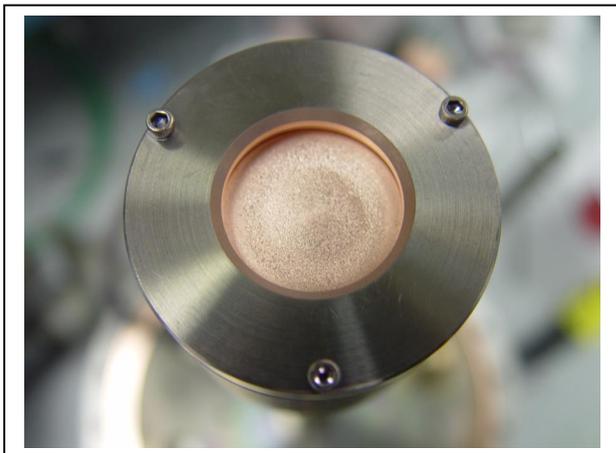


Titan Planar Magnetron 1-inch Sputter Source

PVD Products offers a full line of planar magnetron sputter sources for your specific sputter deposition requirements. These magnetron sources are based on a field proven design-providing ease of use in a small volume with excellent target utilization and deposited film uniformity. Our 1-inch HV magnetrons utilize assemblies that minimize the number of water-to-vacuum interfaces typically found in other sources. The Nd-Fe-B magnets are isolated from the water and are easily field replaceable. The sources operate with both RF and DC power supplies. Standard 1-inch magnetron designs come mounted on a 0.75" diameter shaft. Custom flanges with multiple sources are also available. Integral shutters, tilt mechanisms, and Z-stages are all available as options.



**Photograph of three PVD Products
1-inch Magnetron Sputter sources.**



**Photograph of a PVD Products 1-inch
Magnetron sputter source with a
copper target.**

Titan Magnetron Source Features

- Operates with RF, pulsed DC, and DC power supplies
- No target bonding required
- Nd-Fe-B magnets
- Magnets isolated from water
- Can operate as a diode sputter source
- Axial and right angle mounts available
- Operates from ~1 mTorr to 1 Torr
- Bakeable to 200°C
- Standard 3/4" OD Shaft
- Simple Target Changes
- 1/8" (3 mm) thick targets as standard
- N, HN, or UHF connectors available
- Small diameter head

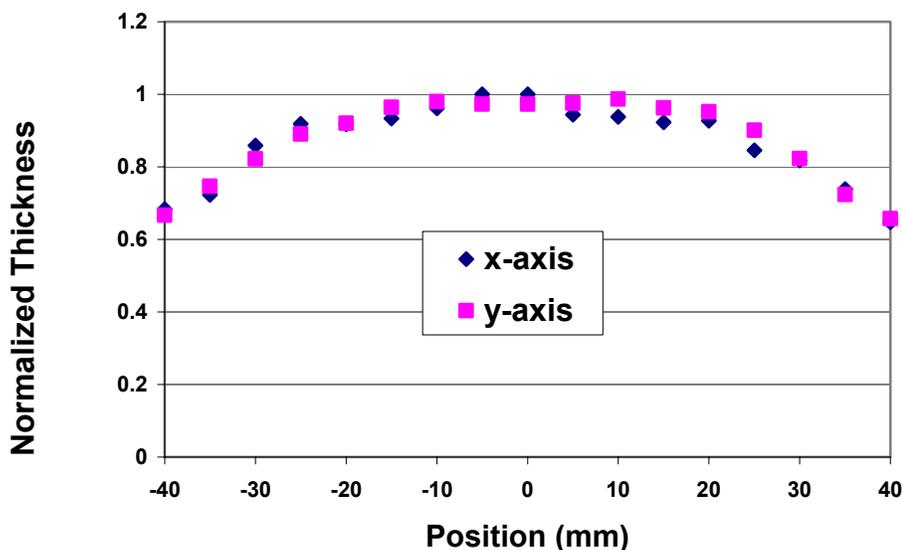
Standard Titan Magnetron Specifications: 1" HV Sputter Source

| | |
|--------------------------|------------------------------------|
| Target Size | 1 ± 0.02" (25.4 mm) |
| Head Diameter | 1.82" (46.3 mm) |
| Target Thickness | 0.125" (3 mm) maximum thickness |
| Maximum DC Power | 250 Watts |
| Maximum RF Power | 100 Watts |
| Electrical Connection | HN Connector (others available) |
| Cathode Voltage | 200 – 1,000 Volts |
| Cathode Current | 3 amps maximum |
| Operating Pressure Range | 1 mTorr to 1 Torr |
| Water Flow Requirements | ½ GPM, Filtered |
| Water Hook Up | Supplied with ¼" quick disconnects |
| Weight | 3 lbs. (1.5 kg) |
| Configurations | Axial or Right Angle |

1-inch Magnetron Source Options:

Manual or in-situ tilt assemblies, Manual or motorized Z-stage, Localized Gas Injection
Custom flange mounts with manual or pneumatic shutter assemblies.

