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 selected from the group consisting of an alloy consisting essentially of boron and nickel and an alloy consisting essentially of boron, nickel, and one or more of a nitrogen dopant and an oxygen dopant, the absorber layer having a thickness less than 30nm while achieving less than 2% reflectivity.

2. The method of claim 1, the alloy consisting essentially of about 2 wt.% to about 10.9 wt.% boron and about 89.1 wt.% to about 98 wt.% nickel.

3. The method of claim 1, the alloy consisting essentially of about 3 wt.% to about 9.9 wt.% boron and about 90.1 wt.% to about 97 wt.% nickel.

4. The method of claim 2, the alloy consisting essentially of 5 wt.% to about 7.9 wt.% boron and about 92.1 wt.% to about 95 wt.% nickel.

5. The method of claim 2, wherein the alloy is amorphous.

6. The method of claim 1, wherein the alloy is formed by co-sputtering the boron and nickel with 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, wherein the alloy is deposited layer by layer as a laminate of boron and nickel layers 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 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.

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

10. The method of claim 3, wherein the alloy is doped with one of more of nitrogen or oxygen in a range of from about 0.1 wt.% to about 5 wt.%.

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 selected from the group consisting of an alloy consisting essentially of boron and nickel and an alloy consisting essentially of boron, nickel, and one or more of a nitrogen dopant and an oxygen dopant, the absorber layer having a thickness less than 30nm while achieving less than 2% reflectivity.

12. The extreme ultraviolet (EUV) mask blank of claim 11, the alloy consisting essentially of about 2 wt.% to about 10.9 wt.% boron and about 89.1 wt.% to about 98 wt.% nickel.

13. The extreme ultraviolet (EUV) mask blank of claim 11, the alloy consisting essentially of about 3 wt.% to about 9.9 wt.% boron and about 90.1 wt.% to about 97 wt.% nickel.

14. The extreme ultraviolet (EUV) mask blank of claim 12, the alloy consisting essentially of about 5 wt.% to about 7.9 wt.% boron and about 92.1 wt.% to about 95 wt.% nickel.

15. The extreme ultraviolet (EUV) mask blank of claim 13, wherein the alloy is amorphous.

16. The extreme ultraviolet (EUV) mask blank of claim 11, wherein the absorber layer is doped with a range of from about 0.1 wt.% to about 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 is etch selective relative to the capping layer.

18. 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 including molybdenum (Mo) and silicon (Si);

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

an absorber layer comprising an alloy selected from the group consisting of an alloy consisting essentially of boron and nickel and an alloy consisting essentially of boron, nickel, and one or more of a nitrogen dopant and an oxygen dopant, the absorber layer having a thickness less than 30nm while achieving less than 2% reflectivity.