

What is claimed is:

Claims

1. ~~1.~~ 1. An extreme ultraviolet (EUV) mask blank comprising:
 - ~~a substrate having a first side and a second side;~~
 - ~~a backside coating layer comprising an alloy of tantalum and nickel on the first side of the substrate;~~
 - ~~, the backside coating layer having a thickness in a range of from 0.1 nm to 50 nm;~~ a multilayer stack of reflective layers on the second side of the substrate, the multilayer stack of reflective layers including a plurality of reflective layers including reflective layer pairs; ~~, the multilayer stack of reflective layers having a thickness in a range of from 138 nm to 414 nm;~~ a capping layer on the multilayer stack of reflective layers; and an absorber layer on the capping layer.
 - ~~a capping layer on the multilayer stack of reflective layers; and~~
 - ~~an absorber layer on the capping layer.~~
2. The extreme ultraviolet (EUV) mask blank of claim 1, wherein the alloy of tantalum and nickel comprises from about 70 to about 85 wt.-% ~~wt.-%~~ tantalum and from about 15 to about 30 wt.-% ~~wt.-%~~ nickel.
3. The extreme ultraviolet (EUV) mask blank of claim 1, wherein the alloy of tantalum and nickel comprises from about 45 to about 55 wt.-% ~~wt.-%~~ tantalum and from about 45 to about 55 wt.-% ~~wt.-%~~ nickel.
4. The extreme ultraviolet (EUV) mask blank of claim 1, wherein the alloy of tantalum and nickel comprises from about 30 to about 45 wt.-% ~~wt.-%~~ tantalum and from about 55 to about 70 wt.-% ~~wt.-%~~ nickel.
5. The extreme ultraviolet (EUV) mask blank of claim 1, wherein the backside coating layer further comprises 0.1 wt.-% ~~wt.-%~~ to about 10 wt.-% ~~wt.-%~~ of a dopant selected from one or more of boron, nitrogen or oxygen.
6. The extreme ultraviolet (EUV) mask blank of claim 1, wherein the backside coating layer comprises a thickness in a range of from 0.1 nm to ~~5040~~ nm, ~~or~~ and the multilayer stack has a thickness in a range of from ~~about 0.1276~~ nm to ~~25414~~ nm.

7. The extreme ultraviolet (EUV) mask blank of claim 1, wherein the backside coating layer comprises a thickness in a range of from 0.1 nm to 25 nm.

~~2.~~ 8. A method of manufacturing an extreme ultraviolet (EUV) mask blank comprising:

providing a substrate having a first side and a second side;

forming a backside coating layer comprising an alloy of tantalum and nickel on the first side of the substrate;

, the backside coating layer having a thickness in a range of from 0.1 nm to 50 nm; forming a multilayer stack of reflective layers having a thickness in a range of from 138 nm to 414 nm on the second side of the substrate, the multilayer stack of reflective layers including a plurality of reflective layer pairs; forming a capping layer on the multilayer stack of reflective layers; and forming an absorber layer on the capping layer.

~~forming a capping layer on the multilayer stack of reflective layers; and~~

~~forming an absorber layer on the capping layer.~~

9. The method of claim 8, wherein the alloy of tantalum and nickel comprises from about 70 to about 85 wt.%, % tantalum and from about 15 to about 30 wt.%, % nickel.

10. The method of claim 8, wherein the alloy of tantalum and nickel comprises from about 45 to about 55 wt.%, % tantalum and from about 45 to about 55 wt.%, % nickel.

11. The method of claim 8, wherein the alloy of tantalum and nickel comprises from about 30 to about 45 wt.%, % tantalum and from about 55 to about 70 wt.%, % nickel.

12. The method of claim 8, wherein the backside coating layer further comprises 0.1 wt. % to about 10 wt. % of a dopant selected from one or more of boron, nitrogen or oxygen.

13. The method of claim 6, wherein the alloy of tantalum and nickel is co-sputtered by a gas selected from one or more of argon (Ar), oxygen (O₂), or nitrogen (N₂) to form the backside coating layer.

14. The method of claim 8, wherein the alloy of tantalum and nickel is deposited using a bulk target having a same composition as the alloy of tantalum and nickel and is sputtered using a gas

selected from one or more of argon (Ar), oxygen (O₂), or nitrogen (N₂) to form the backside coating layer.

15. The method of claim 8, wherein the backside coating layer comprises a thickness in a range of from 0.1 nm to 5040 nm, ~~or~~ and the multilayer stack has a thickness in a range of from 276 nm to 414 nm.

16. The method of claim 8, wherein the backside coating layer comprises a thickness in a range of from 0.1 nm to 25 nm.

~~3.~~ 17. An extreme ultraviolet (EUV) lithography system comprising:

— an extreme ultraviolet light source; -and

— a reticle comprising a substrate having a first side and a second side, the reticle having a pattern that represents a processing layer of an integrated circuit; a backside coating layer comprising an alloy of tantalum and nickel having a thickness on the first side of the substrate; a multilayer stack of reflective layers having a thickness in a range of from 276 nm to 414 nm on the second side of the substrate; and an absorber layer, over the multilayer stack, with a thickness of less than 80 nm and less than 2% reflectivity of an extreme ultraviolet (EUV) light at a wavelength of 13.5 nm, wherein the backside coating ~~layer includes an alloy of tantalum and nickel.~~ has a thickness in a range of from 0.1 nm to 50 nm.

18. The extreme ultraviolet (EUV) lithography system of claim ~~14~~17, further comprising a capping layer between the multilayer stack and the absorber layer, for protecting the multilayer stack.

19. The extreme ultraviolet (EUV) lithography system of claim 17 wherein the reticle has a pattern that represents a processing layer of an integrated circuit.

20. The extreme ultraviolet (EUV) lithography system of claim 17, further comprising an anti-reflective coating on the absorber layer.