What is claimed is:

1. A substrate processing method comprising:

exposing a substrate comprising an oxidized metal layer to a metal halide to etch a portion of the oxidized metal layer and produce an etch residue; and

exposing the substrate to a reductant to remove the etch residue.

2. The method of claim 1, wherein an average oxidation state of the oxidized metal layer is less than an average oxidation state of a stoichiometric metal oxide.

3. The method of claim 2, wherein the oxidized metal layer comprises a sub-stoichiometric metal oxide.

4. The method of claim 2, wherein the metal oxide comprises one or more of N, Si, or C.

5. The method of claim 1, wherein the oxidized metal layer and the metal halide comprise the same metal species.

6. The method of claim 1, wherein the metal halide consists essentially of WF_6 or WCl_5.

7. The method of claim 1, wherein the reductant comprises one or more of H_2, B_2H_6 or BCl_3.

8. The method of claim 1, wherein the substrate processing method is performed at a pressure of greater than or equal to about 5 torr.

9. The method of claim 1, wherein the substrate is maintained at a temperature of less than or equal to about 400 °C.

10. A substrate processing method comprising:

(A) providing a substrate comprising an oxidized metal layer in a processing chamber with a processing volume;

(B) exposing the substrate to a metal halide to remove a portion of the oxidized metal layer and produce an etch residue;

(C) exposing the substrate to a reductant to remove the etch residue; and

(D) repeating (B) and (C) until a predetermined thickness of the oxidized metal layer has been removed.

11. The method of claim 10, further comprising purging the processing volume after exposing the substrate to the metal halide and purging the processing volume after exposing the substrate to the reductant.

12. The method of claim 10, wherein the oxidized metal layer comprises WO_3.

13. The method of claim 10, wherein the metal halide comprises one or more of WF_6 or WCl_5.

14. The method of claim 10, wherein the reductant comprises one or more of H_2, B_2H_6 or BCl_3.

15. A substrate processing method comprising:

(A) providing a substrate comprising a WO_3 layer in a processing chamber with a processing volume;

(B) exposing the substrate to a etchant comprising one or more of WF_6 or WCl_5 to remove a portion of the WO_3 layer and produce an etch residue;

(C) purging the processing volume with an inert gas;

(D) exposing the substrate to a reductant comprising H_2 to remove the etch residue;

(E) purging the processing volume with an inert gas; and

(F) repeating (B) through (E) until a predetermined thickness of the WO_3 layer has been removed.