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(54) **METHOD FOR MANUFACTURING OPEN CELL MICROPOROUS METAL**

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(57) **ABSTRACT**

Disclosed is a method of manufacturing an open cell porous metal, including the steps of mixing a target metal with a low melting point material, having a melting point lower than that of the target metal, to form a mixture; forming a compact by pressurizing the mixture; forming a sintered compact, which open cell micropores are formed, by sintering and polishing the compact; and plating the sintered compact. The present invention has advantages in that pores are easily formed, and the form of the pores can be variously adjusted. Further, the open cell porous metal manufactured by the present invention has an advantage in that the open cell porous metal has various effects or characteristics such as durability, sound-absorbing property, heat resistance, electromagnetic wave blocking, high damping property, high strength, ultra-lightweight, fragrance emission, and fragrance retention, and can thus be used as a functional metal for various uses.

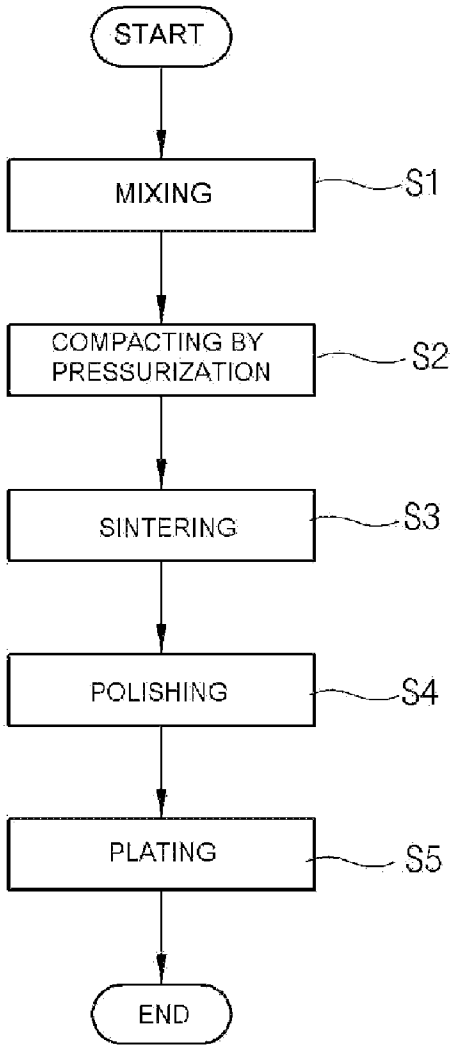


FIG. 1

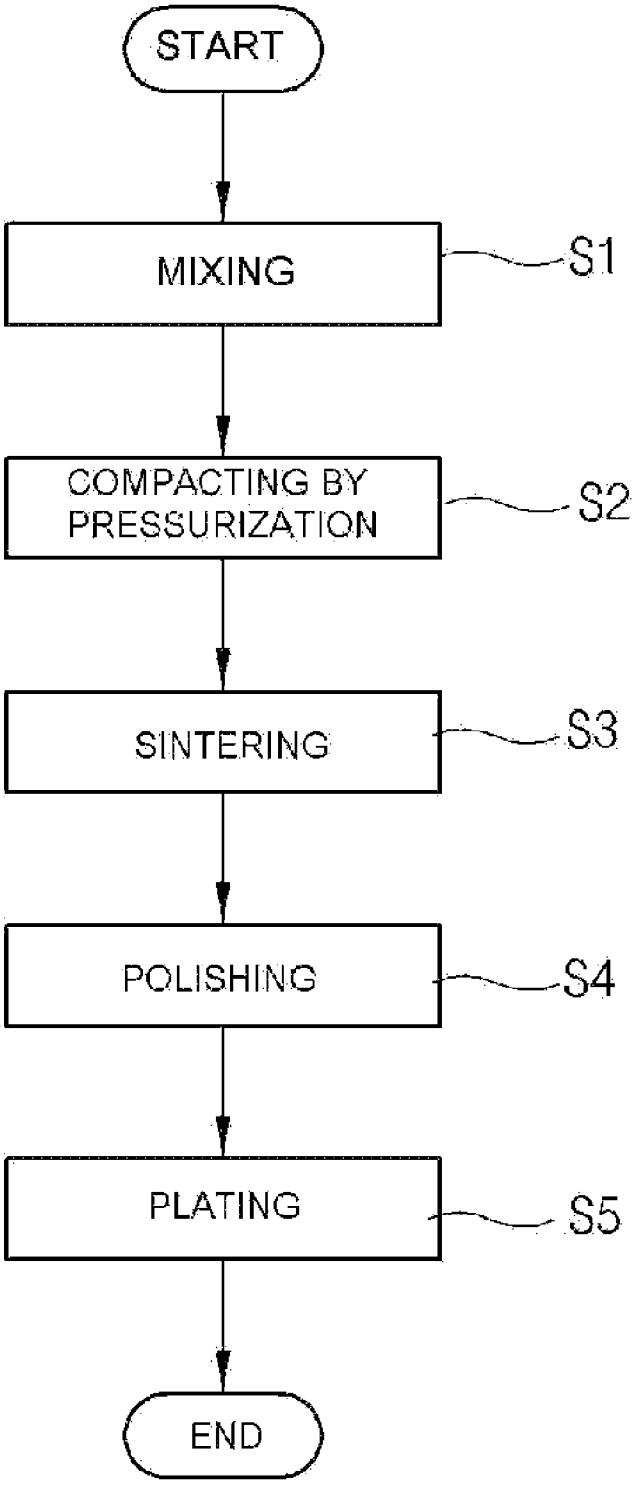

START
MIXING
S1
COMPACTING BY PRESSURIZATION
S2
SINTERING
S3
POLISHING
S4
PLATING
S5
END

FIG. 2

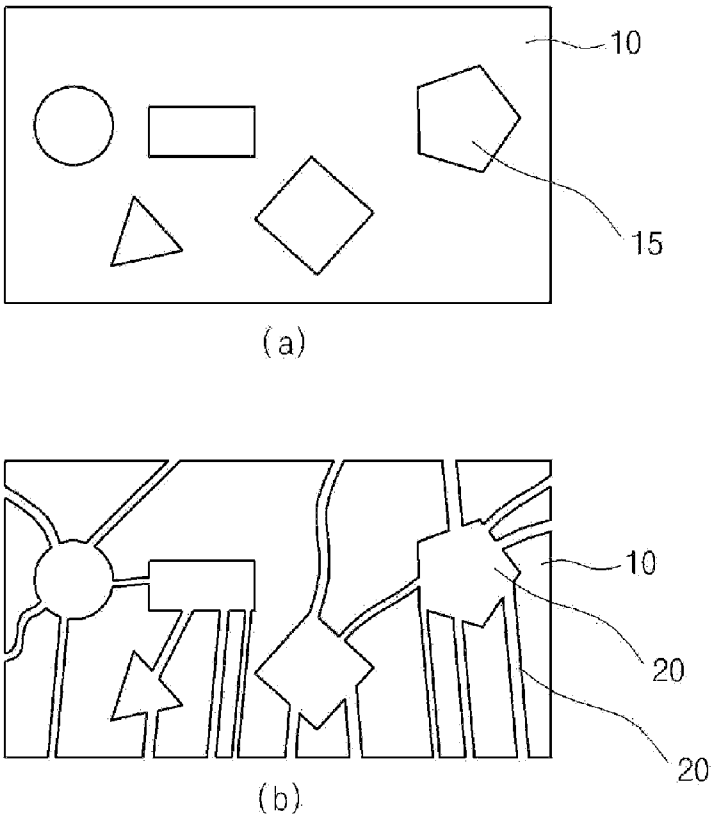
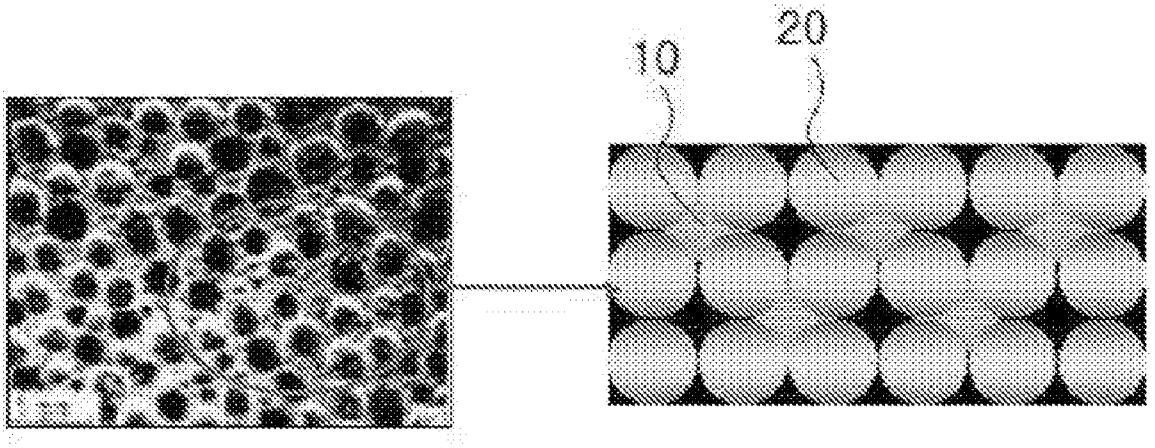


FIG. 3



METHOD FOR MANUFACTURING OPEN CELL MICROPOROUS METAL

CROSS REFERENCE

[0001] Applicant claims foreign priority under Paris Convention and 35 U.S.C. §119 to Korean Patent Application No. 10-2006-0114871, filed on Nov. 21, 2006, and to Korean Patent Application No. 10-2006-0131483, filed on Dec. 21, 2006, each with the Korean Intellectual Property Office.

