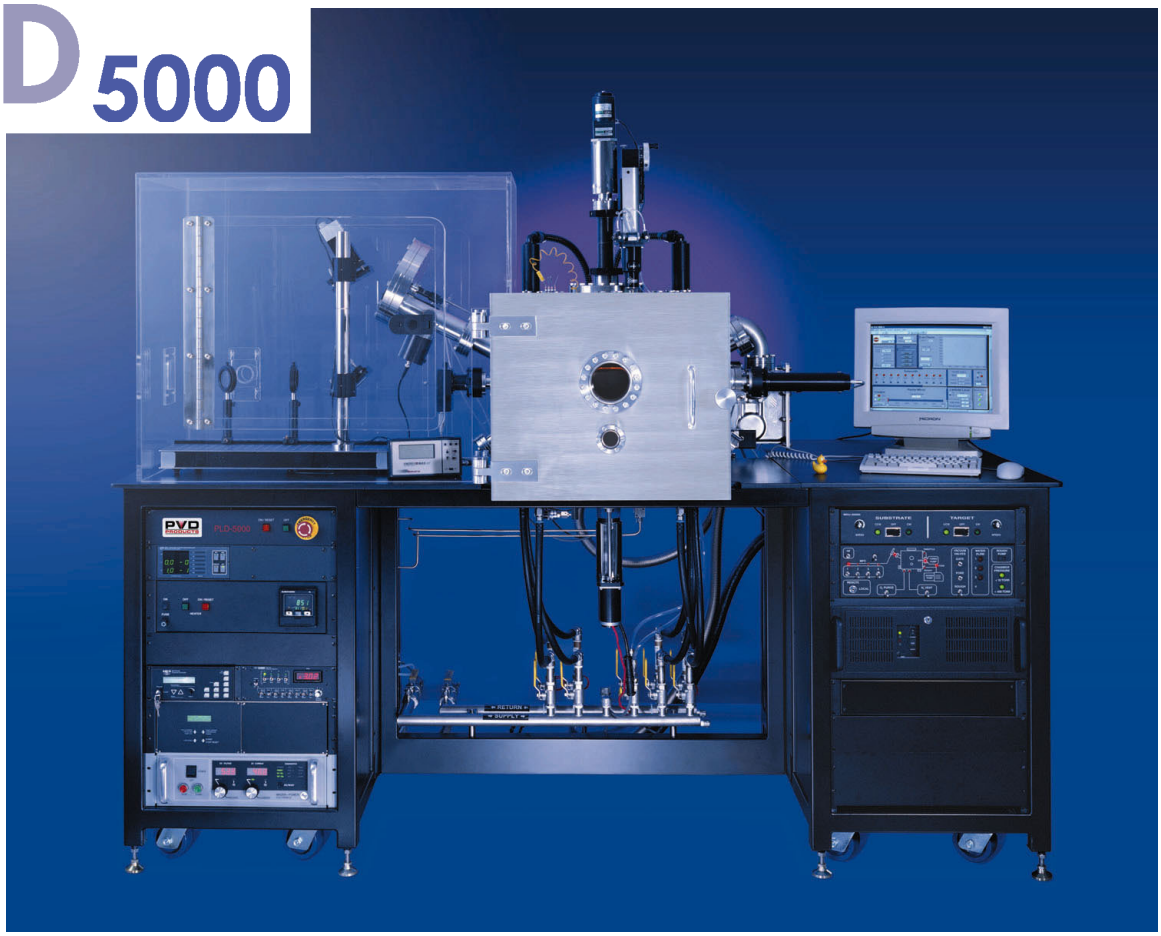
PLD 5000



The PVD Products PLD 5000 is capable of depositing high quality uniform films on substrates up to 5-inches (125-mm) in diameter. Our systems use a box style chamber with a large front-mounted hinged door. This provides for very quick and easy access for substrate and target changes. The chamber includes multiple user accessory ports for target and substrate viewing, a sputter or ion source as well as spectroscopy. A unique blackbody style oven is used for substrate heating. Large transparent substrates such as sapphire, $LaAlO_3$, and MgO can be heated to 850°C without the use of a thermal bonding agent (such as silver paste) or clamping. Silicon or other absorbing substrates may be heated to 950°C. Temperature uniformity of ± 3° is readily achievable over 5-inch diameter substrates. The heater box is surrounded by a water-cooled housing and keeps the chamber walls cool during deposition. Our systems include an enclosed constant-fluence optical train which rasters the laser beam over 6-inch diameter rotating ablation targets. The optical train also includes our Intelligent Window with in-the-chamber energy measurement capability. Pedestals for three 6-inch diameter targets are included along with optional motor driven target indexing. Base pressures below 5 x 10^{-7} Torr are readily achievable with a 500 L/sec molecular drag turbo pumping package and complete vacuum gauging. During deposition constant pressure is obtained by using an MFC with a heated capacitance manometer, and butterfly valve, along with a closed-loop pressure control unit. This system is ideal for device related research or prototype production.

PVD Products, Inc. 231 Andover Street, Wilmington, MA 01887
Tel: 978-694-9455 www.pvdproducts.com Fax: 978-694-9477

PLD 5000 System Specifications:

Maximum substrate size: Can handle one (1) 5-inch, or one 4-inch, or one 3-inch diameter substrate, or three (3) or four (4) 2-inch diameter substrates, or multiple small substrates per customer requirement.
Maximum substrate temperature: 950 °C (in oxygen) for non-transparent substrates such as Silicon, and 850 °C for transparent substrates (such as $LaAlO_3$). *No thermal paste or bonding required.*
Temperature uniformity: ± 3 ^{o}C across 5-inch diameter Si substrate.
Operating Pressure Range: 5 x 10^{-4} Torr base to 300 mTorr.
Target Size: Three 6-inch diameter targets (maximum diameter).
Film Thickness Uniformity: ± 5 % over 90% of a 5-inch diameter substrate (6-inch throw) for a 500 nm thick film using 6-inch diameter target.
Film Compositional Uniformity: ± 1.5 atomic percent over a 5-inch substrate for most materials such as YBCO using a 6-inch diameter target and programmable laser beam rastering, and 6-inch throw (uniformity of materials with high vapor pressures such as Lithium may vary significantly depending on deposition parameters).
Target to Substrate (Throw) Distance: Variable from 4.5 to 6 inches (effects maximum temperature, temperature uniformity, thickness and composition specifications).
Raster path length: 5.8 inches.
Nominal Angle of incidence of the laser beam on target: 60^{o}.
Base Pressure of the Main Chamber: P < 5 x 10^{-7} Torr guaranteed, with system at room temperature without targets in the chamber.
Base Pressure with Load Lock: P < 5 x 10^{-8} Torr guaranteed, with system at room temperature without targets in the chamber.
Operational Wavelength: 248 nm (KrF) or 193 nm (ArF), others available on request.

Super conducting properties for YBCO on $LaAlO_3$:

T_c > 87 ± 1 K across 5-inch diameter area for $LaAlO_3$ substrates.
J_c > 1.5 ± 0.5 MA/cm^2 across 5-inch diameter area for $LaAlO_3$ substrates.

System Options:

Load locks for fast turnaround time and improved main chamber base pressure.
Ion source for IBAD processing.
Magnetron sputter source.
Computer control using LabVIEW platform of all system and laser functions.
Additional MFC's.
Dry Pump packages.
Custom substrate holders.

Note: Specifications subject to change.