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(54) **Vacuum interrupter**

Vakuumschalter

Interrupteur d'aspirateur

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EP 1 983 537 B1

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application is based on, and claims priority from, Korean Application Numbers 10-2007-0037949 filed April 18, 2007, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] The following description relates generally to a vacuum interrupter.

[0003] In vacuum circuit breakers, a load switching and a fault current interruption are made in a vacuum state within a vacuum interrupter, but an external insulation for the vacuum interrupter is made in various media. The vacuum interrupter may be insulated with air as in a vacuum circuit breaker (VCB), may be insulated with oil surrounding the vacuum interrupter as in an oil circuit breaker (OCB) or may be insulated using SF_6 gas as in a high pressure switch. However, these insulation methods have various shortcomings.

[0004] The air insulation method as in the VCB cannot be used, due to low dielectric strength of the air, where high flash-over voltage is required. The oil as used in the OCB is hardly used recently due to danger of oil explosion. Meanwhile, the SF_6 gas as used in the high pressure switch can be used where high flash-over voltage is required and has no danger of oil explosion, but is subject to regulation in an environment aspect.

[0005] Due to the above reasons, solid insulation methods, particularly an integral solid insulation method is recently used where the vacuum interrupter is inserted into an epoxy resin when molding the epoxy resin.

[0006] However, when the vacuum interrupter insulated by the solid insulation method is molded with the epoxy resin, variations in electrical and mechanical properties of the vacuum interrupter are generated by adhesiveness of binding faces between the epoxy resin and upper and lower fixing plates or a ceramic of a vacuum valve. If the binding faces are of the same material, the variations in the electrical and mechanical properties can be solved by maximizing an adhesive power in an initial stage of vacuum interrupter manufacturing. However, since metal or ceramic for forming the vacuum interrupter and the epoxy so molded as to surround the metal or ceramic are different materials, an interface may crack or be separated due to a difference in thermal expansion coefficient caused by different physical properties when manufacturing and using the vacuum interrupter. To complement this shortcoming, a rubber buffer layer has been employed.

[0007] FIG. 1 illustrates a vertical sectional view of an internal structure of a conventional vacuum interrupter molded with an epoxy resin. As shown in Fig. 1, a solid insulator 103 such as an epoxy resin is molded at the outside of a vacuum interrupter 101, and a buffer layer 102 of rubber material for absorbing thermal stress due to the difference in thermal expansion coefficient between a ceramic 104 and the epoxy 103 is formed at the outside surface of the vacuum interrupter 101. However, the buffer layer 102 can increase a mechanical contact force between the ceramic insulating case 104 and the epoxy layer 103 by aiding physical tight contact between the ceramic 104 and the epoxy 103, but there may exist, albeit minutely, a separation of interfaces between the ceramic layer 104 and the butter layer 102 and the epoxy layer 103. Also, a defect such as a void in the interface should be removed completely as the buffer layer 102 is in fully tight contact with the outside of the vacuum interrupter 101 in correspondence to the outside shape of the vacuum interrupter 101, but there is a possibility that, in a case of applying the tube shaped buffer layer 102, the defect may be generated as the buffer layer 102 cannot fill completely in the uneven portions such as a binding part between the metal part and ceramic. And, when coating the vacuum interrupter with rubber material in aqueous or gel phase, there is also a possibility that the void is generated within the buffer layer 102.

[0008] In the vacuum interrupter as described above, a defect such as a void may be generated in the process of forming the buffer layer in the initial manufacture and this defect may be also generated by a mechanical operating impact during its use or in the process of expansion and contraction due to temperature variation. In other words, additional processes for forming the buffer layer during the process of molding the vacuum interrupter with the epoxy are required, and another additional process and costs are also consumed to manufacture the buffer layer.

[0009] Such separation between the interfaces or the void within the layer becomes a factor that lowers a partial discharge property of the epoxy-molded vacuum interrupter and thus a possibility of generation of partial discharge and electric tree in the epoxy resin is more increased. Therefore, there is a shortcoming that reliability for an insulation property of the epoxy resin in the long term use of the vacuum interrupter is lowered.

[0010] Document EP-A-1 343 233 discloses a similar vacuum interrupter, which however lacks an enamel layer.

SUMMARY

[0011] An object of the instant disclosure is to provide a vacuum interrupter, which has superior electrical and mechanical properties and is capable of reducing a manufacturing cost by applying a novel interface treatment without a

buffer layer of rubber material to the epoxy resin-molded vacuum interrupter.

