~~What is claimed is:~~

Claims

~~1.~~ 1. A selective deposition method comprising:

providing a substrate comprising a conductive material having a first surface and an insulating material having a second surface;

controlling the substrate at a predetermined temperature;

exposing the substrate to a ruthenium precursor to form a ruthenium containing compound on the substrate; and

exposing the substrate to a reactant to react with the ruthenium containing compound, the reactant comprising one or more of O_2, H_2 or H_2O,

wherein when the predetermined temperature is greater than or equal to ~~about~~ 250 °C ruthenium selectively deposits on the first surface over the second surface and when the predetermined temperature is less than or equal to ~~about~~ 200 °C ruthenium selectively deposits on the second surface over the first surface.

2. The method of claim 1, wherein the conductive material comprises one or more of Cu, Co, W, Ta, Ti or oxides, nitrides or oxynitrides thereof.

3. The method of claim 1, wherein the insulating material comprises one or more of SiO_2, SiN or high

resistance Si.

4. The method of claim 1, wherein the conductive material consists essentially of W and the insulating material consists essentially of SiO_2.

5. The method of claim 1, wherein the conductive material consists essentially of TiN and the insulating material consists essentially of SiN.

6. The method of claim 1, wherein the ruthenium precursor comprises at least one cyclopentadienyl ligand or a derivative thereof.

7. The method of claim 6, wherein the ruthenium precursor consists essentially of $Ru(Cp)_2$ or $Ru(EtCp)_2$.

8. The method of claim 1, wherein ruthenium is deposited with a selectivity greater than or equal to about 5.

~~2.~~ 9. A selective deposition method comprising:

providing a substrate comprising a conductive material having a first surface and an insulating material having a second surface~~, ;~~;

exposing the substrate to a ruthenium precursor to form a ruthenium containing compound on the substrate; and

exposing the substrate to a reactant to react with the ruthenium containing compound, the reactant comprising one or more of O_2, H_2 or H_2O,

wherein the substrate is maintained at a temperature less than or equal to 200 °C and ruthenium selectively deposits on the second surface over the first surface.

~~exposing the substrate to a ruthenium precursor; and~~

~~exposing the substrate to a reactant, the reactant comprising one or more of O_2, H_2 or H_2O,~~

~~wherein the substrate is maintained at a temperature less than or equal to about 200 °C and ruthenium selectively deposits on the second surface over the first surface.~~

10. The method of claim 9, wherein the conductive material comprises one or more of Cu, Co, W, Ta, Ti or oxides or nitrides thereof.

11. The method of claim 9, wherein the insulating material comprises one or more of SiO_2, SiN or high resistance Si.

12. The method of claim 9, wherein the conductive material consists essentially of W and the insulating material consists essentially of SiO_2.

13. The method of claim 9, wherein the conductive material consists essentially of TiN and the insulating material consists essentially of SiN.

14. The method of claim 9, wherein the ruthenium precursor comprises at least one cyclopentadienyl ligand or a derivative thereof.

~~3.~~ 15. The method of claim 9, wherein ruthenium is deposited with a selectivity greater than or equal to about 5.