CLAIMS

1. A method of manufacturing a reflective mask blank including at least a multilayer reflective film, which is configured to reflect EUV light and is formed on a substrate, and an absorber film, which is configured to absorb the EUV light and is formed on the multilayer reflective film,

the method comprising the steps of:

forming the multilayer reflective film on the substrate to form a substrate with a multilayer reflective film;

subjecting the substrate with a multilayer reflective film to defect inspection;

forming the absorber film on the multilayer reflective film of the substrate with a multilayer reflective film;

forming a reflective mask blank, in which an alignment region is formed in an outer peripheral edge region of a pattern formation region by removing a part of the absorber film in the outer peripheral edge region so that the multilayer reflective film of an area including an element serving as a reference of defect information on the multilayer reflective film is exposed in the alignment region; and

performing defect management of the reflective mask blank through use of the alignment region.

2. A method of manufacturing a reflective mask blank according to claim 1, wherein the defect management of the reflective mask blank is performed through use of a first fiducial mark formed in the alignment region.

3. A method of manufacturing a reflective mask blank according to claim 2, further comprising a step of forming a second fiducial mark, which serves as a reference of the first fiducial mark, in the absorber film,

wherein the defect management of the reflective mask blank includes detecting coordinates of the first fiducial mark with reference to the second fiducial

mark, and converting the defect information on the substrate with a multilayer reflective film with reference to the second fiducial mark.

4. A method of manufacturing a reflective mask blank according to claim 3, wherein the detecting of the coordinates of the first fiducial mark with reference to the second fiducial mark is performed through use of inspection light having a wavelength of less than 100 nm.

5. A method of manufacturing a reflective mask blank according to any one of claims 1 to 4, wherein the defect inspection of the substrate with a multilayer reflective film is performed through use of inspection light having a wavelength of less than 100 nm.

6. A reflective mask blank, comprising at least a multilayer reflective film, which is configured to reflect EUV light and is formed on a substrate, and an absorber film, which is configured to absorb the EUV light and is formed on the multilayer reflective film,

wherein the reflective mask blank has an alignment region formed at a part of the absorber film in an outer peripheral edge region of a pattern formation region so that the multilayer reflective film of an area including an element serving as a reference of defect information on the multilayer reflective film is exposed in the alignment region.

7. A reflective mask blank according to claim 6, wherein the reflective mask blank has a first fiducial mark formed in the alignment region as the element serving as the reference of the defect information on the multilayer reflective film.

8. A reflective mask blank according to claim 7, wherein the reflective mask blank has a second fiducial mark, which serves as a reference of the first fiducial mark, formed in the absorber film outside of and in a vicinity of the alignment region and in a vicinity of the first fiducial mark.

9. A method of manufacturing a reflective mask, the method comprising patterning the absorber film in the reflective mask blank obtained by the method of

manufacturing a reflective mask blank of any one of claims 1 to 5 or in the reflective mask blank of any one of claims 6 to 8, to form an absorber film pattern.

10. A reflective mask, comprising at least a multilayer reflective film, which is configured to reflect EUV light and is formed on a substrate, and an absorber film pattern, which is configured to absorb the EUV light and is formed on the multilayer reflective film,

wherein the reflective mask has an alignment region formed at a part of the absorber film in an outer peripheral edge region of a pattern formation region so that the multilayer reflective film of an area including an element serving as a reference of defect information on the multilayer reflective film is exposed in the alignment region.

11. A reflective mask according to claim 10, wherein the reflective mask has a first fiducial mark formed in the alignment region as the element serving as the reference of the defect information on the multilayer reflective film.

12. A reflective mask according to claim 11, wherein the reflective mask has a second fiducial mark, which serves as a reference of the first fiducial mark, formed in the absorber film pattern outside of and in a vicinity of the alignment region and in a vicinity of the first fiducial mark.

13. A method of manufacturing a semiconductor device, comprising transferring a transfer pattern by exposure to a resist film on a semiconductor substrate through use of the reflective mask of any one of claims 10 to 12, to manufacture a semiconductor device.

