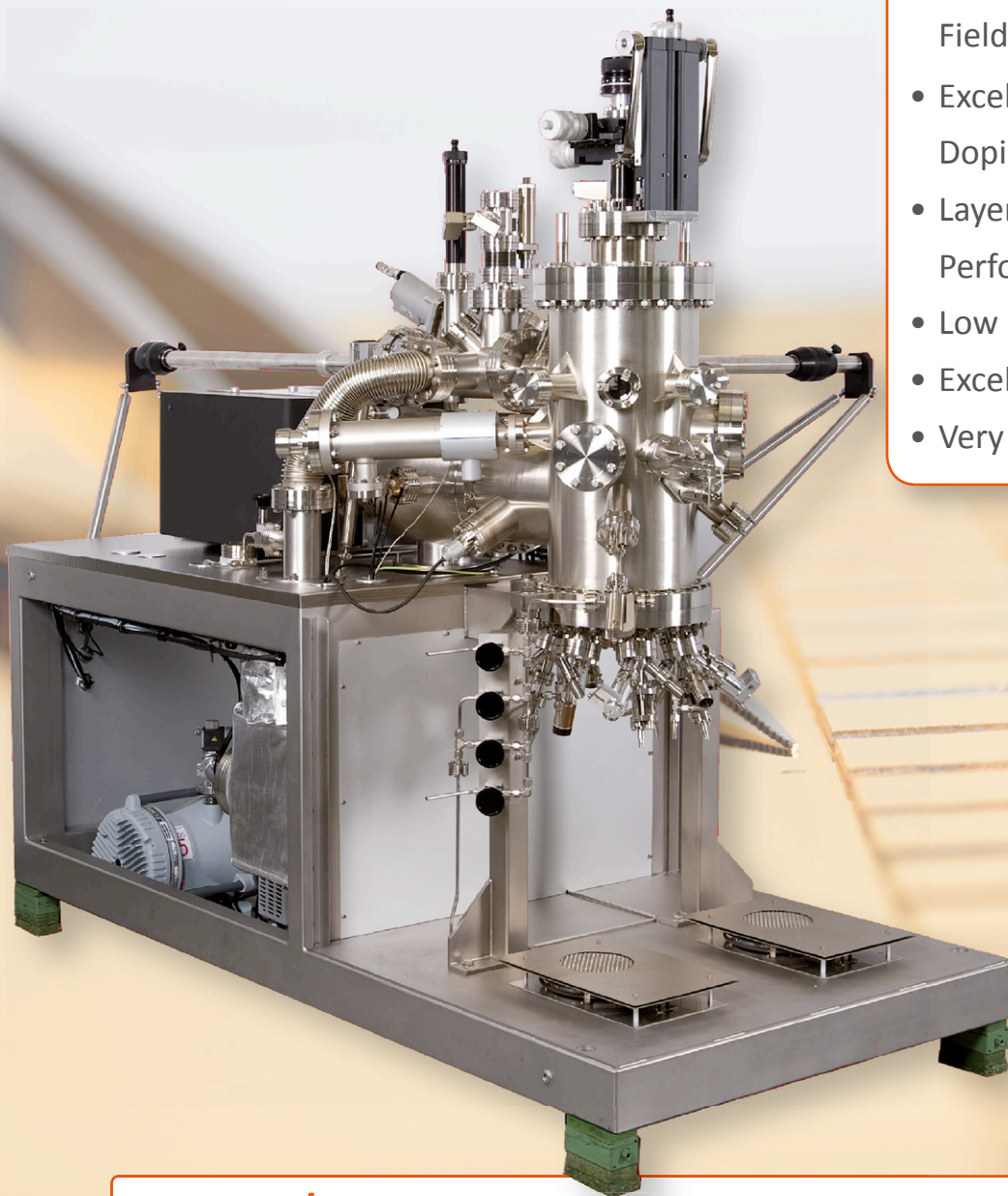


MBE Solutions

Modular MBE Systems

LAB-10 & EVO-25/-50 & PRO-75/100



- Growth System Solutions for all Fields of Application
- Excellent Sample Thickness & Doping Homogeneity
- Layer Growth with Outstanding Performance
- Low Background Doping Level
- Excellent Carrier Density & Mobility
- Very Low Defect Density

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MBE and Analysis in a **SINGLE** System

For more than 15 years we have continuously focussed on the increasing demands of the highest-purity and highest quality epitaxial layer growth. This is reflected in our modular MBE systems - the LAB-, EVO-, and PRO-MBE Series.

