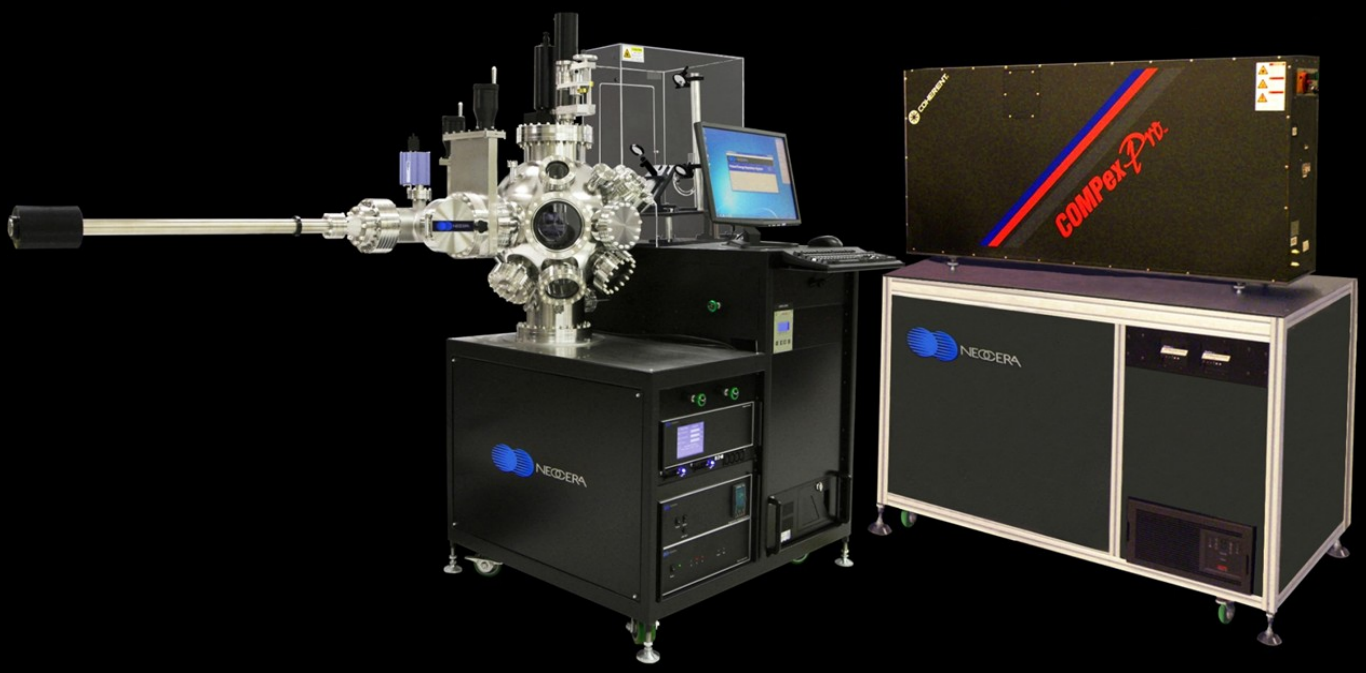
Pioneer 180 Pulsed Laser Deposition System



- Stand-alone turn-key PLD System.
- Deposition of epitaxial films, multilayer heterostructures and Superlattices.
- Deposition of nanoscale thin films using *insitu* RHEED diagnostics.
- Oxygen compatibility for oxide film depositions.
- Upgrades: Ion-assisted PLD, Combinatorial PLD, Target-Substrate load-locks.
- Additional deposition sources: Pulsed Electron Deposition (PED), RF/DC Sputtering.
- Integration with XPS /ARPES UHV Cluster tools, *insitu* UHV wafer transfer.
- Insitu diagnostics: Ion Energy Spectroscopy

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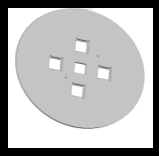
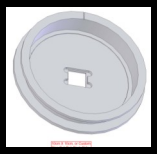
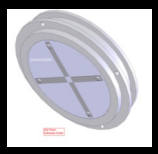
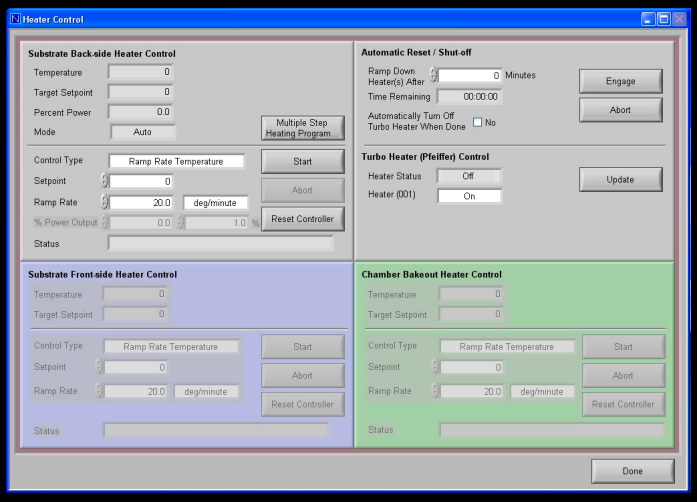






