MEANS FOR SOLVING THE PROBLEMS

[0009]

Making extensive investigations to achieve the outstanding problems, the inventors have found that a coating film of a UV curable resin is formed on a surface of a rare earth magnet by attaching droplet of the UV curable resin composition to the surface of the rare earth magnet with the ejection of the droplet from a tip of a head by an inkjet system of ejecting the droplet from the head, and by curing the UV curable resin composition with the irradiation of the UV curable resin composition attached onto the surface of the rare earth magnet with UV light. As a result, a coating film that imparts corrosion resistance and insulation to a rare earth magnet can be efficiently formed on a surface of the rare earth magnet homogeneously by using a method that is simple and performed at a low cost, and further using a compact device, surface condition in configuration of a coating film formed by the method differs from a coating film formed by a prior art of spray coating, and thus have completed the invention.

[0010]

Accordingly, an aspect of the present invention provides a method for forming a coating film on a rare earth magnet surface and a rare earth magnet, as defined below.

[1]. A method for forming a coating film formed of a UV curable resin that has density of 0.93 g/cm^3 or less on a surface of a rare earth magnet by coating the surface of the rare earth magnet with the UV curable resin composition and irradiating the UV curable resin composition with UV light to cure the UV curable resin composition, the method comprising the steps of:

(A) attaching a droplet of a UV curable resin composition to a surface of a rare earth magnet by ejecting the droplet from a tip of a head by an inkjet system of ejecting the droplet from the head; and

(B) curing the UV curable resin composition by irradiating the UV curable resin composition attached onto the surface of the rare earth magnet with UV light.

[2]. The method of [1], wherein in the step (A), droplets of a UV curable resin composition are sequentially ejected from a tip of a head while the tip is moved in the vicinity of a surface of a rare earth magnet to form a thin layer of the UV curable resin composition on a part or all of the surface of the rare earth magnet, the thin layer being formed by connecting the droplets of the UV curable resin composition, and then the step (B) is performed.

[8]. A rare earth magnet comprising a rare earth magnet body and a resin coating film coating the rare earth magnet body, the coating film has an average thickness of 8 μm or more, a surface of the coating film has a maximum height roughness Rz of 7 μm or more that is 87.5% or less of the average thickness of the coating film.

[9]. A second aspect of the present invention provides a rare earth magnet comprising a rare earth magnet body, and a coating film being formed of a UV curable resin and coating the rare earth magnet body, the coating film having a density of 0.93 g/cm^3 or less.

ADVANTAGEOUS EFFECTS OF THE INVENTION

[0011]

According to the invention, a rare earth magnet having a coating film that can impart corrosion resistance, insulation, and the like is provided. The coating film can be efficiently formed on a surface of the rare earth magnet homogeneously by using a method that may be simple and performed at a low cost, and further using a compact device.

EMBODIMENT FOR CARRYING OUT THE INVENTION

[0012]

Now the invention is described in detail.

In the invention, a surface of a rare earth magnet is coated with a UV (ultraviolet) curable resin composition, the UV curable resin composition coated on the rare earth magnet is irradiated with UV light (ultraviolet light) to be cured, and thus a coating film of the UV curable resin is formed on the surface of the rare earth magnet.

[0013]

As the rare earth magnet, a sintered magnet such as an Nd-Fe-B sintered magnet, and a SmCo sintered magnet, or the like can be targeted. As the shape of the rare earth magnet, as described later, since an inkjet system of ejecting a droplet of a UV curable resin composition from a tip of a head is applied, a shape constituted by a plain face, a circumferential face, an elliptical circumferential face, and a curved face such as a part or all of a spherical surface or a part or all of an elliptic spherical surface is preferred, and a shape not having a concave part into which a head used in an inkjet system cannot enter is also preferred. Specific examples of the shape include a shape in a plate or columnar form having a cross section in a shape of a quadrangle such as rectangle, parallelogram, or trapezoid, and a shape in a plate or columnar form having a cross section in a shape of a

CLAIMS:

1. A method for forming a coating film formed of a UV curable resin that has density of 0.93 g/cm^3 or less on a surface of a rare earth magnet by coating the surface of the rare earth magnet with the UV curable resin composition and irradiating the UV curable resin composition with UV light to cure the UV curable resin composition, the method comprising the steps of:

(A) attaching a droplet of a UV curable resin composition to a surface of a rare earth magnet by ejecting the droplet from a tip of a head by an inkjet system of ejecting the droplet from the head; and

(B) curing the UV curable resin composition by irradiating the UV curable resin composition attached onto the surface of the rare earth magnet with UV light.

2. The method of claim 1, wherein in the step (A), droplets of a UV curable resin composition are sequentially ejected from a tip of a head while the tip is moved in the vicinity of a surface of a rare earth magnet to form a thin layer of the UV curable resin composition on a part or all of the surface of the rare earth magnet, the thin layer being formed by connecting the droplets of the UV curable resin composition, and then the step (B) is performed.

3. The method of claim 2, wherein in the step (A), droplets of a UV curable resin composition are sequentially ejected from a tip of a head while the tip is moved in the vicinity of a surface of a rare earth magnet to form a thin layer of the UV curable resin composition on part of the surface of the rare earth magnet, the thin layer being formed by connecting the droplets of the UV curable resin composition, and then the step (B) is performed, further, the steps (A) and (B) are sequentially repeated on a surface of the rare earth magnet, which has not been coated with the UV curable resin, to form a coating film of the UV curable resin overall the predetermined surface of the rare earth magnet.

4. The method of claim 1, wherein in the step (A), a droplet of a UV curable resin composition is ejected from a tip of a head, and the step (B) is performed on the droplet, the tip of the head is moved to an adjacent part of the UV curable resin in which the droplet

has cured, and further, the steps (A) and (B) are sequentially repeated on a surface of the rare earth magnet, which has not been coated with the UV curable resin, while moving the tip of the head in the vicinity of the surface of the rare earth magnet to form a coating film of the UV curable resin on a part or all of the surface of the rare earth magnet.

5. The method of any one of claims 1 to 4, wherein the droplet of a UV curable resin composition attached onto a surface of a rare earth magnet is kept for 1 second or more without being irradiated with UV light, and then are irradiated with UV light.

6. The method of any one of claims 1 to 5, wherein the rare earth magnet is a sintered magnet.

7. The method of claim 6, wherein the sintered magnet is a Nd-Fe-B sintered magnet or a SmCo sintered magnet.

8. The method of any one of claims 1 to 7, wherein a thickness of the coating film is 3 μm or more, and 20 μm or less.

9. The method of any one of claims 1 to 8, wherein a surface of the coating film having an arithmetic average roughness Ra of 1.05 μm or more that is 20% or less of an average thickness of the coating film.

10. The method of any one of claims 1 to 8, wherein the coating film has an average thickness of 8 μm or more, and a surface of the coating film has a maximum height roughness Rz of 7 μm or more that is 87.5% or less of the average thickness of the coating film.

11. A rare earth magnet comprising a rare earth magnet body, and a coating film being formed of a UV curable resin and coating the rare earth magnet body, the coating film having a density of 0.93 g/cm^3 or less.

12. The rare earth magnet of claim 11, wherein a thickness of the coating film is 3 μm or more, and 20 μm or less.