$1.6 \leqq Ag \times Cu \times Sb \times Co/Fe \leqq 5.7$ (2)

wherein Ag, Cu, Sb, Co, and Fe represent the content (mass%) of the alloy composition in the Relations (1) and (2).

[0027] (5) A solder ball comprising the solder alloy according to (1) or (2) above.

[0028] (6) A solder ball comprising the solder alloy according to (3) above.

[0029] (7) A solder paste comprising a solder powder comprising the solder alloy according to (1) or (2) above.

[0030] (8) A solder paste comprising a solder powder comprising the solder alloy according to (3) above.

[0031] (9) A solder joint comprising the solder alloy according to (1) or (2) above.

[0032] (10) A solder joint comprising the solder alloy according to claim (3).

[0032a] In an aspect of the present disclosure, there is provided a solder alloy having an alloy composition consisting of, by mass%, Ag: 1.0 to 4.0%, Cu: 0.10 to 1.00%, Sb: 1.0 to 7.0%, Co: 0.001 to 0.030%, Fe: 0.005 to 0.050%, optionally at least one of P, Ge, Ga, and Mn: 0.1% or less in total, optionally In: 6.0% or less with the balance being Sn.

[0032b] In another aspect of the present disclosure, there is provided a solder ball consisting of the solder alloy as disclosed herein.

[0032c] In a further aspect of the present disclosure, there is provided a solder paste comprising a solder powder consisting of the solder alloy as disclosed herein.

[0032d] In another aspect of the present disclosure, there is provided a solder joint comprising the solder alloy as disclosed herein.

Brief Description of Drawings

[0033] FIG. 1 is a cross-sectional SEM photograph of a solder joint, FIG. 1(a) is a cross-sectional SEM photograph of a solder joint using a solder alloy of Comparative Example 18, and FIG. 1(b) is a cross-sectional SEM photograph of a solder joint using a solder alloy of Example 16.

FIG. 2 is a cross-sectional SEM photograph of a solder joint, FIG. 2(a) is a cross-sectional SEM photograph of a solder joint using a solder alloy of Comparative Example

CLAIMS

1. A solder alloy having an alloy composition consisting of, by mass%, Ag: 1.0 to 4.0%, Cu: 0.10 to 1.00%, Sb: 1.0 to 7.0%, Co: 0.001 to 0.030%, Fe: 0.005 to 0.050%, optionally at least one of P, Ge, Ga, and Mn: 0.1% or less in total, optionally In: 6.0% or less with the balance being Sn.

2. The solder alloy according to claim 1, wherein the alloy composition comprises In: 0 to 4.0% and satisfies the following Relations (1) and (2):

$$0.040 \leqq Ag \times Cu \times Sb \times Co \leqq 0.075 \quad (1)$$

$$1.6 \leqq Ag \times Cu \times Sb \times Co/Fe \leqq 5.7 \quad (2)$$

wherein Ag, Cu, Sb, Co, and Fe in the Relations (1) and (2) each represent the contents (mass%) thereof in the alloy composition.

3. A solder ball consisting of the solder alloy according to claim 1.

4. A solder paste comprising a solder powder consisting of the solder alloy according to claim 1.

5. A solder joint comprising the solder alloy according to claim 1.