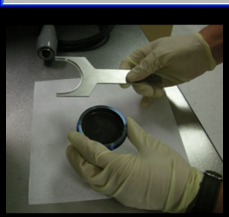


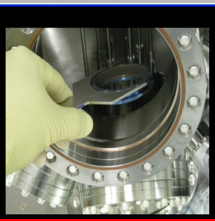
Deposition Chamber

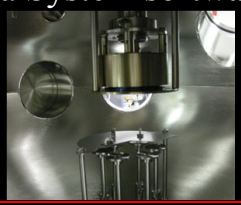
- 18” diameter spherical chamber
- 8” CF port with hinged door.
- 8” CF substrate heater port.
- 8” CF target carousel port.
- 6” CF laser port.
- 6” CF RHEED gun port.
- 6” CF RHEED screen port.
- 6” CF pumping port.
- 3x 6” CF ports (RF, DC Sputtering and /or DC Ion guns/View ports).
- 6.75” CF PED port.
- Additional 2.75” and 1.33” CF ports.

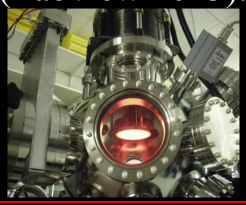
Programmable Radiative Substrate Heater.

- Substrate temperature: 850°C (max).
- Substrate rotation:1-30 RPM (360° substrate rotation, compatible with future RHEED upgrade.
- Substrate size: 2-inch diameter (max), minimum dimension : 10 x10 mm^2.
- Substrate carrier compatible with load-lock upgrade.
- Heater temperature is controlled by programmable PID controller
- Heater is oxygen compatible up to 1 atmosphere of oxygen.
- Heater is top-mounted with substrate surface facing and parallel to ground.
- Pre-ablation shutter is included.
- K-type thermocouple provides input to the PID controller.
- The controller is integrated with Neocera System software (Labview 2013).









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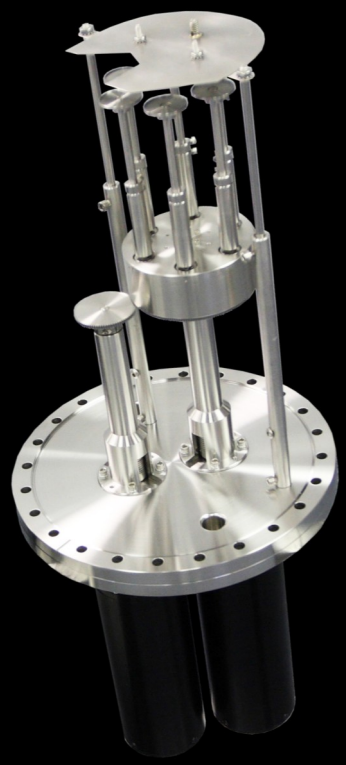
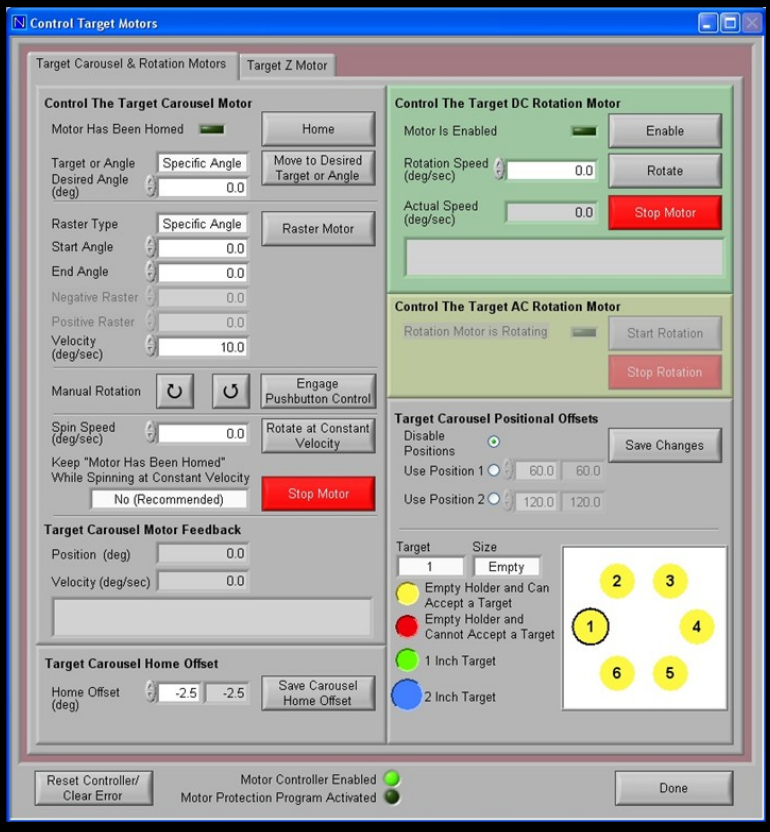


Multi-target Carousel

- Six 1-inch diameter targets or three 2-inch diameter targets.
- Target rotation, 360 degrees continuous (1-20 RPM).
- Target rastering (max 100 degrees/sec) for uniform ablation over the entire target surface.
- Target indexing for multilayers.
- Target height is adjustable (manual adjustability for non-UHV Systems).
- Target shield protects targets from cross-contamination.
- Ideal for depositing epitaxial films, multilayers and superlattices.
- Unique target rastering protocol. Continuous Composition Spreads/ Combinatorial PLD capabilities.

