CLAIMS

~~What is claimed is:~~

1. A method for providing metal filled features in a layer comprising:

depositing a metal seed layer on tops and bottoms of the features;

removing the metal seed layer on tops of the features and overhangs and on at least part of the sidewalls within the features without removing any of the metal seed layer on bottoms of features; and

providing an electroless deposition of metal to fill the features, wherein the electroless deposition first deposits on the metal seed layer on bottoms of the features,

wherein the depositing the metal seed layer deposits the metal seed layer on bottoms of the features with respect to sidewalls of the features at a thickness ratio of at least 10:1.

2. The method, as recited in claim 1, further comprising depositing a barrier layer in the features, before depositing the metal seed layer.

3. The method, as recited in claim 2, further comprising depositing a glue layer on the barrier layer.

4. The method, as recited in claim 3, wherein the removing the metal seed layer on tops of the features and overhangs comprises providing a wet etch or chemical mechanical polishing.

~~5. The method, as recited in claim 4, wherein the depositing the metal seed layer deposits the metal seed layer on bottoms of the features with respect to sidewalls of the features at a thickness ratio of at least 10:1.~~

~~6.~~5. The method, as recited in claim 4, wherein the depositing the metal seed layer deposits metal seed layer on bottoms of the features with respect to sidewalls of the features at a thickness ratio of at least 100:1.

~~7.~~6. The method, as recited in claim ~~6~~5, wherein at least one of the features has depth to width aspect ratio of between 4:1 to 15:1.

~~8.~~7. The method, as recited in claim ~~7~~6, wherein the features have a CD of less than 100 ~~Å~~nm.

~~9.~~8. The method, as recited in claim ~~8~~7, wherein the deposition of metal is a deposition of copper or copper alloy.

~~10.~~9. The method, as recited in claim ~~9~~8, wherein the metal seed layer is a copper or copper alloy seed layer.

~~11. The method, as recited in claim 10, wherein the depositing the metal seed layer comprises providing a physical vapor deposition.~~

~~12.~~10. The method, as recited in claim 1, wherein the depositing the metal seed layer comprises providing at least one of physical vapor deposition, chemical vapor deposition, or electroless deposition.

~~13.~~11. The method, as recited in claim 1, wherein the removing the metal seed layer on tops of the features and overhangs comprises ~~providing a wet etch or chemical mechanical polishing~~ placing features in the layer upside down in a wet bath.

~~14. The method, as recited in claim 1, wherein the depositing the metal seed layer deposits the metal seed layer on bottoms of the features with respect to sidewalls of the features at a thickness ratio of at least 10:1.~~

~~15.~~12. The method, as recited in claim 1, wherein at least one of the features has depth to width aspect ratio of between 4:1 to 15:1.

~~16. The method, as recited in claim 15, wherein the features have a CD of less than 100 Å.~~

~~17.~~13. The method, as recited in claim 1, wherein the deposition of metal is a deposition of copper or copper alloy.

~~18.~~14. The method, as recited in claim 1, wherein the metal seed layer is a copper or copper alloy seed layer.

~~19.~~15. The method, as recited in claim 1, wherein the depositing the metal seed layer comprises providing a physical vapor deposition.

~~20.~~16. A method for providing copper or copper alloy filled features in a layer comprising:

depositing a barrier layer in the features;

directionally and selectively depositing a copper or copper alloy seed layer on tops and bottoms of the features with respect to sidewalls of the features;

selectively removing the copper or copper alloy seed layer on tops of the features and overhangs and on at least part of the sidewalls within the features without removing any of the copper or copper alloy seed layer on bottoms of features using a wet etch or chemical mechanical polishing; and

providing an electroless copper or copper alloy deposition to fill the features, wherein the electroless copper or copper alloy deposition first deposits on the copper or copper alloy seed layer on bottoms of the features.

17. The method of claim 1, wherein the metal seed layer is deposited on the sidewalls of the features continuously from the bottoms of the features to the tops of the features.

18. The method of claim 16, wherein the metal seed layer is deposited on the sidewalls of the features continuously from the bottoms of the features to the tops of the features.