CLAIMS

1. A method for forming an oxide layer, comprising:

forming an interfacial layer on a substrate;

forming an amorphous silicon layer on the interfacial layer;

performing a direct oxidation process to directly and selectively oxidize only a portion of the formed amorphous silicon layer; and

performing a thermal oxidation process to oxidize a remaining non-oxidized portion of the formed amorphous silicon layer.

2. The method of claim 1, wherein

the substrate comprises crystalline silicon, and

the substrate includes concave shaped features and the oxide layer is formed within the concave shaped features.

3. The method of claim 1, wherein the interfacial layer comprises silicon oxide and has a thickness of between 2 Å and 20 Å.

4. The method of claim 1, wherein the forming of the amorphous silicon layer comprises exposing the substrate to a silicon precursor in an atomic layer deposition (ALD) process or in a chemical vapor deposition (CVD) process.

5. The method of claim 1, wherein the amorphous silicon layer has a thickness of between 10 Å and 50 Å.

6. The method of claim 1, wherein the direct oxidation process comprises directing oxygen plasma ions to a selected portion of the substrate.

7. The method of claim 1, wherein the thermal oxidation process comprises exposing the substrate to oxygen radicals.

8. A method for forming an oxide layer, comprising:

forming an amorphous silicon layer on a substrate;

performing a direct oxidation process to directly and selectively oxidize only a portion of the formed amorphous silicon layer; and

performing a thermal radical oxidation process to oxidize a remaining non-oxidized portion of the formed amorphous silicon layer by exposing the formed amorphous silicon layer directly to oxygen radicals.

9. The method of claim 8, wherein the substrate comprises crystalline silicon.

10. The method of claim 8, further comprising:

forming an interfacial layer on the substrate, wherein the interfacial layer comprises silicon oxide and has a thickness of between 2 Å and 20 Å.

11. The method of claim 8, wherein the forming of the amorphous silicon layer comprises exposing the substrate to a silicon precursor in an atomic layer deposition (ALD) process or in a chemical vapor deposition (CVD) process.

12. The method of claim 8, wherein the amorphous silicon layer has a thickness of between 20 Å and 50 Å.

13. The method of claim 8, wherein the thermal oxidation process comprises exposing the substrate to oxygen radicals.

14. The method of claim 8, wherein the direct oxidation process comprises directing oxygen plasma ions to a selected portion of the substrate.

15. A method for forming an oxide layer, comprising:

forming of an amorphous silicon layer on a silicon substrate by exposing the silicon substrate to a silicon precursor in an atomic layer deposition (ALD) process or in a chemical vapor deposition (CVD) process;

performing a direct oxidation process to directly and selectively oxidize only a portion of the formed amorphous silicon layer; and

performing a thermal oxidation process to oxidize a remaining non-oxidized portion of the formed amorphous silicon layer to form an oxide layer on the silicon substrate by exposing the formed amorphous silicon layer directly to oxygen radicals.

16. The method of claim 15, further comprising:

forming an interfacial layer on the silicon substrate prior to the forming the amorphous silicon layer on the silicon substrate.

17. The method of claim 16, wherein the interfacial layer comprises silicon oxide and has a thickness of between 2 Å and 20 Å.

18. The method of claim 15, wherein the amorphous silicon layer has a thickness of between 10 Å and 40 Å.

19. The method of claim 15, wherein the thermal oxidation process comprises exposing the silicon substrate to oxygen radicals.

20. The method of claim 15, wherein the direct oxidation process comprises directing oxygen plasma ions to a selected portion of the silicon substrate.