- Target indexing, target rastering and target rotation are controlled by LabVIEW 2013 software, facilitating multilayers and superlattice depositions.
- Software controls external triggering of the laser-facilitates nano-scale thin film growth control.
- Software provides continuous composition spread of binary and ternary phase spreads (optional).



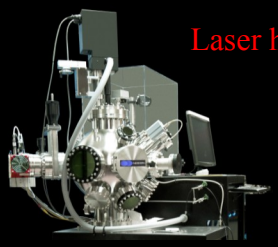
Vacuum Pumping Package

- All-dry vacuum pumps: Turbomolecular pump backed by dry mechanical pump.
- Minimum base pressure: 8 x 10^{-8} Torr in standard systems, 5 x 10^{-9} Torr in UHV systems.
- Turbo-speed is controlled by software.

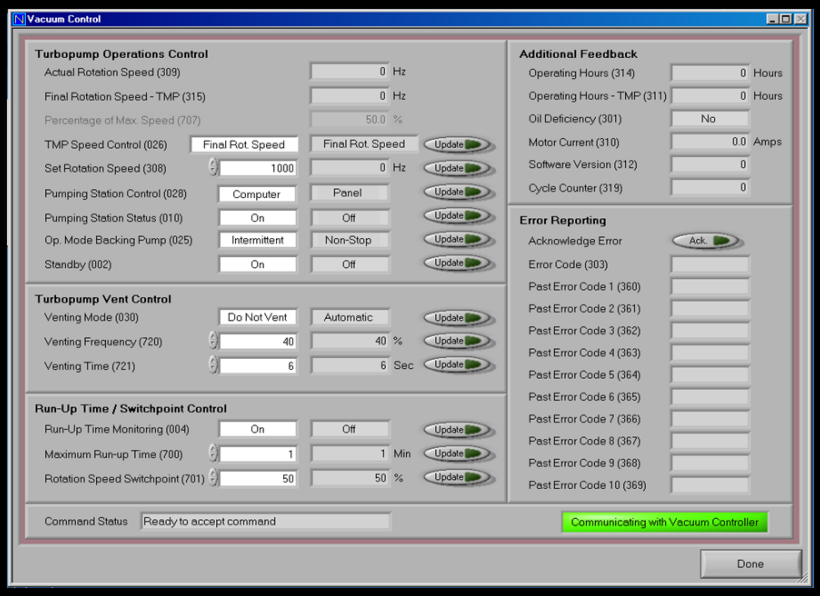
P180 PLD System with upgrades

Pressure Measurement and Control

- Wide range vacuum gauges for pressure measurement from atmosphere to 5 x 10^{-9} Torr.
- MKS Mass Flow Controllers are integrated with PLD System software. Flow rate~100 SCCM for Oxygen.
- Closed loop deposition-pressure control.



Laser heater



PLD System Software

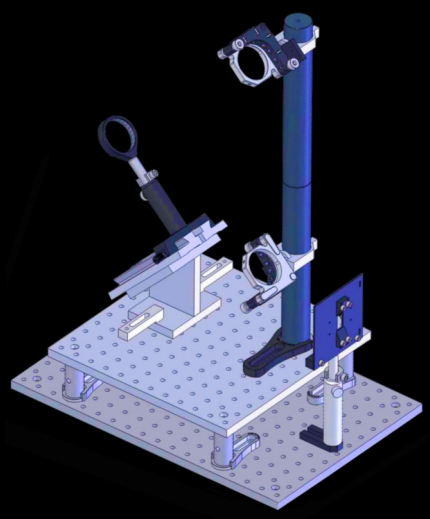
- Windows 7, LabVIEW 2013
- Controls substrate heating stage.
- Controls target carousel stage.
- Controls vacuum pumping stage.
- Controls Mass Flow Controllers.
- External laser triggering.
- Optional process automation.

PLD System Utilities:

- Power: 110/220V, 20A, 1 Phase.
- Water: 1 gallon/minute at 20C.

PLD Optics Package (KrF Excimer Laser)

- 45°and 22.5° degree Laser Mirrors for 248nm.
- Plano-convex Lens for 248nm. The focal length is approximately 50 cm.
- Adjustable Aperture.
- Anodized aluminum breadboard for mounting optics.
- Stable kinematic mounts for laser mirrors and lens with maximum clear aperture and wide angular range.
- A complete set of mounting rods, base plates.
- Light-tight enclosure to protect users from laser radiation.



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