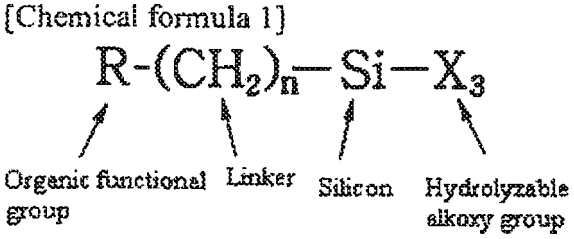
[0012] In one general aspect, a vacuum interrupter comprises: a ceramic insulating case provided with an upper conductor and a lower conductor connected with the outside; an enamel layer formed on the outside surface of the insulating case; a silane coupling agent layer formed by coating a silane coupling agent on the outside surface of the enamel layer; and an epoxy resin insulation layer molded on the outside surface of the silane coupling agent layer, wherein the silane coupling agent layer is chemically coupled with the enamel layer and the epoxy resin insulation layer.

[0013] In another general aspect, a vacuum interrupter comprises: a ceramic insulating case provided with an upper conductor and a lower conductor connected with the outside; an enamel layer formed on the outside surface of the insulating case; an embossed layer formed by sand blasting the outside surface of the enamel layer; a silane coupling agent layer formed by coating a silane coupling agent on the outside surface of the embossed layer; and an epoxy resin insulation layer molded on the outside surface of the silane coupling agent layer, wherein the silane coupling agent layer is chemically coupled with the enamel layer and the epoxy resin insulation layer.

[0014] Preferably, the silane coupling agent is coated on the outside surfaces of the upper conductor and the lower conductor of the ceramic insulating case.

[0015] Preferably, the silane coupling agent is a compound represented by the following chemical formula 1:

[Chemical formula 1]



wherein, R is a reaction group of $C_1 \sim C_{15}$ aliphatic or aromatic hydrocarbon having a carbon number of 1 to 15, n is an integer of 1~10, X is $C_1 \sim C_{15}$ aliphatic or aromatic alkoxy group having a carbon number of I to 15.

[0016] Preferably, the epoxy resin insulation layer includes silica as a dimensional stabilizer.

[0017] In still another general aspect, a method for manufacturing a vacuum interrupter comprises: preparing a ceramic insulating case; treating an enamel on the outside surface of the ceramic insulating case to form an enamel layer; coating a silane coupling agent on the outside surface of the enamel layer to form forming a silane coupling agent layer; and molding an epoxy resin insulation layer on the outside surface of the silane coupling agent layer.

[0018] In yet another general aspect, a method for manufacturing a vacuum inten-upter comprises: preparing a ceramic insulating case; treating an enamel on the outside surface of the ceramic insulating case to form an enamel layer; sand blasting the outside of the enamel layer to form an emboss layer; coating a silane coupling agent on the outside surface of the emboss layer to form a silane coupling agent layer; and molding an epoxy resin insulation layer on the outside surface of the silane coupling agent layer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 illustrates a vertical sectional view of an internal structure of a conventional vacuum interrupter molded with an epoxy resin.

FIG.2 illustrates a vertical sectional view of an internal structure of a vacuum interrupter.

FIG. 3 illustrates a structural view of a detailed structure between a ceramic insulating case and an epoxy resin insulation layer of the vacuum interrupter according to an embodiment of the present invention.

FIG.4 illustrates a structural view of a detailed structure between a ceramic insulating case and an epoxy resin insulation layer of the vacuum interrupter according to another embodiment of the present invention.

DETAILED DESCRIPTION

[0020] Now, exemplary implementations of the present inventive disclosure will be described in detail with reference to the accompanying drawings. In this application, the use of the singular includes the plural unless specifically stated otherwise. Furthermore, the use of the term "including", as well as other forms, such as "includes" and "included", is not limiting. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0021] FIG.2 illustrates a vertical sectional view of an internal structure of a vacuum interrupter, which does not form part of the present invention. More specifically, FIG. 2 illustrates a structure in that a silane coupling agent is coated on surfaces of a ceramic insulating case 203 of a vacuum interrupter and then an epoxy resin molded thereon by a pressure gelation molding. The vacuum interrupter of FIG. 2 structurally includes the ceramic 203, a coating surface 202 of a silane coupling agent and an epoxy resin insulation layer 201. The manufacturing of the epoxy-molded vacuum interrupter of FIG. 2 is implemented in sequence of cleaning the vacuum interrupter, coating the silane coupling agent on the outside surface of the vacuum interrupter, preheating the vacuum interrupter, placing the vacuum interrupter into a mold, molding the vacuum interrupter and post hardening the molded vacuum interrupter. At this time, the coating of the silane coupling agent may be implemented before or after the preheating. The silane coupling agent can be coated by any method including spraying, brushing or the like.

