CLAIMS

1. A method of manufacturing an extreme ultraviolet (EUV) mask blank comprising:

forming on a substrate a multilayer stack which reflects EUV radiation, the multilayer stack comprising a plurality of reflective layer pairs;

forming a capping layer on the multilayer stack; and

forming an absorber layer on the capping layer, the absorber layer comprising an alloy of tantalum and antimony, wherein the alloy of tantalum and antimony comprises 33.7 wt.% to 57.8 wt.% tantalum and 42.2 wt.% to 63.3 wt.% antimony and wherein the absorber layer has a thickness of less than 45 nm.

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

forming on a substrate a multilayer stack which reflects EUV radiation, the multilayer stack comprising a plurality of reflective layer pairs;

forming a capping layer on the multilayer stack; and

forming an absorber layer on the capping layer, the absorber layer comprising an alloy of tantalum and antimony, wherein the alloy of tantalum and antimony comprises 57.8 wt.% to 78.2 wt.% tantalum and 21.8 wt.% to 42.2 wt.% antimony and wherein the absorber layer has a thickness of less than 45 nm.

3. The method of claim 1, wherein the alloy of tantalum and antimony comprises 21.9 wt.% to 33.7 wt.% tantalum and 66.3 wt.% to 78.1 wt.% antimony.

4. The method of claim 1 or 2 wherein the alloy of tantalum and antimony is amorphous.

5. The method of claim 1 or 2, wherein the alloy is formed by co-sputtering the tantalum and antimony with a gas selected from one or more of argon (Ar), oxygen (O_2), or nitrogen (N_2) to form the absorber layer.

6. The method of claim 1 or 2, wherein the alloy is deposited layer by layer as a laminate of tantalum and antimony layers using a gas selected from one or more of argon (Ar), oxygen (O_2), or nitrogen (N_2) to form the absorber layer.

7. The method of claim 1 or 2, wherein the alloy is deposited using a bulk target having the same composition as the alloy and is sputtered using a gas selected from one or more of argon (Ar), oxygen (O_2), or nitrogen (N_2) to form the absorber layer.

8. The method of claim 1, wherein the alloy of tantalum and antimony is doped with one of more of nitrogen or oxygen in a range of from 0.1 wt.% to 5 wt.%.

9. The method of claim 2, wherein the alloy of tantalum and antimony is doped with one of more of nitrogen or oxygen in a range of from 0.1 wt.% to 5 wt.%.

10. An extreme ultraviolet (EUV) mask blank comprising:

a substrate;

a multilayer stack which reflects EUV radiation, the multilayer stack comprising a plurality of reflective layer pairs;

a capping layer on the multilayer stack of reflecting layers; and

an absorber layer comprising an alloy of tantalum and antimony, wherein the alloy of tantalum and antimony comprises 33.7 wt.% to 57.8 wt.% tantalum and 42.2 wt.% to 63.3 wt.% antimony and wherein the absorber layer has a thickness of less than 45 nm.

11. An extreme ultraviolet (EUV) mask blank comprising:

a substrate;

a multilayer stack which reflects EUV radiation, the multilayer stack comprising a plurality of reflective layer pairs;

a capping layer on the multilayer stack of reflecting layers; and

an absorber layer comprising an alloy of tantalum and antimony, wherein the alloy of tantalum and antimony comprises 33.7 wt.% to 57.8 wt.% tantalum and 42.2 wt.% to 63.3 wt.% antimony and wherein the absorber layer has a thickness of less than 45 nm.

12. The extreme ultraviolet (EUV) mask blank of claim 10, the alloy of tantalum and antimony comprises 57.8 wt.% to 78.2 wt.% tantalum and 21.8 wt.% to 42.2 wt.% antimony.

13. The extreme ultraviolet (EUV) mask blank of claim 11, wherein the alloy of tantalum and antimony comprises 21.9 wt.% to 33.7 wt.% tantalum and 66.3 wt.% to 78.1 wt.% antimony.

14. The extreme ultraviolet (EUV) mask blank of claim 10 or 11, wherein the alloy of tantalum and antimony is amorphous.

15. The extreme ultraviolet (EUV) mask blank of claim 10, wherein the absorber layer has a thickness of less than 40 nm.

16. The extreme ultraviolet (EUV) mask blank of claim 10 or 11, wherein the absorber layer further comprises a range of from 0.1 wt.% to 5 wt.% of a dopant selected from one or more of nitrogen or oxygen.

17. The extreme ultraviolet (EUV) mask blank of claim 11, wherein the absorber layer has a thickness of less than 40 nm.

18. The extreme ultraviolet (EUV) mask blank of claim 10 or 11, wherein the absorber layer is etch selective relative to the capping layer.