The new and innovative MBE systems allows for epitaxial layer growth of highest quality. Various system layouts are dedicated to suit the researcher's demands, such as III-V, III-N, II-VI, metal oxide or pure metal layer growth.

The MBE-series of systems fulfil the most stringent requirements of modern nanotechnology research. Therefore our MBE systems employ state-of-the-art components for the MBE growth:

- sophisticated substrate manipulators for continuous rotation at high temperature (up to 1400 °C),
- standard MBE sources with various crucible sizes (1.5 cm³ up to 200 cm³)
- specifically designed MBE sources for elemental & compound evaporation or sublimation in a temperature range from less than 70 °C to more than 2000 °C (suitable for low or high growth rates and extremely pure doping conditions)

- In-situ growth control (RHEED, ellipsometry, Quartz Micro Balance, Beam Flux Monitor, RGA etc.)
- a wide range of Electron Beam Evaporators (EFM, EBVV and EBV series) which are ideal for high-purity evaporation in UHV, ranging from refractory metals (e.g. from rods, wires or crucibles) to delicate reactive substances.


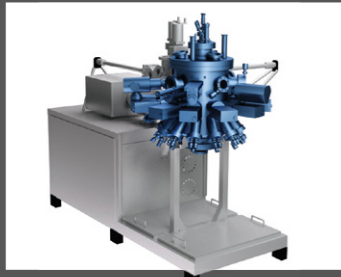
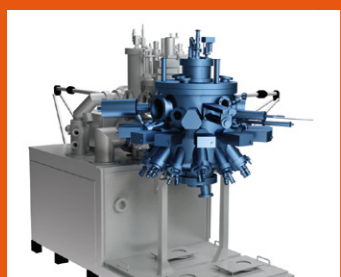
Special care has been taken to address the requirements for oxide film growth. We offer several solutions for high temperature sample heating and high temperature effusion cells in an oxygen enriched environment. The EPI-Soft process control software allows to control the growth of the most sophisticated and complex layer structures - with just a mouse click.

Photo supported by:
Leibniz-Institut für Festkörper- und Werkstoff-
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MBE Solutions