[0022] The adhesion by the silane coupling agent 202 is not a physical contact by existing buffer layer of rubber, but a chemical coupling between the epoxy, i.e. an organic matter and a ceramic or metal, i.e. an inorganic matter. Therefore, a difference in contraction rate generated by a difference in a thermal expansion coefficient between binding faces of the epoxy and the ceramic or metal can be considerably canceled through such chemical coupling. Also, the epoxy resin insulation layer may include ceramic based silica as a dimensional stabilizer, thereby capable of reducing more the shortcomings caused by difference in the thermal expansion coefficient between the ceramic insulating case and the epoxy resin insulation layer.

[0023] Furthermore, the silane coupling agent may be coated not only on the ceramic portion of the vacuum interrupter but also on conductor portions 204 of the upper and lower parts of the vacuum interrupter, thereby capable of increasing an adhesive power at the conductor portions.

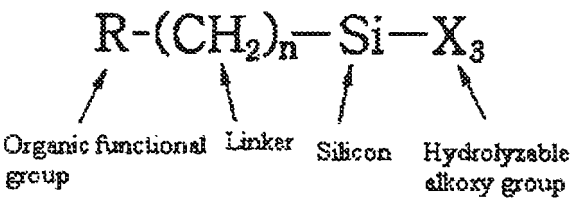
[0024] FIG. 3 illustrates a structural view of an enamel layer 303 treated between a ceramic insulating case 301 and an epoxy resin insulation layer 302 of the vacuum interrupter according to an embodiment of the present invention. The ceramic insulating case 203 of the vacuum interrupter used in the present invention is preferably treated with enamel on the surface. The enamel layer 303 on the surface of the ceramic insulating case acts to prevent contamination such as moisture, dust and the like on the surface of the ceramic and acts as a seal for maintaining a high vacuum, which is one of the most important functions of the vacuum interrupter. The enamel is preferably coated, but not particularly limited to, in a thickness of 100μm on the surface of the ceramic 301. The ceramic insulating case coated with the enamel is baked at 1300 to 1400°C so that the enamel can soak into the ceramic layer. Therefore, the enamel layer 303 formed by coating of the enamel has a layer which impregnates into the inside of the ceramic. As such, by the enamel layer 303 coated on and impregnating into the surface of the ceramic, the ceramic insulating case 301 can be maintained at the high vacuum. Since the enamel coated on the outside of the ceramic case 301 mainly contains silicon like the ceramic, it can easily react with reaction group of the silane coupling agent.

[0025] In other words, the vacuum interrupter of the present invention is completely formed by coating the silane coupling agent 202 on the enamel layer 303 treated on the ceramic surface of vacuum interrupter and then molding the epoxy resin 302 thereon. Therefore, the silane coupling agent 202 having the reaction group which is coupled to silicon based inorganic matter also reacts easily with the hyaline enamel layer 303 at the outside of the ceramic case 301.

[0026] As described above, unlike the conventional buffer layer using the physical contact, the silane coupling agent 202 between the enamel-treated ceramic and the epoxy resin layer adheres two materials through chemical coupling between the two materials since the silane coupling agent reacts chemically, due to its double reaction structure, with the epoxy resin, the ceramic and the enamel on the ceramic surface to form a bond ring. This is not the simple mechanical tight contact in the case that the existing buffer layer is applied, but the chemical coupling. Therefore, it does not cause electrical shortcomings such as generation of a partial discharge or destruction of an interface insulation due to separation of the binding portion.

[0027] The silane coupling agent is preferably a silicon hydride compound represented by the following chemical formula 1. The silane coupling agent represented by the chemical formula 1 has both the organic functional group which can react with organic matters and a hydrolyzable alkoxy group which can react with inorganic matters in a single molecule.