TECHNICAL FIELD

[0002] The present invention relates to an open cell porous metal, and, more particularly, to a method of manufacturing an open cell porous metal, in which open cell pores are more easily formed in a target metal which is to be prepared for various uses, and in which the shape or structure of the pores can be variously adjusted.

BACKGROUND ART

[0003] As commonly known, a porous metal has a plurality of micropores formed therein or thereon. Such porous metal includes an open cell porous metal, the pores of which communicate with the exterior, and a closed cell porous metal, the pores of which are sealed, depending on the form of the pore.

[0004] Since this porous metal has open cell pores or closed cell pores formed therein, the porous metal has been variously used in heat exchangers, aircraft, shock absorbers, fragrance retention, and the like.

[0005] However, conventional methods of manufacturing the porous metal have problems in that it is difficult to adjust the form of pores, and in that the range of metals in which pores can be formed is limited (for example, use of only metal such as stainless steel is allowed).

DISCLOSURE

Technical Problem

[0006] Accordingly, the present invention has been made in order to solve the above problems occurring in the prior art, and an object of the present invention is to provide a method of manufacturing an open cell porous metal, in which open cell micropores are more easily formed, and in which the shape or structure of the micropores can be more easily adjusted.

Technical Solution

[0007] In order to accomplish the above object, the present invention provides a method of manufacturing an open cell porous metal, including the steps of mixing a target metal with a low melting point material that has a melting point lower than that of the target metal to form a mixture; forming a compact by pressurizing the mixture; forming a sintered compact, in which open cell micropores are formed, by sintering and polishing the compact; and plating the sintered compact.

[0008] The method is characterized in that the mixing ratio of the target metal to the low melting point material ranges from 7:3 to 9.95:0.05.

[0009] The method is characterized in that the low melting point material has a melting point of 200~600° C.

[0010] The method is characterized in that, in the step of sintering, the open cell micropores are formed in the compact by melting only the low melting point material.

[0011] The method is characterized in that, in the step of sintering, the low melting point material is melted at a temperature of 200~3500° C. in an ammonia cracking reductive atmosphere or a vacuum atmosphere.

[0012] The method is characterized in that, in the step of plating, a corrosion inhibition film is formed using a dry plating method.

Advantageous Effects

[0013] As described above, the method of manufacturing a porous metal according to the present invention has advantages in that pores are easily formed, porosity is remarkably increased, and the form or structure of the pores can be variously adjusted.

[0014] Further, the open cell porous metal manufactured by the present invention has an advantage in that the open cell porous metal has various effects or characteristics such as durability, sound-absorption, heat resistance, electromagnetic wave blocking, high damping, high strength, ultra-lightweight, fragrance emission, fragrance retention and the like, and can be thus used as a functional metal for realizing various uses or purposes.

DESCRIPTION OF DRAWINGS

[0015] FIG. **1** is a flow chart showing a method of manufacturing an open cell porous metal according to an embodiment of the present invention;

[0016] FIG. **2** is a view sequentially showing a method of manufacturing an open cell porous metal according to an embodiment of the present invention; and

[0017] FIG. **3** is a photograph and an enlarged view showing the open cell porous metal manufactured by the present invention.

BEST MODE

[0018] Hereinafter, the present invention will be described in detail with reference to the accompanying drawings.

[0019] FIG. **1** is flow chart showing a method of manufacturing a porous metal according to the present invention.

[0020] As shown in FIG. **1**, in the method of manufacturing a porous metal according to the present invention, a target metal **10**, such as gold, silver, titanium, stainless steel, aluminum, copper or tungsten, is suitably mixed with a low melting point material **15** having a melting point lower than that of the target metal **10** (S**1**). Particularly, the low melting point material **15** may be uniformly distributed in the target metal **10**. Here, the target metal **10** and the low melting point material **15** may be mixed in the form of powder or chips. In this case, it is preferred that the mixing ratio of the target metal to the low melting material be within the range from 7:3 to 9.95:0.05 depending on the desired porosity (S**1**).

[0021] Next, the mixture obtained in S**1** is formed into a compact having an exterior form corresponding to the use thereof through a pressurization process. It is preferred that this process of forming a compact be performed at room temperature (S**2**).