Modular MBE Systems
LAB-10 & EVO-25/-50 & PRO-75/100

Features of the Standard MBE System Family

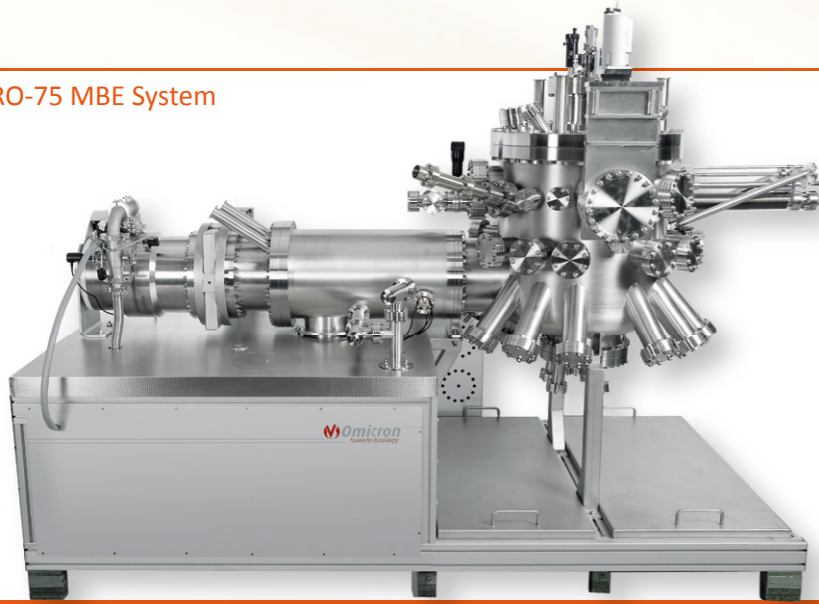
	Growth applications	Substrate size	Number of effusion cells & size	Pumping system	Source to substrate orientation	In-Vacuum length for effusion cells	Sample manipulator	Further details*
LAB-10 MBE System 	<ul style="list-style-type: none"> • Metal MBE growth • Semiconductor growth • Magnetic materials growth • Oxide MBE growth • Organic MBE 	Standard sample plates (10 x 10 mm)	Up to 7 effusion cells with cell capacity from 10 cm ³ up to 35 cm ³ for layer growth (smaller effusion cell volumes from 1.5 cm ³ to 5 cm ³ for doping applications)	Large pumping port for high pumping speed and true UHV using Turbo-, TSP- and IGP-pumps	<ul style="list-style-type: none"> • Source angle tilt with respect to sample normal: 18° (< 1% thickness homogeneity for a 10 x 10mm substrate) • Source to substrate distance: 160 mm 	<ul style="list-style-type: none"> • 287 mm for CF70 • 270 mm for CF114 	Cooling, heating, e-beam heating, ultra high temperature	<ul style="list-style-type: none"> • Easy & intuitive to operate growth control software • Fast & reliable sample transfer • Excellent performance • Low cost of ownership • Rotary shutters for effusion cells
EVO-25 & EVO-50 MBE Systems 	<ul style="list-style-type: none"> • Metal MBE growth • Semiconductor growth • Magnetic materials growth • Oxide MBE growth • Organic MBE 	Suitable for 1" and 2" substrates	Up to 10 effusion cells with cell capacity from 35 cm ³ up to 80 cm ³ for layer growth (smaller effusion cell volumes from 1.5 cm ³ to 5 cm ³ for doping applications)	Large pumping port for high pumping speed and true UHV using Turbo-, TSP-, IGP- or Cryo-pumps	<ul style="list-style-type: none"> • Source angle tilt with respect to sample normal: 38° (< 1% thickness homogeneity for a 2" substrate) • Source to substrate distance: 190 mm 	<ul style="list-style-type: none"> • 287 mm for CF70 • 270 mm for CF114 • 250 mm for CF150 	High temperature sample heating with Ta-Wire, W-Wire, SiC or PG-Heater	<ul style="list-style-type: none"> • Easy & intuitive to operate growth control software • Fast & reliable sample transfer • Excellent performance • Low cost of ownership • Double walled LN₂ cooling shroud • User adjustable tradeoff between thickness uniformity & material consumption (crucible insert) • Rotary shutters for effusion cells (optional linear shutter ports)
PRO-75 & PRO-100 MBE Systems 	<ul style="list-style-type: none"> • Metal MBE growth • Semiconductor growth • Magnetic materials growth • Oxide MBE growth • Organic MBE 	Suitable for 3" and 4" substrates	Up to 12 effusion cells with cell capacity from 60 cm ³ up to 200 cm ³ for layer growth (smaller effusion cell volumes from 1.5 cm ³ to 10 cm ³ for doping applications)	Large pumping port for high pumping speed and true UHV using Turbo-, TSP-, IGP- or Cryo-pumps	<ul style="list-style-type: none"> • Source angle tilt with respect to sample normal: 40° (< 1% thickness homogeneity for a 4" substrate) • Source to substrate distance: 290 mm 	<ul style="list-style-type: none"> • 287 mm for CF70 • 270 mm for CF114 • 250 mm for CF150 	High temperature sample heating with Ta-Wire, W-Wire, SiC or PG-Heater	<ul style="list-style-type: none"> • Easy & intuitive to operate growth control software • Fast & reliable sample transfer • Excellent performance • Low cost of ownership • Double walled LN₂ cooling shroud • User adjustable tradeoff between thickness uniformity & material consumption (crucible insert) • Rotary shutters for effusion cells (optional linear shutter ports)

