## CLAIMS

~~*What is claimed is:*~~

1. A post-CMP cleaning method comprising:

   treating a wafer in a gas-phase oxidizing environment at a temperature above about 100°C; then

   treating the wafer in a gas-phase reducing environment at a temperature above about 100°C.

2. The method of claim 1 wherein treating the wafer in the oxidizing environment includes treating the wafer in an atmosphere comprising $O_2$.

3. The method of claim 2 wherein the atmosphere comprises between about 1% to about 10% $O_2$.

4. The method of claim 1 wherein treating the wafer in the oxidizing environment includes treating the wafer in an atmosphere comprising $O_3$.

5. The method of claim 4 wherein the atmosphere comprises between about 1% to about 2% $O_3$.

6. The method of claim 1 wherein the temperature of the oxidizing environment is between about 150°C to about 250°C.

7. The method of claim 1 wherein a pressure within the oxidizing environment is about 1 Torr.

21. The method of claim 19 wherein the first gas-phase environment comprises an atmosphere including $O_3$ at a temperature above about 100°C.

22. The method of claim 19 wherein the second gas-phase environment comprises an atmosphere including $H_2$ at a temperature above about 100°C.

23. The method of claim 19 further comprising substantially removing a residue layer with a basic solution prior to oxidizing the $Cu_2O$ surface layer.

24. The method of claim 23 wherein the basic solution has a pH in the range of about 8 to about 11.

25. The method of claim 23 wherein the basic solution comprises tetramethyl ammonium hydroxide.

~~26. A method for selectively forming a capping layer over a conductive feature of a wafer, the~~ method comprising:

cleaning the wafer, including

oxidizing a $Cu_2O$ surface layer of the conductive feature in a first gas-phase environment to form a CuO surface layer; then

reducing the CuO surface layer in a second gas-phase environment to Cu; and

forming the capping layer selectively over the conductive feature by electroless deposition.

~~27. The method of claim 26 wherein cleaning the wafer further includes, before oxidizing the $Cu_2O$ surface layer, treating the wafer with a basic solution.~~

~~28. The method of claim 26 wherein the capping layer comprises cobalt or a cobalt alloy.~~