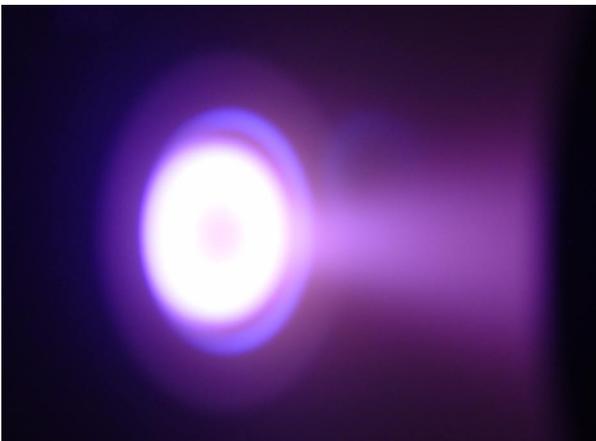
1-inch HV Magnetron Film Thickness Uniformity



Normalized Film Thickness obtained depositing a ~200-nm thick film with a PVD HV Magnetron with a 1-inch Cu target. The film was deposited onto an oxidized **non-rotating** Si wafer using 150 Watts DC in 10 mTorr (Ar), with a target-to-substrate distance of 3-inches (75-mm). Measurements were made via a 4-point probe in two mutually perpendicular directions (X, Y) across the wafer surface.

Titan Planar Magnetron 2-inch Sputter Source

PVD Products offers a full line of Titan planar magnetron sputter sources for your specific sputter deposition requirements. These magnetron sources are based on a field proven design-providing ease of use in a small volume with excellent target utilization and deposited film uniformity. All Titan magnetrons utilize vacuum brazed assemblies that eliminate all water-to-vacuum interfaces typically found in other sources. The Nd-Fe-B magnets are isolated from the water and are field replaceable. The sources operate with both RF and DC power supplies and are configurable for both balanced and unbalanced sputtering modes. Standard Titan designs come mounted on a 0.75" diameter shaft. Alternatively, sources can be made fully UHV compatible when properly mounted on customer specified conflat flange. Custom flanges with multiple sources are also available. Integral shutters, gas distribution, tilt mechanisms, chimneys, and Z-stages are all available as options.



Photograph of a PVD Products 2-inch Titan Magnetron sputter source operating at 100 Watts and 5-mTorr of Argon gas with a Ti target.



Photograph of a PVD Products 2-inch Titan Magnetron Sputter source.

Titan Magnetron Source Features

- Operates with RF, pulsed DC, and DC power supplies
- Compatible with magnetic targets
- No water to vacuum seals
- No target bonding required
- Nd-Fe-B magnets
- Magnets isolated from water
- Balanced and un-balanced modes available
- Can operate as a diode sputter source
- Adjustable Anode Gap
- Axial and right angle mounts available
- Operates from 0.5 mTorr to 1 Torr
- Convertible target assemblies available
- Bakeable to 200°C
- Standard 3/4" OD Shaft
- UHV Versions Available
- Simple Target Changes