MBE Solutions

Modular MBE Systems
LAB-10 & EVO-25/-50 & PRO-75/100

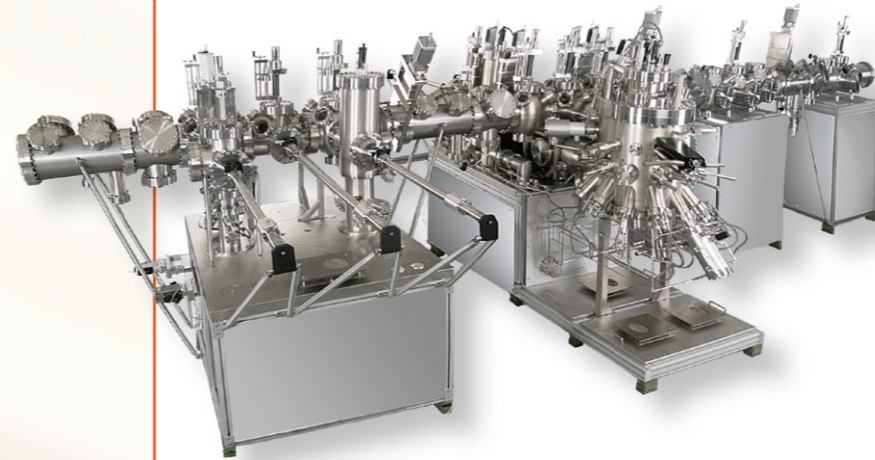
Just a few MBE Systems...

PRO-75 MBE System



PRO-75 Metal Oxide system for 3 inch substrates with a high temperature oxygen resistant SiC heater. The system is equipped with a number of effusion cells and it is designed to accept e-beam evaporators with flux feedback regulation. RHEED for in-situ growth control is also possible. The system is controlled using the EPI-Soft process control software.

PRO-100 MBE System (4")



PRO-100 III-V MBE system for high-end quality film growth on 4 inch wafers. The system is equipped with effusion cells for Gallium, Indium, Aluminium, a valved Arsenic cracker source, doping sources, RHEED, beam flux monitor and EPI-Soft process control software.

EVO-25 MBE System (1")



EVO-25 III-N MBE system for 1 inch sized substrates equipped with effusion cells for Gallium, Indium, Aluminium, Atomic Nitrogen using a RF-Plasma cracker source, a valved Arsenic cracker source, doping sources, RHEED and EPI-Soft process control software.

PRO-75 MBE System (3")



State-of-the-Art PRO-75 III-N MBE system for 3 inch sized substrates with an additional in-situ VT SPM directly attached. The system is equipped with various effusion cells and doping sources for III-V materials growth, RHEED, beam flux monitor and EPI-Soft software.

EVO-50 MBE System (2")



EVO-50 III-N MBE system for 2 inch substrates equipped with effusion cells for Gallium, Indium, Aluminium, Atomic Nitrogen using a RF-Plasma cracker source, a valved Arsenic cracker source, doping sources, RHEED and EPI-Soft process control software.

PRO-100 MBE (4") PVD, ALD, Sputtering & Analysis System



Combined SiGe-MBE, metal MBE, sputtering-, annealing- and ALD-system for up to 4" wafers. This system is capable of thin film deposition using PVD methods including electron beam evaporation, molecular beam deposition, sputter deposition and thermal evaporation methods.

Additionally, in-situ characterization techniques include angle-resolved monochromatic X-ray and ultraviolet photoelectron spectroscopy, scanning auger electron spectroscopy, atomic force and scanning tunnelling microscopy/spectroscopy.

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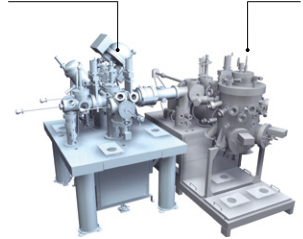
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MBE and Analysis in a Single System

Analysis MBE



Our MBE systems can be easily operated as a standalone system. For maximum/ultimate performance the MBE module can be seamlessly integrated with an Analysis module into a single system. This also allows the customer to either operate the complete MBE/Analysis combination from the beginning or choose to start with one module and then integrate the second module at a later date (as shown).

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Specifications and descriptions contained in this brochure are subject to alteration without notice.