14. A method of manufacturing a reflective mask blank including at least a multilayer reflective film, which is configured to reflect EUV light and is formed on a substrate, and an absorber film, which is configured to absorb the EUV light and is formed on the multilayer reflective film,

the method comprising the steps of:

forming the multilayer reflective film on the substrate to form a substrate

with a multilayer reflective film;

subjecting the substrate with a multilayer reflective film to defect inspection; and

forming the absorber film on the multilayer reflective film of the substrate with a multilayer reflective film to form a reflective mask blank,

the forming the absorber film including a step of forming, in an outer peripheral edge region of a pattern formation region, an alignment region without forming the absorber film at a part of the outer peripheral edge region so that the multilayer reflective film of an area including a first fiducial mark, which serves as a reference of defect information on the multilayer reflective film, is exposed in the alignment region,

the method further comprising the steps of:

forming, in the absorber film, a second fiducial mark, which serves as a reference of the first fiducial mark, in a vicinity of the pattern formation region side and outside of the alignment region; and

performing defect management of the reflective mask blank through use of the alignment region.

15. A method of manufacturing a reflective mask blank according to claim 14, wherein the step of forming the alignment region includes forming the absorber film with a shielding member being provided so that the absorber film is prevented from being formed and the multilayer reflective film is exposed.

16. A method of manufacturing a reflective mask blank according to claim 14 or 15, wherein the defect management of the reflective mask blank is performed through use of the first fiducial mark formed in the alignment region.

17. A method of manufacturing a reflective mask blank according to any one of claims 14 to 16, wherein the defect management of the reflective mask blank includes detecting coordinates of the first fiducial mark with reference to the second fiducial mark, and converting the defect information on the substrate with a

multilayer reflective film with reference to the second fiducial mark.

18. A method of manufacturing a reflective mask blank according to claim 17, wherein the detecting of the coordinates of the first fiducial mark with reference to the second fiducial mark is performed through use of inspection light having a wavelength of less than 100 nm.

19. A method of manufacturing a reflective mask blank according to any one of claims 14 to 18, wherein the defect inspection of the substrate with a multilayer reflective film is performed through use of inspection light having a wavelength of less than 100 nm.

20. A reflective mask blank, comprising at least a multilayer reflective film, which is configured to reflect EUV light and is formed on a substrate, and an absorber film, which is configured to absorb the EUV light and is formed on the multilayer reflective film,

wherein the reflective mask blank has an alignment region formed at a part of the absorber film in an outer peripheral edge region of a pattern formation region so that the multilayer reflective film of an area including a first fiducial mark, which serves as a reference of defect information on the multilayer reflective film, is exposed in the alignment region, and

wherein the reflective mask blank has a second fiducial mark, which serves as a reference of the first fiducial mark, formed in the absorber film in a vicinity of the pattern formation region side and outside of the alignment region.

21. A method of manufacturing a reflective mask, comprising patterning the absorber film in the reflective mask blank obtained by the method of manufacturing a reflective mask blank of any one of claims 14 to 19 or in the reflective mask blank of claim 20, to form an absorber film pattern.

22. A reflective mask, comprising at least a multilayer reflective film, which is configured to reflect EUV light and is formed on a substrate, and an absorber film pattern, which is configured to absorb the EUV light and is formed on

the multilayer reflective film,

wherein the reflective mask has an alignment region formed at a part of the absorber film in an outer peripheral edge region of a pattern formation region so that the multilayer reflective film of an area including a first fiducial mark, which serves as a reference of defect information on the multilayer reflective film, is exposed in the alignment region, and

wherein the reflective mask has a second fiducial mark, which serves as a reference of the first fiducial mark, formed in the absorber film in a vicinity of the pattern formation region side and outside of the alignment region.

23. A method of manufacturing a semiconductor device, comprising transferring a transfer pattern by exposure to a resist film on a semiconductor substrate through use of the reflective mask of claim 22, to manufacture a semiconductor device.