<Chemical formula 1>



[0028] The silicon silane coupling agent performs two reactions simultaneously since it has, as can be found in the chemical formula 1, more than two different reaction groups in a single molecule. One of the reaction groups is the organic reaction group (vinyl group, epoxy group, amino group, methacrylic group, mercapto group, etc.) which is chemically bonded with organic materials (synthetic resins) and the other is the hydrolyzable alkoxy group (methoxy group, ethoxy group, etc.) which is chemically bonded with inorganic materials (glass, metal, sand, etc.). Therefore, it can be used as a coupling agent for connecting an organic material and an inorganic material which are generally hard to be connected with each other.

[0029] Any method is possible including a pretreatment method (an inorganic filler is previously treated), an integral blend method (added to resin structure) or the like when using the silane coupling agent in the manufacture of epoxy resin-molded vacuum interrupter. However, in the present invention, the silane coupling agent is treated on the surface of the vacuum interrupter by the pretreatment method and the epoxy resin is directly molded thereon. This direct molding method enhances adhesiveness between the surface of the vacuum interrupter and the epoxy resin without forming of a conventional buffer layer, thereby capable of significantly enhancing a mechanical strength and an electrical property such as a prevention of partial discharge.

[0030] FIG.4 illustrates a detailed structural view of an embossed layer 400 formed between the ceramic insulating case 301 and the epoxy resin insulation layer 302 of the vacuum interrupter according to another embodiment of the present invention. The embossed layer 400 is for more enhancing the adhesive power of the silane coupling agent in the epoxy-molded vacuum interrupter using the silane coupling agent. In other words, the outside of the ceramic insulating case 301 of which surface is formed with the enamel layer 303 thereon, is sand blasted to form the embossments 400 on the surface of the ceramic insulating case 301, thereby maximizing the reaction area of the silane coupling agent 202.

[0031] The sand blasting is a method for processing a surface by shooting particles of silica, ceramic, metal or the like. In the sand blasting of the present invention, it is preferable to use silica or ceramic particles of 30 to 60mesh. Also, though the time required to blast may vary as a size of the used particles, the blasting is preferably completed in about three minutes for each vacuum interrupter.

[0032] In the embossed layer 400 formed on the surface of the ceramic insulating case by the sand blasting treatment, an interface structure between the two materials becomes to have various directivities, thereby capable of significantly enhancing the adhesive power of the epoxy-molded vacuum interrupter using the silane coupling agent.

[0033] Therefore, the instant novel disclosure has an advantage in that the adhesiveness between the surface of the vacuum interrupter and the epoxy resin is enhanced without the conventional buffer layer by applying a direct molding of the epoxy insulation layer and ensuring a superior adhesive property, thereby significantly enhancing the mechanical strength and the electrical property such as the partial discharge, etc. Also, the instant novel disclosure has an advantage in that the separation phenomenon is removed and generation of the void is minimized through the increase in the adhesiveness of the interface, thereby exhibiting increase in partial discharge extinction voltage by more than 50% in comparison with the existing silicon buffer layer of gel phase.

[0034] While the present novel concept has been described with reference to the particular illustrative implementations, it is not to be restricted by those implementations but only by the appended claims.

Claims

1. A vacuum interrupter comprising: a ceramic insulating case (301) provided with an upper conductor and a lower conductor connected with the outside; an enamel layer (303) formed on the outside surface of the insulating case; a silane coupling agent layer (202) formed by coating a silane coupling agent on the outside surface of the enamel layer; and an epoxy resin insulation layer (302) molded on the outside surface of the silane coupling agent layer, wherein the silane coupling agent layer is chemically coupled with the enamel layer and the epoxy resin insulation layer.

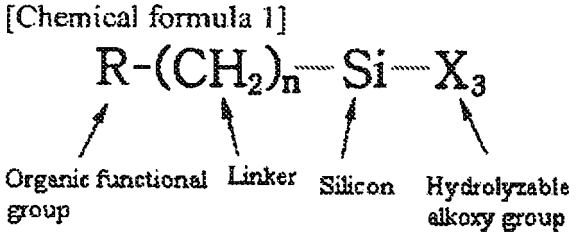
2. . A vacuum interrupter comprising: a ceramic insulating case (301) provided with an upper conductor and a lower conductor connected with the outside; an enamel layer (303) formed on the outside surface of the insulating case; an embossed layer (400) formed by sand blasting the outside surface of the enamel layer; a silane coupling agent layer (202) formed by coating a silane coupling agent on the outside surface of the embossed layer; and an epoxy resin insulation layer (302) molded on the outside surface of the silane coupling agent layer, wherein the silane coupling agent layer is chemically coupled with the enamel layer and the epoxy resin insulation layer.

