CLAIMS

1. An extreme ultraviolet (EUV) mask blank comprising: an ultra-low expansion substrate including surface imperfections; a planarization layer on the ultra-low expansion substrate encapsulating the surface imperfections; a multi-layer stack over the planarization layer; and a bi-layer absorber over the multi-layer stack including a primary absorber layer and a secondary absorber layer having a combined thickness of 30 nm, the primary absorber layer having a thickness that provides a reflectivity of less than 1.9% at a wavelength of 13.5 nm.

2. The mask blank as claimed in claim 1 further comprising a capping layer formed on the multi-layer stack and the bi-layer absorber formed on the capping layer, the capping layer protecting the multi-layer stack.

3. The mask blank as claimed in claim 1 wherein the thickness of the primary absorber layer includes the range of 26.5 nm to 28 nm.

4. The mask blank as claimed in claim 1 wherein the thickness of the secondary absorber layer includes the range of 2 nm to 3.5 nm.

5. The mask blank as claimed in claim 1 further comprising an additional multi-layer stack formed directly on the planarization layer, wherein the additional multi-layer stack includes up to 60 of the multi-layer stack formed in a vertical stack.

6. The mask blank as claimed in claim 1 wherein the bi-layer absorber includes the primary absorber layer of Tin (Sn), Platinum (Pt), Silver (Ag), Indium (In), or Nickel (Ni).

7. The mask blank as claimed in claim 1 wherein the bi-layer absorber includes the secondary absorber layer of Nickel (Ni), Zinc (Zn), Antimony (Sb), Chromium (Cr), Copper (Cu), Tantalum (Ta), or Tellurium (Te).

8. The mask blank as claimed in claim 1 wherein the bi-layer absorber includes the primary absorber layer of Silver (Ag) and the secondary absorber layer of Nickel (Ni) deposited to the combined thickness of 30 nm.

9. The mask blank as claimed in claim 1 wherein the bi-layer absorber includes the primary absorber layer of Platinum (Pt) and the secondary absorber layer of Zinc (Zn) deposited to the combined thickness of 30 nm.

10. The mask blank as claimed in claim 1 wherein the bi-layer absorber includes the primary absorber layer of Indium (In) and the secondary absorber layer of Tellurium (Te) deposited to the combined thickness of 30 nm.