Pioneer 180 Pulsed Electron Deposition System

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

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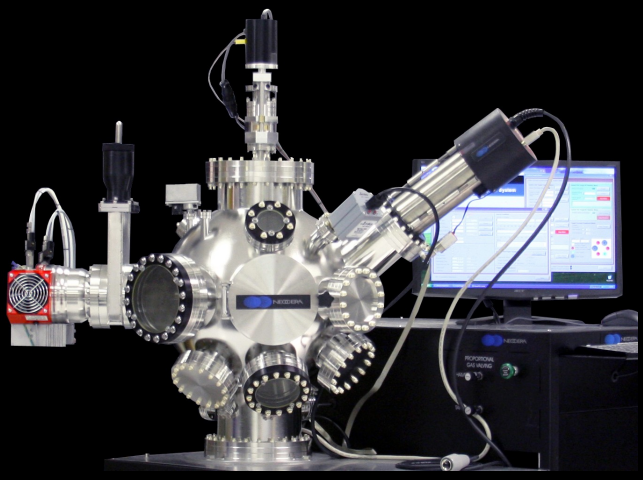
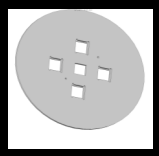
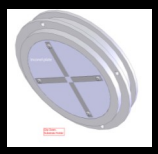
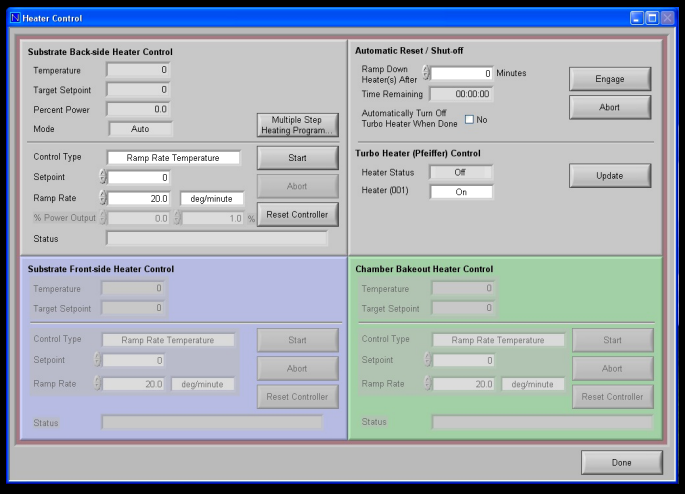






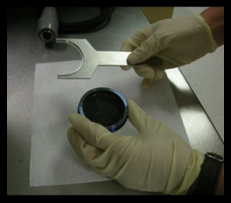


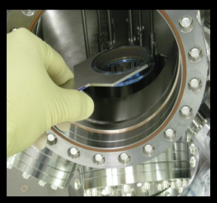
Deposition Chamber

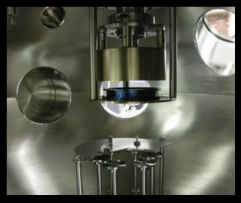
- 18” diameter spherical chamber
- 8” CF port with hinged door.
- 8” CF substrate heater port.
- 8” CF target carousel port.
- 6.75” CF PED source port.
- 6” CF RHEED gun port.
- 6” CF RHEED screen port.
- 6” CF pumping port.
- 3x 6” CF ports (RF, DC Sputtering and /or DC Ion guns/View ports).
- 6” CF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