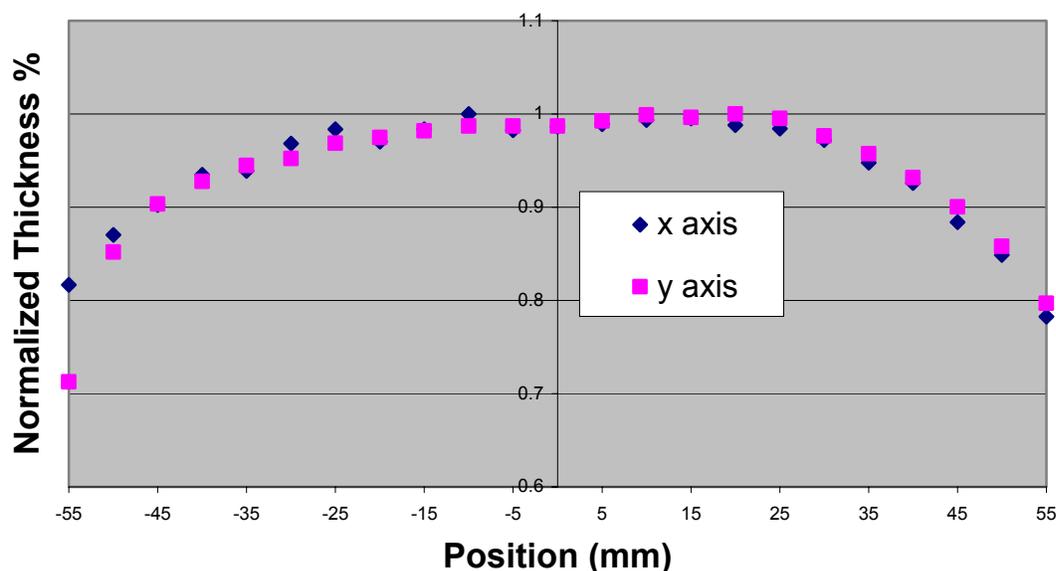
Standard Titan Magnetron Specifications: 2" Titan Sputter Source

| | |
|--------------------------|--------------------------------------|
| Target Size | 2 ± 0.02" (1/4" maximum Thickness) |
| Head Diameter | 2.90" |
| Target Thickness | 0.375" maximum |
| Maximum DC Power | 600 Watts |
| Maximum RF Power | 400 Watts |
| Electrical Connection | HN Connector (N style available) |
| Cathode Voltage | 200 – 1,000 Volts |
| Cathode Current | 3 amps maximum |
| Operating Pressure Range | 0.5 mTorr to 1 Torr |
| Water Flow Requirements | 3/4 GPM, Filtered |
| Water Hook Up | Supplied with 1/4" quick disconnects |
| Weight | 5 lbs. |
| Configurations | Axial or Right Angle |

Titan Magnetron Source Options:

Manual or in-situ tilt assemblies
 Manual or motorized Z-stage
 Localized Gas Injection
 Custom flange mounts with manual or pneumatic shutter assemblies
 Chimney

Titan 2-inch Film Thickness Uniformity Map



Film Thickness obtained from depositing a 100-nm thick film with a 2-inch Titan Magnetron using a Cu target. The film was deposited at 300 Watts DC onto an oxidized *non-rotating* Si wafer in 5 mTorr (Ar), using a target-to-substrate distance of 4-inches. Measurements were made via a 4-point probe in two mutually perpendicular directions (X, Y) across the wafer surface. A uniformity of ± 5% is obtained over a 3.5" (90 mm) area.

Titan Planar Magnetron 3-inch Sputter Source

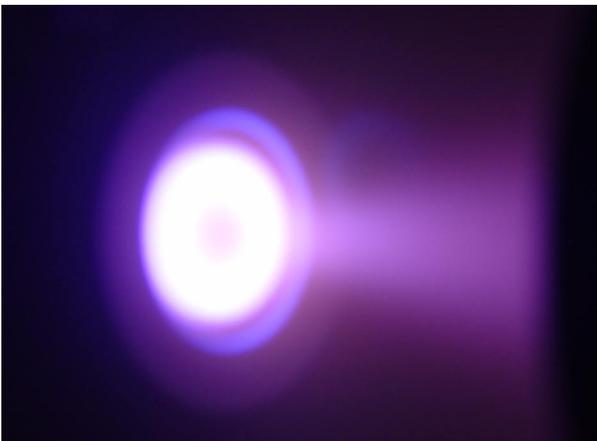
PVD Products offers a full line of Titan planar magnetron sputter sources for your specific sputter deposition requirements. These magnetron sources are based on a field proven design-providing ease of use in a small volume with excellent target utilization and deposited film uniformity. All Titan magnetrons utilize vacuum brazed assemblies that eliminate all water-to-vacuum interfaces typically found in other sources. The Nd-Fe-B magnets are isolated from the water and are field replaceable. The sources operate with both RF and DC power supplies and are configurable for both balanced and unbalanced sputtering modes. Standard Titan designs come mounted on a 0.75" diameter shaft. Alternatively, sources can be made fully UHV compatible when properly mounted on customer specified conflat flange. Custom flanges with multiple sources are also available. Integral shutters, gas distribution, tilt mechanisms, chimneys, and Z-stages are all available as options.



