~~What is claimed is:~~

CLAIMS

1. A processing method comprising:

forming a gap fill layer comprising tungsten or molybdenum by an atomic layer deposition process comprising exposing a substrate surface having at least one feature thereon sequentially to a metal precursor and a reducing agent comprising hydrogen to form the gap fill layer in the feature, wherein there is not a nucleation layer between the substrate surface and the gap fill layer.

2. The processing method of claim 1, wherein the metal precursor is one or more of WF_6, WCl_x, $W(CO)_5$, MoF_6, $MoCl_x$, where x is 5 or 6, and the reducing agent is H_2.

3. The processing method of claim 1, wherein the substrate surface prior to forming the gap fill layer has not been exposed to air.

4. The processing method of claim 1, wherein the substrate surface prior to forming the gap fill layer has been exposed to a chemical treatment to remove oxides and the chemical treatment comprises exposing the substrate surface to one or more of the following:

Si_xH_{2x+2}, wherein x >=1;

$Si_xH_yF_z$, wherein x>=2 and y + z = 2x+2;

$Si_xH_yCl_z$, wherein x>=2 and y + z = 2x+2;

B_xH_y, wherein x>=2 and y<= 2x+2;

$B_xH_yCl_z$, wherein x>=2 and y + z <= 2x+2;

$B_xH_yF_z$, wherein x>=2 and y + z <= 2x+2; and

$B_xH_yR_z$, wherein x>=2, y + z <= 2x+2, and R comprises an alkyl group having 1 to 6 carbons.

5. The processing method of claim 4, wherein the chemical treatment excludes the metal precursor.

6. A processing method comprising:

positioning a substrate surface in a processing chamber, the substrate surface having at least one feature thereon;

exposing the substrate surface sequentially to a first metal precursor and a reactant to form an underlying layer, wherein the first metal precursor comprises one or more of a titanium precursor, an aluminum precursor, and a silicon precursor, and the reactant comprises a nitrogen precursor, an oxygen precursor, or combinations thereof;

exposing the underlying layer sequentially to a second metal precursor comprising a tungsten precursor or a molybdenum precursor, and a reducing agent comprising hydrogen (H_2) to form a gap fill layer on the underlying layer~~.~~ by atomic layer deposition.

7. The processing method of claim 6, wherein the underlying layer comprises TiN, TiN, TiON, TiSiN, TiSiON, AlN, TiAlN, or TiAlON.

8. The processing method of claim 6, wherein the second metal precursor is one or more of WF_6, WCl_x, $W(CO)_5$,MoF_6, $MoCl_x$, where x is 5 or 6.

9. The processing method of claim 6, wherein exposing the underlying layer sequentially to the second metal precursor and the hydrogen occurs in the absence of exposure of the substrate surface to air.

10. The processing method of claim 6 further comprising before exposing the underlying layer sequentially to the second metal precursor and the hydrogen, exposing the substrate surface to air and applying a chemical treatment to the underlying layer to remove surface oxidation, wherein the chemical treatment comprises exposing the substrate surface to one or more of the following:

Si_xH_{2x+2}, wherein x >=1;

$Si_xH_yF_z$, wherein x>=2 and y + z = 2x+2;

$Si_xH_yCl_z$, wherein x>=2 and y + z = 2x+2;

B_xH_y, wherein x>=2 and y<= 2x+2;

$B_xH_yCl_z$, wherein x>=2 and y + z <= 2x+2;

$B_xH_yF_z$, wherein x>=2 and y + z <= 2x+2; and

$B_xH_yR_z$, wherein x>=2, y + z <= 2x+2, and R comprises an alkyl group having 1 to 6 carbons.

11. The processing method of claim 6, wherein there is not a nucleation layer between the underlying layer and the gap fill layer.

~~12. A processing method comprising:~~

~~placing a substrate having a substrate surface into a processing chamber comprising a plurality of sections, each section separated from adjacent sections by a gas curtain, the substrate surface having at least one feature with a top, bottom and sides and an aspect ratio of greater than or equal to 10:1;~~

~~exposing at least a portion of the substrate surface to a first process condition in a first section of the processing chamber, the first process condition comprising a precursor of titanium, aluminum, silicon, or combinations thereof;~~

~~laterally moving the substrate surface through a gas curtain to a second section of the processing chamber;~~

~~exposing the substrate surface to a second process condition in the second section of the processing chamber, the second process condition comprising a reactant to form a film with the precursor of titanium, aluminum, silicon or combinations thereof, the film comprising TiN, TiN, TiON, TiSiN, TiSiON, AlN, TiAlN, or TiAlON;~~

~~optionally repeating exposure to the first and second sections, including lateral movement of the substrate surface to form an underlying layer;~~

laterally moving the substrate surface through a gas curtain to a third section of the processing chamber;

exposing the substrate surface to a third process condition in the third section of the processing chamber, the third process condition comprising a tungsten precursor or molybdenum precursor;

laterally moving the substrate surface through a gas curtain to a fourth section of the processing chamber;

exposing the substrate surface to a fourth process condition in the fourth section of the processing chamber, the fourth process condition comprising hydrogen as a reductant to form a film with the tungsten or molybdenum precursor; and

optionally repeating exposure to the third and fourth sections, including lateral movement of the substrate surface to fill the feature.

13. The processing method of claim 12, wherein the reductant consists essentially of hydrogen.

14. The processing method of claim 12, wherein the first process condition comprises the precursor of titanium, which is $TiCl_4$, TiI_4, or $Ti[NMe_2]_4$ and the second process condition comprises NH_3 to form the underlying layer that comprises TiN.

15. The method of claim 12, wherein prior to exposing the substrate surface to the second process condition, the substrate is exposed to a chemical treatment process condition in a chemical treatment section of the processing chamber, the chemical treatment process condition comprising one or more of the following:

Si_xH_{2x+2}, wherein x >=1;

$Si_xH_yF_z$, wherein x>=2 and y + z = 2x+2;

$Si_xH_yCl_z$, wherein x>=2 and y + z = 2x+2;

B_xH_y, wherein x>=2 and y<= 2x+2;

$B_xH_yCl_z$, wherein x>=2 and y + z <= 2x+2;

~~$B_xH_yF_z$, wherein x>=2 and y + z <= 2x+2; and~~

~~$B_xH_yR_z$, wherein x>=2, y + z <= 2x+2, and R comprises an alkyl group having 1 to 6 carbons.~~