Claims

1. A lead-free solder ball which is used for electrodes by mounting on a module substrate for a BGA or CSP and which has a solder composition comprising 0.5 - 1.1 mass % of Ag, 0.7 - 0.8 mass % of Cu, 0.05 - 0.08 mass % of Ni, and a remainder of Sn.

2. A lead-free solder ball as set forth in claim 1 wherein the solder composition comprises 0.9 - 1.1 mass % of Ag, 0.7 - 0.8 mass % of Cu, 0.05 - 0.08 mass % of Ni, and a remainder of Sn.

3. A lead-free solder ball as set forth in claim 1 wherein the solder composition comprises 1.0 mass % of Ag, 0.75 mass % of Cu, 0.07 mass % of Ni, and a remainder of Sn.

4. A solder ball as set forth in any of claims 1 - 3 characterized in that the solder composition further contains at least one element selected from Fe, Co, and Pt in a total amount of 0.003 - 0.1 mass %.

5. A solder ball as set forth in any of claims 1 - 3 characterized in that the solder composition further contains at least one element selected from Bi, In, Sb, P, and Ge in a total amount of 0.003 - 0.1 mass %.

6. A lead-free solder ball as set forth in any of claims 1 - 5 wherein the solder ball has a diameter of at least 0.1 mm.

7. A lead-free solder ball as set forth in any of claims 1 - 5 wherein the solder ball has a diameter of at least 0.3 mm.

8. A lead-free solder ball as set forth in any of claims 1 - 5 wherein the

solder ball has a diameter of at least 0.5 mm.

9. A method of forming a solder bump on a module substrate having electrodes selected from electroplated Ni/Au electrodes, electroless Ni/Pd/Au electrodes, and Cu-OSP electrodes using a solder ball as set forth in any of claims 1 - 8.

Claims

1. A lead-free solder ball which is used for electrodes by mounting on a module substrate for a BGA or CSP and which has a solder composition comprising 0.5 - 1.1 mass % of Ag, 0.7 - 0.8 mass % of Cu, 0.05 - 0.08 mass % of Ni, and a remainder of Sn.

2. A lead-free solder ball as set forth in claim 1 wherein the solder composition comprises 0.9 - 1.1 mass % of Ag, 0.7 - 0.8 mass % of Cu, 0.05 - 0.08 mass % of Ni, and a remainder of Sn.

3. A lead-free solder ball as set forth in claim 1 wherein the solder composition comprises 1.0 mass % of Ag, 0.75 mass % of Cu, 0.07 mass % of Ni, and a remainder of Sn.

4. A lead-free solder ball as set forth in any of claims 1 - 3 wherein the solder ball has a diameter of at least 0.1 mm.

5. A lead-free solder ball as set forth in any of claims 1 - 3 wherein the solder ball has a diameter of at least 0.3 mm.

6. A lead-free solder ball as set forth in any of claims 1 - 3 wherein the solder ball has a diameter of at least 0.5 mm.

7. A method of forming a solder bump on a module substrate having electrodes selected from electroplated Ni/Au electrodes, electroless Ni/Pd/Au electrodes, and Cu-OSP electrodes using a solder ball as set forth in any of claims 1 - 6.