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Invention

SEMICONDUCTOR DEVICE BUMP

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Specification

1. Title of Invention

SEMICONDUCTOR DEVICE BUMP

2. Scope of Patent Claims

A semiconductor device bump, wherein the bump of the semiconductor device has a rectangular planar shape with its short side in the bump arrangement direction and its long side perpendicular to this direction.

3. Detailed Description of Invention

(Field of Industrial Applicability)

The present invention relates to the shape of bumps in semiconductor devices.

(Summary of Invention)

In the present invention, the shape of the semiconductor bumps is a rectangular planar shape with the short side in the bump arrangement direction and the long side perpendicular to this direction, thereby ensuring bump adhesion strength even when the bumps are highly dense.

(Conventional Art)

Conventionally, the planar shape of bumps in semiconductor devices has generally been square, as illustrated in FIG. 3.

(Problem to Be Solved by Invention)

However, in this type of shape, as the bumps become denser and the bump pitch becomes smaller, the planar shape of the bumps inevitably becomes smaller, which in turn reduces the bonding area between the bump and the electrode portion and reduces the bump adhesion strength, which can lead to the problem of poor bonding during semiconductor mounting.

(Means for Solving Problem)

The present invention has been configured to solve such problems, and the planar shape of the bumps is a rectangle, with the short side in the bump arrangement direction and the long side in the direction perpendicular thereto.

(Effect)

By using such a shape, even when the bumps are highly dense and the bump pitch is small, the bonding area can be increased by adjusting the length of the long side and decrease in adhesion strength can be prevented.

(Examples)

Examples of the present invention will be described below with reference to the drawings.

FIG. 1 is a schematic diagram illustrating one embodiment of the semiconductor device bump according to the present invention, and FIGS. 2(a) to (d) are cross-sectional views illustrating steps of manufacturing the semiconductor device bump according to the present invention.

Reference numeral 1 is a semiconductor wafer on which an electronic circuit is formed, and furthermore, an Al electrode part 2 acting as a pad electrode part is formed, and a passivation film 3 such as a PSG film, a silicon nitride film, or the like is formed. A barrier film 4 made of chromium, titanium, or the like, which has good adhesion to the underlayer, and a conductive film for plating made of gold or the like, which has good plating properties, are formed sequentially over the entire surface of the semiconductor wafer 1 (FIG. 2(a)).

A plating resist layer is formed on the semiconductor wafer 1 using photoresist, with openings only in the bump formation part (FIG. 2(b)).

In this case, the openings of the Al electrode part 2 and passivation film 3 are rectangular,

it is possible to prevent the bump strength from decreasing.

Furthermore, even when configuring as such a bump shape, there is no problem in mounting, bonding is possible, and occurrence of mounting defects can be reduced insofar as decrease in the bump adhesion strength can be prevented.

The rectangular bump shape is not limited to gold bumps, and the same effect can be obtained when applied to bumps made of base metals such as solder bumps and silver bumps.

Furthermore, it goes without saying that the length of the long side of the rectangle may be set to a reasonable value calculated based on how the short side changes depending on the bump pitch and the required bump strength.

4. Brief Description of Drawings

FIG. 1 is a schematic diagram illustrating one embodiment of the semiconductor device bump according to the present invention, FIGS. 2(a) to (d) are cross-sectional views illustrating steps of manufacturing

with the short side in the bump arrangement direction (Al electrode arrangement direction) and the long side perpendicular thereto. At the same time, the bump formation part is also formed as a rectangular opening similar to the above rectangle.

Next, gold bump plating is carried out to a thickness of 15 to 30 microns to form gold bumps 6 (FIG. 2(c)).

Then, a plating resist layer 6 is removed, the barrier film 4 and the conductive film for plating 5 are removed, to produce a semiconductor wafer 1 having gold bumps 7 with rectangular planar shapes (FIG. 2(d)).

This gold bump has no change in manufacturability or the like compared to conventional square gold bumps, and in particular, as illustrated in FIG. 1, even when the bump density is increased, the reduction in the short side and the increase in the long side prevent a decrease in the bump adhesion strength.

(Effect of invention)

As described above, according to the present invention, by making the gold bump planar shape rectangular, the bumps are densely packed, and even when the bump length in the bump arrangement direction is shortened, by adjusting the bump length in the direction perpendicular thereto,

the semiconductor device bump according to the present invention, and FIG. 3 is a schematic diagram illustrating semiconductor device bumps according to conventional art.

- 1 ... Semiconductor wafer
- 2 ... Al electrode part
- 3 ... Passivation film
- 4 ... Barrier film
- 5 ... Conductive film for plating
- 6 ... Plating resist layer
- 7 ... Gold bump

End

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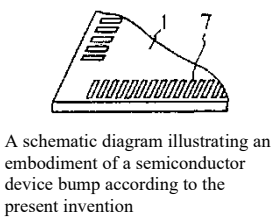
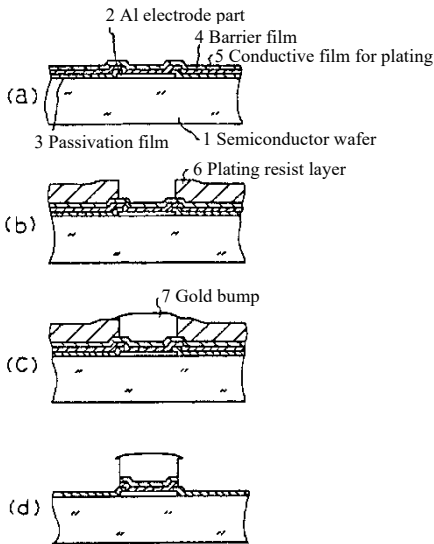


FIG. 1



A cross-sectional view of a manufacturing process of a semiconductor device bump according to the present invention

FIG. 2

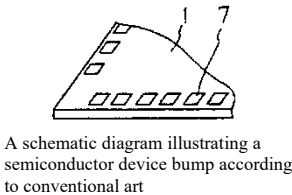


FIG. 3