CLAIMS

What is claimed is:

1. A plating processing method of a gripping surface of a gripping tool, the method comprising:

placing the gripping tool in a bottom of a first plating solution, which is an electroplating solution containing nickel ion as a main ingredient, so that the gripping surface can become horizontal, placing, on the gripping surface, a plurality of first diamond grains having a uniform grain diameter in a quantity that can cover the gripping surface, and temporarily fixing the first diamond grains onto the gripping surface by depositing nickel on the gripping surface in a state where the gripping surface is made stationary until a position relationship between the gripping surface and the first diamond grains is not displaced even when the gripping tool is moved;

removing first diamond grains that are not temporarily fixed after the first diamond grains have been temporarily fixed, placing, in a bottom of the electroplating solution containing nickel ion as a main ingredient, or in a second plating solution that is an electroless plating solution that forms a nickel alloy film with auto-catalysis, the gripping tool in such a way that the gripping surface becomes horizontal, and adhering the first diamond grains onto the gripping surface by further depositing a metal containing nickel within the second plating solution on the gripping surface in a uniform thickness that does not exceed the first grain diameter;

placing, in the bottom of the second plating solution, the gripping tool in such a manner that the gripping surface becomes horizontal, after the first diamond grains have been adhered; and

placing a plurality of second diamond grains having a second grain diameter smaller than the first grain diameter onto a metal surface of the gripping surface on which the first diamond grains are not present and which is formed by depositing

the metal containing nickel, and adhering the second diamond grains onto the metal surface by further depositing the metal containing nickel within the second plating solution on the metal surface in a uniform thickness that does not exceed the first grain diameter and the second grain diameter until a position relationship between the metal surface and the second diamond grains is not displaced even when the gripping tool is moved.

2. The plating processing method according to claim 1, wherein

the first diamond grains can be adjusted to a desired distribution density with respect to an area of the gripping surface.

3. The plating processing method according to claim 1, wherein

the first grain diameter is equal to or smaller than 140μm.

4. The plating method according to claim 2, wherein

the first grain diameter is equal to or smaller than 140μm.

5. The plating processing method according to claim 1, further comprising

performing a gold plating process on the gripping surface of the gripping tool onto which the first and the second diamond grains are adhered.

6. The plating processing method according to claim 2, further comprising

performing a gold plating process on the gripping surface of the gripping tool onto which the first and the second diamond grains are adhered.

7. The plating processing method according to claim 3,

further comprising

performing a gold plating process on the gripping surface of the gripping tool onto which the first and the second diamond grains are adhered.

8. The plating processing method according to claim 1, further comprising

before the first diamond grains are temporarily fixed, performing a degreasing process for removing oil and fat of the gripping surface of the gripping tool, a masking process for preventing the first diamond grains from attaching to a portion other than the gripping surface on which the nickel plating process is performed, and an acid treatment for forming or removing an oxide film on or from the gripping surface.

9. A gripping tool, wherein

a plurality of first diamond grains having a uniform first grain diameter equal to or smaller than 140μm are adhered onto a gripping surface by a metal layer containing nickel in a thickness that does not exceed the first grain diameter in a state where the first diamond grains make contact with the gripping surface and are evenly distributed so that tops of the first diamond grains can be aligned, and

a plurality of second diamond grains having a second grain diameter smaller than the first grain diameter are adhered by a metal layer, containing nickel, of the gripping surface onto the metal layer containing nickel in which the first diamond grains are not present, in a uniform thickness that causes heads of the diamond grains having the first grain diameter and the second grain diameter to protrude.

10. The gripping tool according to claim 9, further comprising

a gold-plated layer on surfaces of the metal layer, and of the first and the second diamond grains adhered by the metal

layer.

11. The gripping tool according to claim 10 being a needle holder for gripping a sewing needle.

12. The gripping tool according to claim 10 being tweezers for an operation that grips a living tissue such as a biological membrane, a blood vessel or the like.

CLAIMS

What is claimed is:

1. A plating processing method of a gripping surface of a gripping tool, the method comprising:

placing the gripping tool in a bottom of a first plating solution, which is an electroplating solution containing nickel ion as a main ingredient, so that the gripping surface can become horizontal, placing, on the gripping surface, a plurality of first diamond grains having a uniform grain diameter in a quantity that can cover the gripping surface, and temporarily fixing the first diamond grains onto the gripping surface by depositing nickel on the gripping surface in a state where the gripping surface is made stationary until a position relationship between the gripping surface and the first diamond grains is not displaced even when the gripping tool is moved;

removing first diamond grains that are not temporarily fixed after the first diamond grains have been temporarily fixed, placing, in a bottom of the electroplating solution containing nickel ion as a main ingredient, or in a second plating solution that is an electroless plating solution that forms a nickel alloy film with auto-catalysis, the gripping tool in such a way that the gripping surface becomes horizontal, and adhering the first diamond grains onto the gripping surface by further depositing a metal containing nickel within the second plating solution on the gripping surface in a uniform thickness that does not exceed the first grain diameter;

placing, in the bottom of the first plating solution, the gripping tool in such a manner that the gripping surface becomes horizontal, after the first diamond grains have been adhered; and

placing a plurality of second diamond grains having a second grain diameter smaller than the first grain diameter onto a metal surface of the gripping surface on which the first diamond grains are not present and which is formed by depositing the metal containing nickel, and adhering the second diamond

grains onto the metal surface by further depositing the metal containing nickel within the second plating solution on the metal surface in a uniform thickness that does not exceed the first grain diameter and the second grain diameter until a position relationship between the metal surface and the second diamond grains is not displaced even when the gripping tool is moved.

2. The plating processing method according to claim 1, wherein

the first diamond grains can be adjusted to a desired distribution density with respect to an area of the gripping surface.

3. The plating processing method according to claim 1 or 2, wherein

the first grain diameter is equal to or smaller than 140μm.

4. The plating processing method according to any of claims 1 to 3, further comprising

performing a gold plating process on the gripping surface of the gripping tool onto which the first and the second diamond grains are adhered.

5. The plating processing method according to any of claims 1 to 4, further comprising

before the first diamond grains are temporarily fixed, performing a degreasing process for removing oil and fat of the gripping surface of the gripping tool, a masking process for preventing the first diamond grains from attaching to a portion other than the gripping surface on which the nickel plating process is performed, and an acid treatment for forming or removing an oxide film on or from the gripping surface.

6. A gripping tool, wherein

a plurality of first diamond grains having a uniform first

grain diameter equal to or smaller than 140μm are adhered onto a gripping surface by a metal layer containing nickel in a thickness that does not exceed the first grain diameter in a state where the first diamond grains make contact with the gripping surface and are evenly distributed so that tops of the first diamond grains can be aligned, and

a plurality of second diamond grains having a second grain diameter smaller than the first grain diameter are adhered by a metal layer, containing nickel, of the gripping surface onto the metal layer containing nickel in which the first diamond grains are not present, in a uniform thickness that causes heads of the diamond grains having the first grain diameter and the second grain diameter to protrude.

7. The gripping tool according to claim 6, further comprising

a gold-plated layer on surfaces of the metal layer, and of the first and the second diamond grains adhered by the metal layer.

8. The gripping tool according to claim 7 being a needle holder for gripping a sewing needle.

9. The gripping tool according to claim 7 being tweezers for an operation that grips a living tissue such as a biological membrane, a blood vessel or the like.