[0022] The compact formed in a desired shape in S**2** is solidified to have a desired strength. Here, impurities such as carbon etc. may be removed from the compact.

[0023] Then, the solidified compact is sintered in order to form pores by taking advantage of the difference in melting point between the target metal **10** and the low melting point material **20** (S**3**).

[0024] In this sintering process, a plurality of micropores **20** can be variously formed in the form of open cells by melting only the low melting point material **15** in the target metal **10**, as shown in FIGS. **2**A and **2**B.

[0025] That is, as shown in FIG. **2**A, when only the low melting point material **15** is melted in a state in which the low melting point material **15** is mixed in the target metal **10** in the form of powder or chips, as shown in FIG. **2**B, the open cell micropores **20** are formed by discharging the low melting point material **15** through gaps in the target metal **10** during an evaporation process or an extraction process.

[0026] The shape or structure of such micropores **20** can be variously adjusted depending on whether the low melting point material **15** is in chip or powder form, on the state of the low melting point material **15**, and the like.

[0027] Meanwhile, a high melting point metal having a relatively high melting point, such as gold (melting point: 1063° C.), silver (melting point: 962° C.), titanium (melting point: 2850° C.), stainless steel (melting point: 1400° C.), aluminum (melting point: 659° C.), copper (melting point: 1530° C.), tungsten (melting point: 3500° C.) or the like, is mainly used as the target metal **10**. Further, a material having a relatively low melting point from 200° C. to 600° C., such as tin (melting point: 232° C.), zinc (melting point: 419° C.) or the like, is mainly used as the low melting point material.

[0028] Accordingly, it is preferred that the sintering process be performed at a sintering temperature of 200~3500° C. in an ammonia cracking atmosphere or a vacuum atmosphere (S**3**).

[0029] The sintered compact formed through the sintering process in S**3** is polished in order to smooth the surface of the compact (S**4**). After this polishing process is performed, the porous metal of the present invention has a porosity of about 5~70%.

[0030] Meanwhile, metals corrode due to the diffusion of oxygen contacting the surface of the metal or the diffusion of the metal itself. Open cell micropores can be blocked due to this corrosion of metal. Accordingly, in the present invention, a corrosion inhibition film is plated on the surface of the sintered compact, polished in S**4** and the surface of the micropores (S**5**).

[0031] This plating process (S**5**) is characterized in that the micropores are not blocked and the inner walls thereof are precisely plated by employing dry plating, such as vacuum ion plating.

[0032] Prior to the plating process (S**5**), an ultrasonic cleaning process, an acid cleaning process, a water separation process and a drying process are performed. Then, the corrosion inhibition film is applied on the surface of the porous metal and the inner wall of the micropores through this plating process (S**5**).

[0033] After this plating process (S**5**) is completed, various post-treatments may be performed according to the use of the porous metal. In these post-treatments, the plated compact may be immersed in a fragrance emission material which emits a desired fragrance, or the fragrance emission material may be charged between the pores by exposing the plated compact to a high-pressure controlled fragrance emission material-laden atmosphere. Since this process of charging the fragrance emission material can be repeatedly performed after most of the fragrance has been emitted and the concentration thereof is thus low, the fragrance can be emitted semi-permanently.

[0034] As shown in FIG. **3**, in the present invention, it can be seen that the low melting point materials, located between the target metals **10**, are discharged by evaporation or extraction in the sintering process, thereby forming pores **20**.

[0035] Since the pores **20** in FIG. **3**, unlike conventional technologies, are spaces charged with the low melting point metals, the sizes of the pores are larger than those of pores formed by alloying metals having melting points similar to each other. Accordingly, the porosity of the porous metal is also increased. That is, in the present invention, the pores of porous metal are easily formed in precious metals using the low melting point metals, and the porosity thereof can thus be remarkably increased.

What is claimed is:

1. A method of manufacturing an open cell porous metal, comprising the steps of:

mixing a target metal with a low melting point material having a melting point lower than that of the target metal to form a mixture;

forming a compact by pressurizing the mixture;

forming a sintered compact, in which open cell micropores are formed, by sintering and polishing the compact; and

plating the sintered compact.

2. The method according to claim **1**, wherein a mixing ratio of the target metal to the low melting point material ranges from 7:3 to 9.95:0.05.

3. The method according to claim **1**, wherein the low melting point material has a melting point of 200~600° C.

4. The method according to claim **1**, wherein, in the step of sintering, the open cell micropores are formed in the compact by melting only the low melting point material.

5. The method according to claim **4**, wherein, in the step of sintering, the low melting point material is melted at a temperature of 200~3500° C. in an ammonia cracking reductive atmosphere or a vacuum atmosphere.

6. The method according to claim **1**, wherein, in the step of plating, a corrosion inhibition film is plated using a dry plating method.

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