

What is claimed is:

1. A physical vapor deposition chamber comprising:
a first target comprising material to be deposited on a substrate, the first target
5 comprising a bottom surface, a top surface, a cross-sectional thickness defining a first
target cross-sectional thickness between the top surface and the bottom surface, a
first end and a second end opposite the first end, the cross-sectional thickness T_1 at
the first end being less than the cross-sectional thickness T_2 at the second end.
- 10 2. The physical vapor deposition chamber of claim 1, wherein the cross-sectional
thickness T_1 of the first target at the first end and the cross-sectional thickness T_2 of
the first target at the second end are such that there is a ratio of the cross-sectional
thickness of the first target at the first end to the cross-sectional thickness of the first
target at the second end in a range of from 1:5 to 1:1.5.
- 15 3. The physical vapor deposition chamber of claim 1, wherein there is a ratio of
the cross-sectional thickness T_1 of the first target at the first end to the cross-sectional
thickness T_2 of the first target at the second end is in a range of from 1:3 to 1:2.
- 20 4. The physical vapor deposition chamber of claim 1, wherein the cross-sectional
thickness T_1 of the first target at the first end is less than half of the cross-sectional
thickness T_2 of the first target at the second end.
5. The physical vapor deposition chamber of claim 1, wherein the cross-sectional
25 thickness T_1 of the first target at the first end is in a range of from 0.5 cm to about 2.5
cm and the cross-sectional thickness T_2 of the first target at the second end is in a
range of from 1.5 cm to about 5 cm.
6. The physical vapor deposition chamber of claim 1, wherein the cross-sectional
30 thickness of the first target between the first end and the second end defines a right
trapezoid shape.

7. The physical vapor deposition chamber of claim 1, wherein
8. The physical vapor deposition chamber of claim 1, wherein the physical vapor deposition chamber comprises a shield surrounding the first end and the second end
5 of at least the first target.
9. The physical vapor deposition chamber of claim 1, wherein the physical vapor deposition chamber comprises a chamber liner surrounding a substrate support, the chamber liner defining an interior space of the chamber, and substrate support is on
10 center and the first target is off-center.
10. The physical vapor deposition chamber of claim 9, further comprising a second target comprising a second target bottom surface, a second target top surface defining a second target cross-sectional thickness between the second target top surface and
15 the second target bottom surface, a second target first end and a second target second end opposite the second target first end, the second target cross-sectional thickness at the second target first end less than the cross-sectional thickness at the second end of the second target.
- 20 11. The physical vapor deposition chamber of claim 10, wherein the first target and the second target are each wedge-shaped in cross-section.
12. A physical vapor deposition chamber comprising:
a first target comprising material to be deposited on a substrate, the first target
25 comprising a bottom surface, a top surface, a cross-sectional thickness defining a first target cross-sectional thickness between the top surface and the bottom surface, a first end and a second end opposite the first end, the cross-sectional thickness at the first end being less than the cross-sectional thickness at the second end; and
a second target comprising a second target bottom surface, a second target top
30 surface defining a second target cross-sectional thickness between the second target top surface and the second target bottom surface, a second target first end and a second target second end opposite the second target first end, the second target cross-sectional thickness at the second target first end less than the cross-sectional

thickness at the second end of the second target, wherein the physical vapor deposition chamber comprises a chamber liner surrounding a substrate support, the chamber liner defining a process area including a center, and substrate support is on center and the first target and the second target are off-center.

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13. A substrate processing method comprising:

supporting a substrate having an exposed substrate surface in a physical vapor deposition process chamber on a substrate support;

forming a plume of deposition material from at least a first target comprising

10 first target material, the plume of deposition material forming a plume area with respect to the substrate surface, the target comprising a center, a bottom surface and a top surface, and a first target cross-sectional thickness between the top surface and the bottom surface, a first end and a second end opposite the first end, a first end and a second end defining a first target cross-sectional thickness, the first target cross

15 sectional thickness T_1 at the first end is less than the first target cross sectional thickness T_2 at the second end; and

depositing a layer from the plume of deposition material on the exposed substrate surface.

20 14. The method of claim 13, further comprising positioning a shield to surround the first end and the second end of the first target.

15. The method of claim 13, further comprising rotating the substrate support about a rotational axis.

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16. The method of claim 15, wherein the center of the first target is offset from the rotational axis of the substrate support.

17. The method of claim 15, wherein the second end of the target is adjacent to the

30 shield.

18. The method of claim 15, wherein the physical vapor deposition process is performed in a multi-cathode physical vapor deposition chamber and the first target and a second target each have a radial center that is offset from the rotational axis.

5 19. The method of claim 18, wherein the second target comprises a second target material, a second target bottom surface, a second target top surface defining a second target cross-sectional thickness between the second target top surface and the second target bottom surface, a second target first end and a second target second end opposite the second target first end, the second target cross-sectional
10 thickness at the second target first end less than the second target cross-sectional thickness at the second end of the second target.

20. The method of claim 19, further comprising alternately depositing the first target material from the first target and the second target material from the second target.

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