Photograph of a PVD Products Titan 3-inch Magnetron Sputter source.

Titan Magnetron Source Features

- Operates with RF, pulsed DC, and DC power supplies
- Compatible with magnetic targets
- No water to vacuum seals
- No target bonding required
- Nd-Fe-B magnets
- Magnets isolated from water
- Balanced and un-balanced modes available
- Can operate as a diode sputter source
- Adjustable Anode Gap
- Axial and right angle mounts available
- Operates from 0.5 mTorr to 1 Torr
- Convertible target assemblies available
- Bakeable to 200°C
- Standard 3/4" OD Shaft
- UHV Versions Available
- Simple Target Changes



Photograph of a PVD Products 2-inch Titan Magnetron sputter source operating at 500 Watts and 5-mTorr of Argon gas with a Ti target.

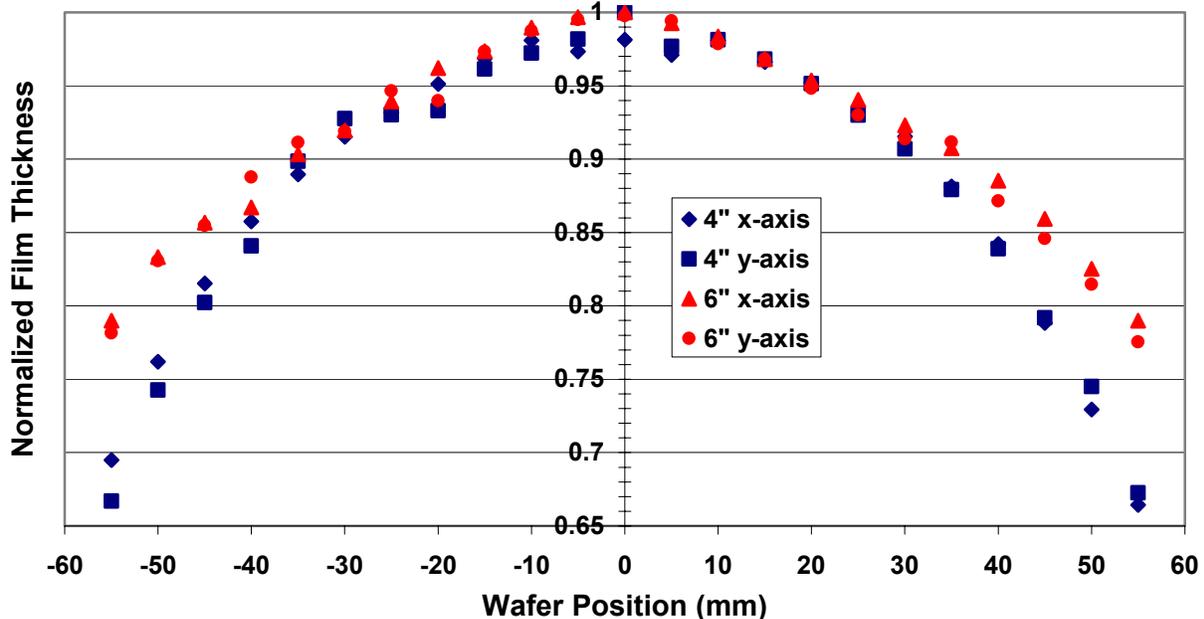
Standard Titan Magnetron Specifications: 3" Titan Sputter Source

| | |
|--------------------------|--------------------------------------|
| Target Size | 3 ± 0.02" (1/4" maximum Thickness) |
| Head Diameter | 3.88" |
| Target Thickness | 0.375" maximum |
| Maximum DC Power | 2,000 Watts |
| Maximum RF Power | 750 Watts |
| Electrical Connection | HN Connector (N style available) |
| Cathode Voltage | 200 – 1,000 Volts |
| Cathode Current | 5 amps maximum |
| Operating Pressure Range | 0.5 mTorr to 1 Torr |
| Water Flow Requirements | 3/4 GPM, Filtered |
| Water Hook Up | Supplied with 1/4" quick disconnects |
| Weight | 9 lbs. |
| Configurations | Axial or Right Angle |

Titan Magnetron Source Options:

Manual or in-situ tilt assemblies, Manual or motorized Z-stage, Localized Gas Injection
 Custom flange mounts with manual or pneumatic shutter assemblies, Chimney

