having a flexible configuration design. A wide variety of oxide materials can be grown and researched in the versatile MBE platform. The 26-O-V is outfitted with a multiple pocket electron beam evaporator and ports for up to 10 other sources.

### SPECIFICATIONS

Maximum Sample Size .....	4" (101 mm) Diameter
Maximum Sample Temperature .....	1,000 °C
Source Ports .....	Seven 4.5" (DN63) CF Ports
.....	One 8" (DN150) CF Port (e-Beam)
.....	One 10" (DN200) CF Port (e-Beam)
Growth Chamber Pumping .....	1,500 l/sec Turbo Pump
.....	400 l/sec Ion Pump
Deposition Sources .....	Multi-Pocket e-Beam (4 x 5 cc)
.....	(3) 40 cc Capacity Cells
(Other Configurations Available)	(2) 16 cc Capacity Cells
	RF-4.5 Plasma Source



### ADDITIONAL FEATURES

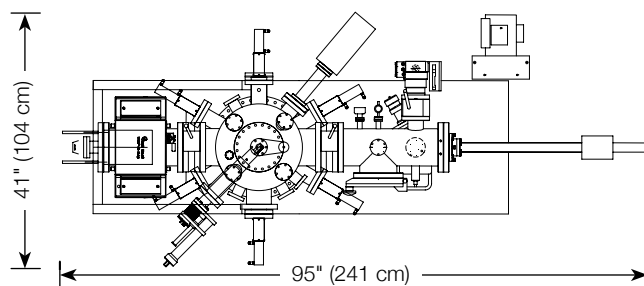
RoboMBE Process Control Software  
Sample Loadlock  
Sample Preparation Station  
Integrated Thermal Bake

## 26-O-C Compact Oxide MBE

The Compact MBE System incorporates full MBE capabilities with a minimized footprint. Multiple oxide 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 Turbo 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

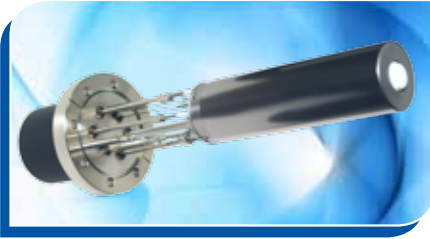
# Oxide MBE Components

## RF Plasma Sources

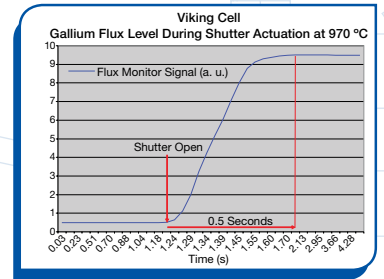


All three of SVT Associates RF-Plasma Source models for oxygen include active charge suppression to minimize substrate damage during deposition. With up to 70% cracking efficiency the RF Plasma Source delivers a high level of activated oxygen atoms while maintaining vacuum. Complete automation packages are available for simplified operation and enhanced control.

## Effusion Cells



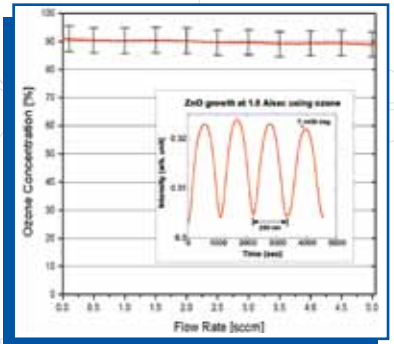
A wide range of SVT Associates effusion cell models ensure that there is an appropriate cell to evaporate the materials needed for your application. The Viking Effusion Cell provides high flux stability to eliminate shutter transient and fluctuation as material is depleted. The fully enclosed filament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



## High Purity Ozone Injection System

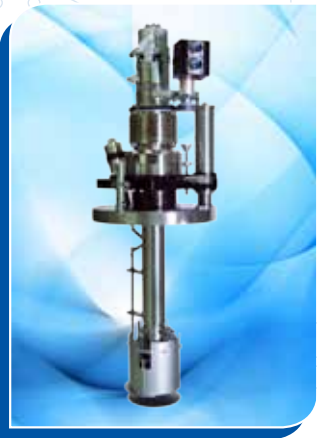


The High Purity Ozone Injection System utilizes a proprietary ozone distillation technique to concentrate ozone to greater than 90%. Excellent for wide ranging growth rate applications, the highly concentrated ozone can be delivered at flow rates from 0.1-10.0 sccm. The self contained gas cabinet and integrated software control ensures that the ozone is kept under stable conditions for the highest level of safety.



*The Ozone Injection System Produces Ozone with Concentrations of Greater than 90%*

## Oxygen Compatible Sample Manipulators



SVT Associates sample manipulators provide high temperatures of up to 1,000 °C for Oxide MBE uniformly across the sample. The magnetically coupled, continuous sample rotation increases film uniformity but also has reduced wobble to allow for in-situ monitoring tools to be utilized with accuracy. The hot zone is engineered for longevity in the harsh oxide environment.

### Selected Publications Performed on SVT Associates OXIDE MBE systems:

1. "Growth of  $\text{In}_2\text{O}_3$  (100) on Y-stabilized  $\text{ZrO}_2$  (100) by O-plasma assisted molecular beam epitaxy" A. Bourlange, D. J. Payne, R. G. Egdell, J. S. Foord, P. P. Edwards, M. O. Jones, A. Schertel, P. J. Dobson, and J. L. Hutchison, Applied Physics Letters 92, 092117 (2008)
2. "Optical and morphological properties of MBE grown wurtzite  $\text{CdZn}_{1-x}\text{O}$  thin films" J.W. Mares, F.R. Ruhge, A.V. Thompson, P.G. Kik, A. Osinsky, B. Hertog, A.M. Dabiran, P.P. Chow, W.V. Schoenfeld, Optical Materials 30, p.346-350 (2007)
3. "Epitaxial Growth of High- $\kappa$  Dielectrics for GaN MOSFETs" Jesse S. Jur, Ginger D. Wheeler, Matthew T. Veety, Daniel J. Lichtenwalner, Douglas W. Barlage, and Mark A. L. Johnson, MRS Proceedings vol. 1068 (2008)