3. . The vacuum interrupter as claimed in claim 1, wherein the silane coupling agent is coated on the outside surfaces of the upper conductor and the lower conductor of the ceramic insulating case.

4. . The vacuum interrupter as claimed in claim 1, wherein the silane coupling agent is a compound represented by

the following chemical formula 1:

[Chemical formula 1]



wherein, in the chemical formula 1, R is $C_1 \sim C_{15}$ aliphatic or aromatic hydrocarbon including a reaction group, n is an integer of 1~10, X is $C_1 \sim C_{15}$ aliphatic or aromatic alkoxy group.

5. . The vacuum interrupter as claimed in claim 1, wherein the epoxy resin insulation layer includes silica as a dimensional stabilizer.

6. . A method for manufacturing a vacuum interrupter according to claim 1, comprising: preparing a ceramic insulating case (301), treating an enamel on the outside surface of the ceramic insulating case to form an enamel layer (303); coating a silane coupling agent on the outside surface of the enamel layer to form forming a silane coupling agent layer (202); and molding an epoxy resin insulation layer (302) on the outside surface of the silane coupling agent layer.

7. . A method for manufacturing a vacuum interrupter according to claim 2, comprising; preparing a ceramic insulating case (301); treating an enamel on the outside surface of the ceramic insulating case to form an enamel layer (303); sand blasting the outside of the enamel layer to form an emboss layer (400); coating a silane coupling agent on the outside surface of the emboss layer to form a silane coupling agent layer (202); and molding an epoxy resin insulation layer (302) on the outside surface of the silane coupling agent layer.

Patentansprüche

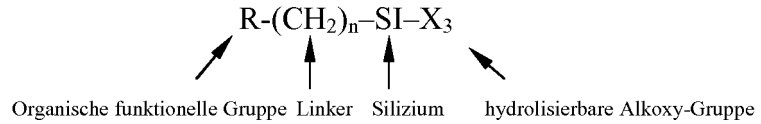
1. Vakuumschalter, umfassend: Ein keramisches Isoliergehäuse (301), versehen mit einem oberen Leiter und einem unteren Leiter, die nach außen angeschlossen sind; eine Emailleschicht (303), gebildet an der Außenfläche des Isoliergehäuses; eine Silan-Haftmittelschicht (202), gebildet durch Beschichten eines Silan-Haftmittels an der Außenfläche der Emailleschicht; und eine Epoxidharz-Isolierschicht (302), formgepresst an der Außenfläche der Silan-Haftmittelschicht, wobei die Silan-Haftmittelschicht chemisch mit der Emailleschicht und der Epoxidharz-Isolierschicht gekoppelt ist.

2. Vakuumschalter, umfassend: Ein keramisches Isoliergehäuse (301), versehen mit einem oberen Leiter und einem unteren Leiter, die nach außen angeschlossen sind; eine Emailleschicht (303), gebildet an der Außenfläche des Isoliergehäuses; eine Prägeschicht (400), gebildet durch Sandstrahlen der Außenfläche der Emailleschicht; eine Silan-Haftmittelschicht (202), gebildet durch Beschichten eines Silan-Haftmittels an der Außenfläche der Prägeschicht; und eine Epoxidharz-Isolierschicht (302) formgepresst an der Außenseite der Silan-Haftmittelschicht, wobei die Silan-Haftmittelschicht chemisch mit der Emailleschicht und der Epoxidharz-Isolierschicht gekoppelt ist.

3. Vakuumschalter nach Anspruch 1, wobei das Silan-Haftmittel an den Außenflächen des oberen Leiters und des unteren Leiters des keramischen Isoliergehäuses beschichtet ist.

4. Vakuumschalter nach Anspruch 1, wobei das Silan-Haftmittel eine Verbindung ist, die durch die nachfolgende chemische Formel 1 dargestellt wird:

[Chemische Formel 1]



wobei in der chemischen Formel 1 R ein aliphatischer oder aromatischer C_1 - C_{15}-Kohlenwasserstoff, umfassend eine Reaktionsgruppe ist, n eine ganze Zahl von 1 - 10 ist, X eine aliphatische oder aromatische C_1 - C_{15}-Alkoxy-Crruppe ist.

5. Vakuumschalter nach Anspruch 1, wobei die Epoxidharz-Isolierschicht ein Silicamaterial als Maßhaltigkeitsstabilisator umfasst.