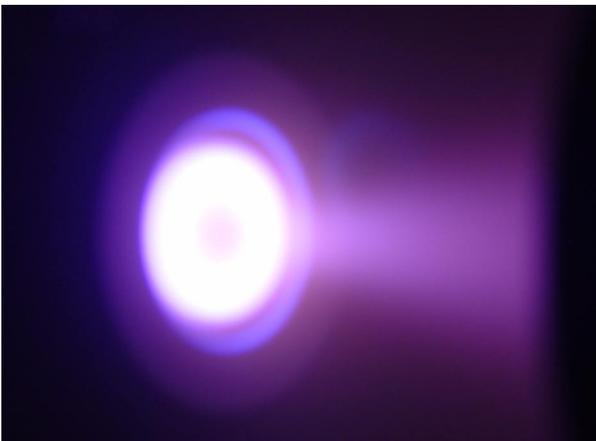
3-inch Titan Film Thickness Uniformity Map



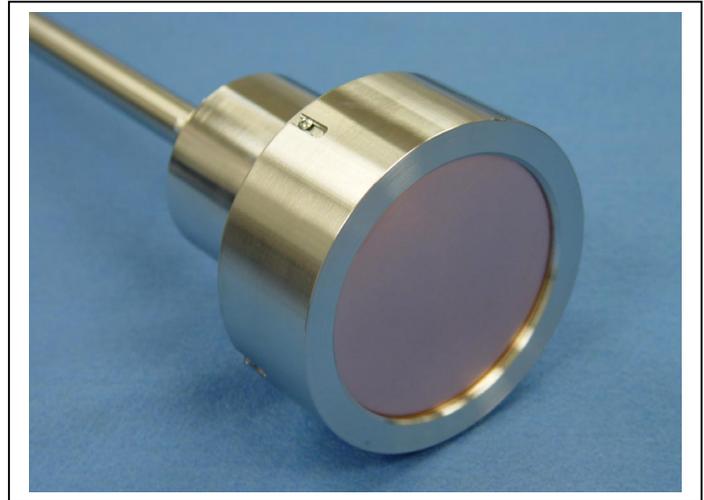
Normalized Film Thickness obtained depositing ~100-nm thick films with a PVD Titan Magnetron with a 3-inch Cu target. The films were deposited at 1 kW DC onto an oxidized *non-rotating* Si wafer in 5 mTorr (Ar), using a target-to-substrate distance of 4- and 6-inches. Measurements were made via a 4-point probe in two mutually perpendicular directions (X, Y) across each wafer surface. A uniformity of ± 5% is obtained over a 70 mm diameter for both films without substrate rotation, and ± 10% at 80 mm and 100 mm diameter for the 4-inch and 6-inch throw distances, respectively.

Titan Planar Magnetron 4-inch Sputter Source

PVD Products offers a full line of Titan planar magnetron sputter sources for your specific sputter deposition requirements. These magnetron sources are based on a field proven design-providing ease of use in a small volume with excellent target utilization and deposited film uniformity. All Titan magnetrons utilize vacuum brazed assemblies that eliminate all water-to-vacuum interfaces typically found in other sources. The Nd-Fe-B magnets are isolated from the water and are field replaceable. The sources operate with both RF and DC power supplies and are configurable for both balanced and unbalanced sputtering modes. Standard Titan designs come mounted on a 0.75" diameter shaft. Alternatively, sources can be made fully UHV compatible when properly mounted on customer specified conflat flange. Custom flanges with multiple sources are also available. Integral shutters, gas distribution, tilt mechanisms, chimneys, and Z-stages are all available as options.



Photograph of a PVD Products 2-inch Titan Magnetron sputter source operating at 500 Watts and 5-mTorr of Argon gas with a Ti target.



Photograph of a PVD Products Titan 4-inch Magnetron Sputter source.