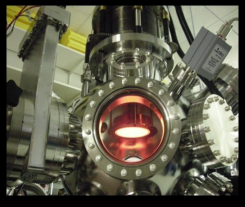
Programmable Radiative Substrate Heater

- Substrate temperature: 850°C (max).
- Substrate rotation:1-30 RPM (360° substrate rotation.
- Substrate size: 2-inch diameter (max), minimum dimension : 10 x10 mm^2.
- Substrate sizes compatible with future load-lock upgrade.
- Heater temperature is controlled by a 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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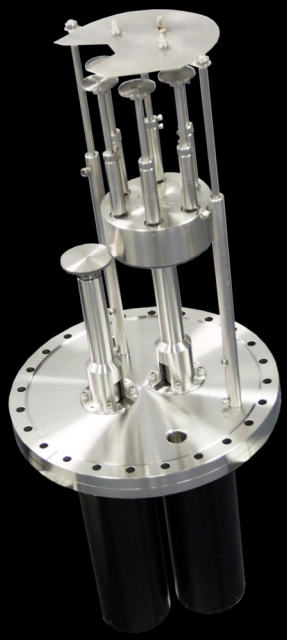
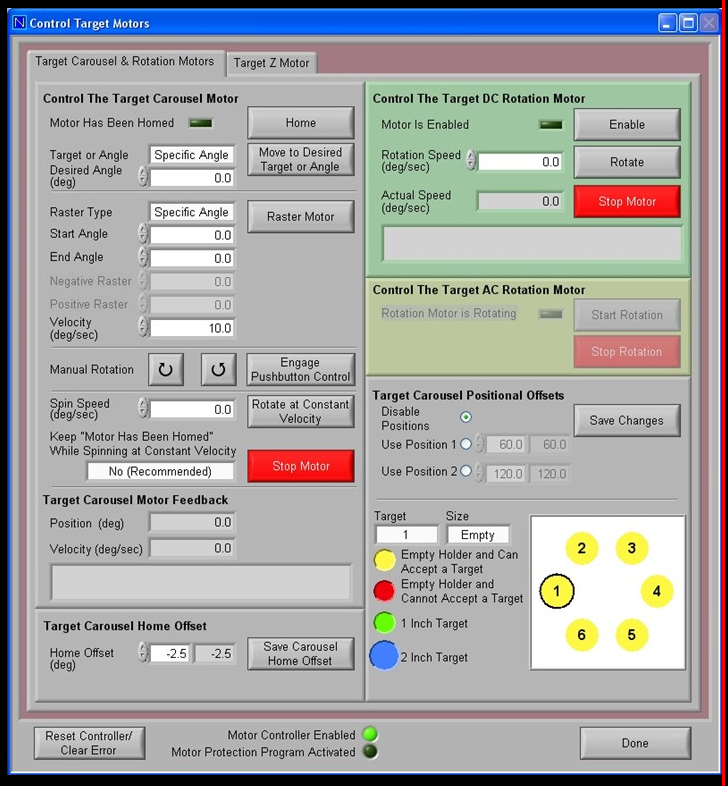


Multi-target Carousel

- 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.
- Provides Continuous Composition Spreads/ Combinatorial PED 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 PED source facilitating nanoscale thin film growth control.
- Software provides continuous composition spread of binary and ternary phase spreads (optional).



Pulsed Electron Deposition Source

- Energy of Electrons: 8-20 keV
- Maximum energy per pulse: 800 mJ
- Minimum energy per pulse: 100 mJ
- Process Gas Pressure: 3-20 mTorr.
- Process Gases: Oxygen, Nitrogen, Argon
- Pulse energy variations: $\pm$10%
- Pulse width: 100 ns
- Maximum Repetition Rate.: 10 Hz at 15kV, 5 Hz at 20kV
- Beam cross section, (min) :8 x10^{-2} cm^2
- Maximum power density :1.3 x 10^8 W/cm^2
- Z - alignment range: 50 mm
- XY- alignment range: +/- 20 mm
- Cathode module lifetime ~3x10 ^{7} pulses

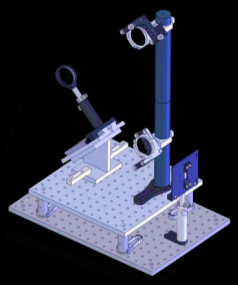
Vacuum Pumping Package

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

Pressure Measurement / Control

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

PED and PLD in one System! Add a Pulsed Laser and Optics package.



PED System Software

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

For further information, please contact: sales@neocera.com or +1-301-210-1010, ext 104