6. Verfahren zum Herstellen eines Vakuumschalters nach Anspruch 1, umfassend: Herstellen eines keramischen Isoliergehäuses (301); Behandeln einer Emaille an der Außenfläche des keramischen Isoliergehäuses, um eine Emailleschicht (303) zu bilden; Beschichten eines Silan-Haftmittels an der Außenfläche der Emailleschicht, um eine Silan-Haftmittelschicht (202) zu bilden und Formpressen einer Epoxidharz-Isolierschicht (302) an der Außenfläche der Silan-Haftmittelschicht.

7. Verfahren zum Herstellen eines Vakuumschalters nach Anspruch 2, umfassend: Herstellen eines keramischen Isoliergehäuses (301); Behandeln einer Emaille an der Außenfläche des keramischen Isoliergehäuses, um eine Emailleschicht (303) zu bilden; Sandblasen des Äußeren der Emailleschicht, um eine Prägeschicht (400) zu bilden; Beschichten eines Silan-Haftmittels an der Außenfläche der Prägeschicht, um eine Silan-Haftmittelschicht (202) zu bilden, und Formpressen einer Epoxidharz-Isolierschicht (302) an der Außenfläche der Silan-Haftmittelschicht.

Revendications

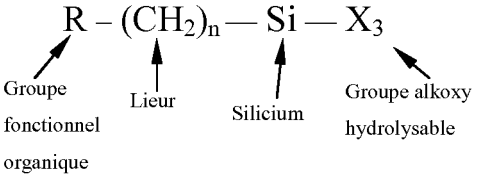
1. Interrupteur d'aspirateur comprenant : un boîtier isolant en céramique (301) pourvu d'un conducteur supérieur et d'un conducteur inférieur connectés avec l'extérieur ; une couche en émail (303) formée sur la surface extérieure du boîtier isolant ; une couche d'agent de couplage au silane (202) formée en revêtant un agent de couplage au silane sur la surface extérieure de la couche en émail ; et une couche d'isolation en résine époxyde (302) moulée sur la surface extérieure de la couche d'agent de couplage au silane, dans lequel la couche d'agent de couplage au silane est couplée chimiquement à la couche en émail et la couche d'isolation en résine époxyde.

2. Interrupteur d'aspirateur comprenant : un boîtier isolant en céramique (301) pourvu d'un conducteur supérieur et d'un conducteur inférieur connectés avec l'extérieur ; une couche en émail (303) formée sur la surface extérieure du boîtier isolant ; une couche gaufrée (400) formée en sablant la surface extérieure de la couche en émail ; une couche d'agent de couplage au silane (202) formée en revêtant un agent de couplage au silane sur la surface extérieure de la couche gaufrée ; et une couche d'isolation en résine époxyde (302) moulée sur la surface extérieure de la couche d'agent de couplage au silane, dans lequel la couche d'agent de couplage au silane est couplée chimiquement à la couche en émail et la couche d'isolation en résine époxyde.

3. Interrupteur d'aspirateur selon la revendication 1, dans lequel l'agent de couplage au silane est revêtu sur les surfaces extérieures du conducteur supérieur et du conducteur inférieur du boîtier isolant en céramique.

4. Interrupteur d'aspirateur selon la revendication 1, dans lequel l'agent de couplage au silane est un composé représenté par la formule chimique 1 suivante :

[formule chimique 1]



dans lequel, dans la formule chimique 1, R est un hydrocarbure aliphatique ou aromatique C_1 - C_{15} comprenant un groupe de réaction, n est un entier de 1 - 10, X est un groupe alkoxy aliphatique ou aromatique C_1 - C_{15}.

5. Interrupteur d'aspirateur selon la revendication 1, dans lequel la couche d'isolation en résine époxyde comprend de la silice en tant que stabilisateur dimensionnel.

6. Procédé de fabrication d'un interrupteur d'aspirateur selon la revendication 1, comprenant : préparer un boîtier isolant en céramique (301) ; traiter un émail sur la surface extérieure du boîtier isolant en céramique pour former une couche en émail (303) ; revêtir un agent de couplage au silane sur la surface extérieure de la couche en émail pour former une couche d'agent de couplage au silane (202) ; et mouler une couche d'isolation en résine époxyde (302) sur la surface extérieure de la couche d'agent de couplage au silane.