Titan Magnetron Source Features

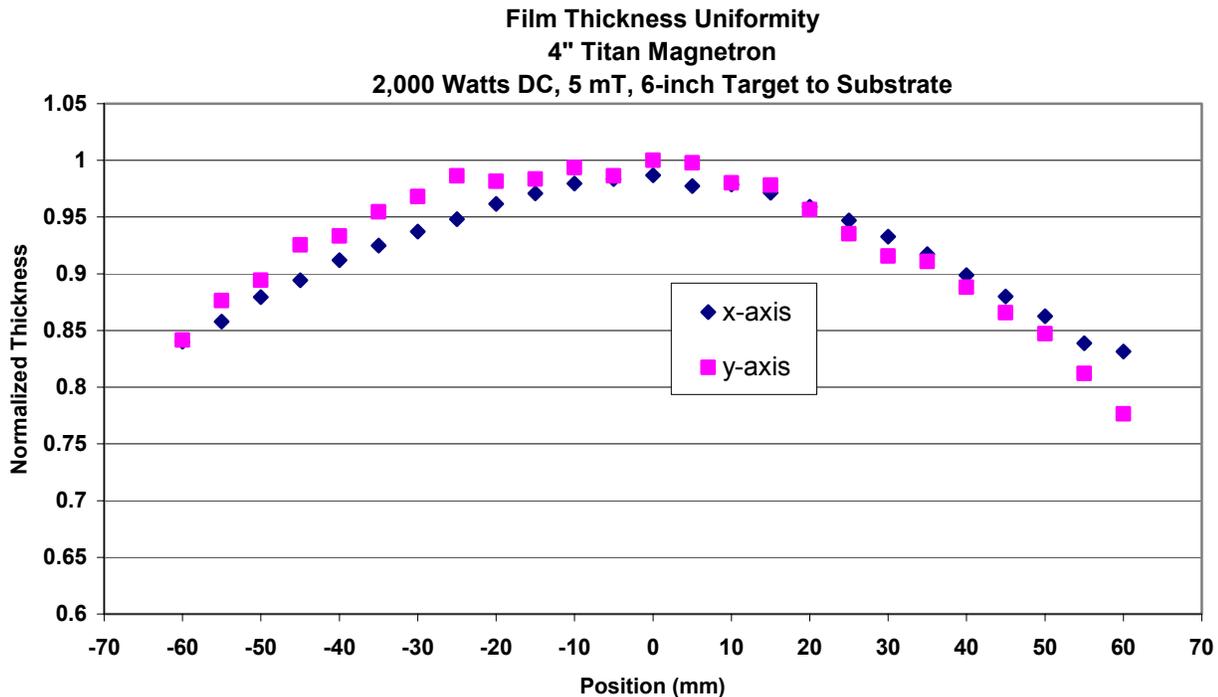
- Operates with RF, pulsed DC, and DC power supplies
- Compatible with magnetic targets
- No water to vacuum seals
- No target bonding required
- Nd-Fe-B magnets
- Magnets isolated from water
- Balanced and un-balanced modes available
- Can operate as a diode sputter source
- Adjustable Anode Gap
- Axial and right angle mounts available
- Operates from 0.5 mTorr to 1 Torr
- Convertible target assemblies available
- Bakeable to 200°C
- Standard 3/4" OD Shaft
- UHV Versions Available
- Simple Target Changes

Standard Titan Magnetron Specifications: 4" Titan Sputter Source

| | |
|--------------------------|--------------------------------------|
| Target Size | 4 ± 0.02" (3/8" maximum Thickness) |
| Head Diameter | 4.88" (124 mm) |
| Target Thickness | 0.375" maximum (9 mm) |
| Maximum DC Power | 3,000 Watts |
| Maximum RF Power | 1,250 Watts |
| Electrical Connection | HN Connector (N style available) |
| Cathode Voltage | 200 – 1,000 Volts |
| Cathode Current | 5 amps maximum |
| Operating Pressure Range | 0.5 mTorr to 1 Torr |
| Water Flow Requirements | 1 GPM, Filtered |
| Water Hook Up | Supplied with 1/4" quick disconnects |
| Weight | 15 lbs. (33 kG) |
| Configurations | Axial or Right Angle |

Titan Magnetron Source Options:

Manual or in-situ tilt assemblies, Manual or motorized Z-stage, Localized Gas Injection
 Custom flange mounts with manual or pneumatic shutter assemblies, Chimney



Normalized Film Thickness obtained depositing ~100-nm thick films with a PVD Titan Magnetron using a 4-inch Cu target. The films were deposited at 2 kW DC onto an oxidized *non-rotating* Si wafer in 5 mTorr (Ar), using a target-to-substrate distance of 6-inches. Measurements were made via a 4-point probe in two mutually perpendicular directions (X, Y) across each wafer surface. A uniformity of ± 2.5% is achieved over a 2-inch wafer, ± 6.5% over a 4-inch wafer, and ±10% over a 6-inch wafer diameter.