CLAIMS

1. A ceramic substrate, comprising:

a base material composed of an amorphous phase; and

particles composed of a crystalline phase and dispersed in the base material,

wherein some of the particles protrudes from at least one surface of the base material.

2. The ceramic substrate according to claim 1, wherein the amorphous phase contains glass; and the crystalline phase contains a crystalline filler.

3. The ceramic substrate according to claim 1 or 2, wherein a ratio of the particles protruding from the base material to an area of the at least one surface of the base material is in a range of 0.3 to 0.45.

4. The ceramic substrate according to any one of claims 1 to 3, wherein surfaces of the some of the particles protruding from the at least one surface of the base material are flattened.

5. A functional ceramic substrate unit, comprising:

a ceramic substrate having a base material composed of an amorphous phase and particles composed of a crystalline phase and dispersed in the base material, some of the particles protruding from at least one surface of the base material;

a conductive element formed on the at least one surface of the base material of the ceramic substrate via the particles; and

a metal element attached to the conductive element.

6. The functional ceramic substrate unit according to claim 5, wherein the amorphous phase contains glass; and the crystalline phase contains a crystalline filler.

7. The functional ceramic substrate unit according to claim 5 or 6, wherein a ratio of the particles protruding from the base material to an area of the at least one surface of

the base material is in a range of 0.3 to 0.45.

8. The functional ceramic substrate unit according to any one of claims 5 to 7, wherein surfaces of the some of the particles protruding from the at least one surface of the base material are flattened.

9. A probe card, comprising: the functional ceramic substrate unit according to any one of claims 5 to 8, wherein the metal element is a probe pin.

10. A manufacturing method of a ceramic substrate, comprising:

producing a sintered ceramic body, the sintered ceramic body having a base material composed of an amorphous phase and particles composed of a crystalline phase and dispersed in the base material; and

performing a chemical mechanical polishing treatment on at least one surface of the sintered ceramic body.

11. The manufacturing method of the ceramic substrate according to claim 10, further comprising: after producing the sintered ceramic body and before performing the chemical mechanical polishing treatment, performing a mechanical polishing treatment on the at least one surface of the sintered ceramic body.

CLAIMS

1. A probe card, comprising

a functional ceramic substrate unit, comprising:

a ceramic substrate having a base material composed of an amorphous phase and particles composed of a crystalline phase and dispersed in the base material, some of the particles protruding from at least one surface of the base material;

a conductive element formed on the at least one surface of the base material of the ceramic substrate via the particles; and

a metal element attached to the conductive element,

wherein the metal element is a probe pin.

2. The probe card of claim 1, wherein

the amorphous phase contains glass; and

the crystalline phase contains a crystalline filler.

3. The probe card of claim 1 or 2, wherein a ratio of the particles protruding from the base material to an area of the at least one surface of the base material is in a range of 0.3 to 0.45.

4. The probe card of any one of claims 1 to 3, wherein surfaces of the some of the particles protruding from the at least one surface of the base material are flattened.

5. A manufacturing method of the functional ceramic substrate unit of the probe card of claim 1, the method comprising:

producing a sintered ceramic body, the sintered ceramic body having a base material composed of an amorphous phase and particles composed of a crystalline phase and dispersed in the base material;

performing a chemical mechanical polishing treatment on at least one surface of the sintered ceramic body;

after producing the sintered ceramic body and before performing the chemical mechanical polishing treatment, performing a mechanical polishing treatment on the at least one surface of the sintered ceramic body; and

after performing the chemical mechanical polishing treatment, forming a conductive element on the at least one surface of the base material of the sintered ceramic body.

6. The method of claim 5, wherein the conductive element has a layer structure in which a Ti Layer, a Cu layer, a Ni layer and a Au layer are successively laminated together.