~~What is claimed is:~~

CLAIMS

1. A selective deposition method comprising:

providing a substrate comprising a first semiconductor surface and a second dielectric surface;

exposing the substrate to a blocking compound to selectively form a blocking layer on the second surface over the first surface;

exposing the substrate to a titanium precursor to selectively deposit a Ti-containing layer on the first surface over the second surface; and

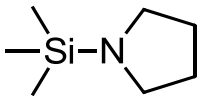
heating the substrate to form a modified first surface comprising titanium and silicon.

2. The method of claim 1, wherein the substrate comprises a finFET structure.

3. The method of claim 2, wherein the finFET structure comprises source and drain terminals comprising silicon surfaces.

4. The method of claim 1, wherein the blocking compound comprises a blocking agent of a general formula R_3Si-X, where each R is independently C1-C4 alkyl and X is any leaving group.

5. The method of claim 4, wherein the blocking agent consists essentially of a compound of Formula I.



(I)

6. The method of claim 5, wherein the substrate is exposed to the blocking compound at a temperature in a range of about 250 °C to about 450 °C.

7. The method of claim 1, wherein the titanium precursor comprises a species comprising at least one halide ligand.

8. The method of claim 1, wherein the titanium precursor comprises a species comprising at least one amine ligand.

9. The method of claim 8, wherein the amine ligand is of a general formula –~~NR2~~NR'2 and each ~~R~~R' is independently selected from H, C1-C4 alkyl group or a ~~trimethyl~~trimetyl silyl group.

10. The method of claim 9, wherein R' consists essentially of ethyl groups.

11. The method of claim 9, wherein R' consists essentially of methyl groups.

~~10.~~12. The method of claim 9, wherein the titanium precursor consists essentially of tetrakis(ethylmethylamido)titanium.

~~11.~~13. The method of claim 1, wherein the titanium precursor comprises a species comprising at least one oxo ligand.

~~12.~~14. The method of claim 1, wherein exposing the substrate to a titanium precursor further comprises separately exposing the substrate to a reactant.

~~13.~~15. The method claim ~~12~~14, further comprising exposing the substrate to a plasma.

16. The method of claim 15, wherein the plasma is generated remotely.

~~14.~~17. The method of claim 1, wherein the Ti-containing layer comprises a titanium alloy.

~~15.~~18. The method of claim 1, wherein the modified first surface consists essentially of $TiSi_2$.

19. A selective deposition method comprising:

providing a substrate comprising a first semiconductor surface and a second dielectric surface;

exposing the substrate to a blocking compound to selectively form a blocking layer on the second surface;

exposing the substrate to a titanium precursor to selectively deposit a Ti-containing layer on the first surface over the second surface; and

exposing the substrate to a germanium precursor to selectively deposit a Ge-containing layer on the first surface over the second surface; and

heating the substrate to form a modified first surface comprising germanium and silicon.

20. A selective deposition method comprising:

providing a substrate comprising a first silicon surface and a second silicon oxide surface;

exposing the substrate to a blocking compound to selectively form a blocking layer on the second surface;

exposing the substrate to a titanium precursor to selectively deposit a Ti-containing layer on the first surface over the second surface;

exposing the substrate to a silicon precursor to selectively deposit a Si-containing layer on the first surface over the second surface; and

heating the substrate to form a modified first surface consisting essentially of $TiSi_2$.