7. Procédé de fabrication d'un interrupteur d'aspirateur selon la revendication 2, comprenant : préparer un boîtier isolant en céramique (301) ; traiter un émail sur la surface extérieure du boîtier isolant en céramique pour former une couche en émail (303) ; sabler l'extérieur de la couche en émail pour former une couche gaufrée (400) ; revêtir un agent de couplage au silane sur la surface extérieure de la couche gaufrée pour former une couche d'agent de couplage au silane (202) ; et mouler une couche d'isolation en résine époxyde (302) sur la surface extérieure de la couche d'agent de couplage au silane.

FIG. 1

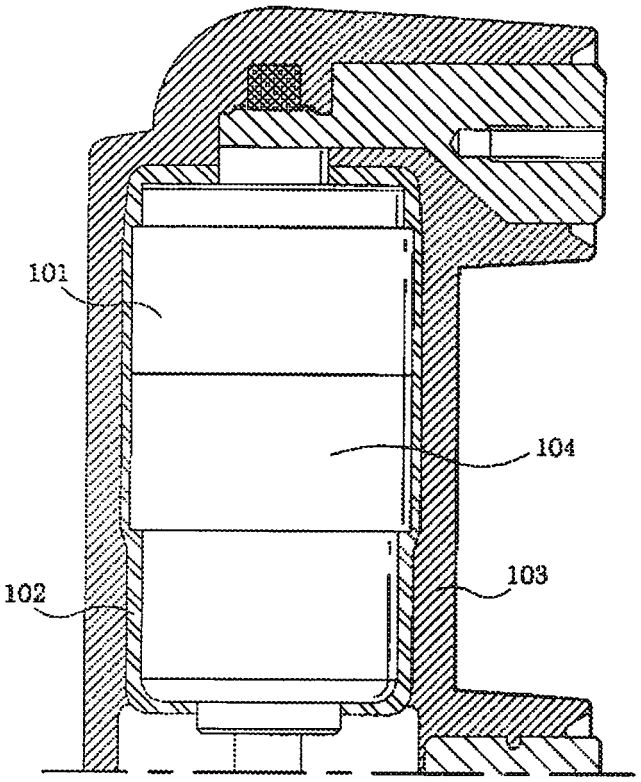


FIG. 2

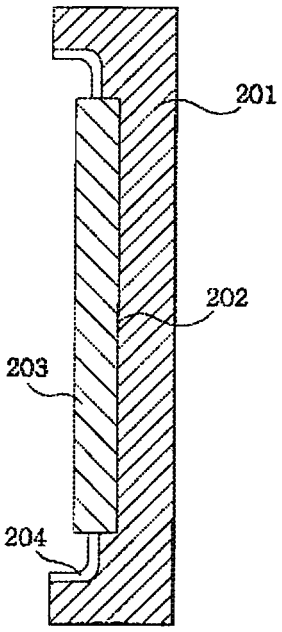


FIG. 3

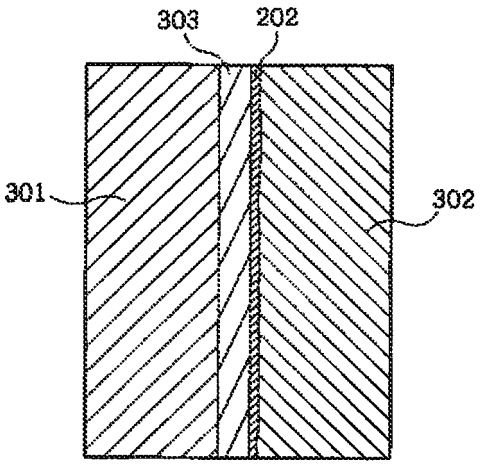
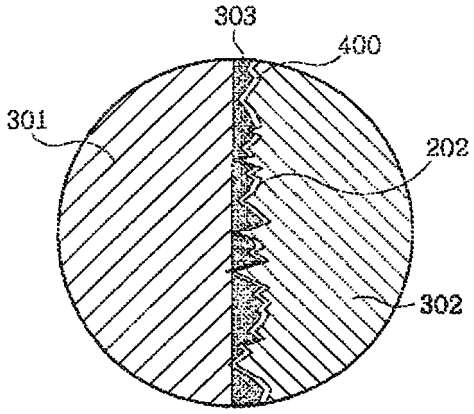


FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 1020070037949 **[0001]**
- EP 1343233 A **[0010]**