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(54) **Surface Treatment Method For Housing**

(57) A surface treatment method for housings comprising: providing a metal housing and pre-treating it to be cleaned; electroplating the housing to form a hexavalent chromium coating on the surface of the housing;

and electroplating the housing to form a trivalent chromium coating on the hexavalent chromium coating.

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Description

[0001] The present disclosure relates to a surface treatment method for housings, especially to an electroplating method for metal housings.

[0002] A typical surface treatment method now for portable electronic devices' housings is electroplating. Commonly, the housing is electroplated to form a trivalent chromium coating on its surface to present high gloss appearance and enhance abrasion resistance. To enhance the bonding between the trivalent chromium coating and the housing, the housing is electroplated with a nickel coating prior to the forming of the chromium coating. However, the nickel coating and the whole process of electroplating with nickel are not environmentally friendly because the nickel or nickel iron contained in the electrolyte is toxic.

[0003] Therefore, there is room for improvement within the art.

BRIEF DESCRIPTION OF THE DRAWING

[0004] Many aspects of the surface treatment method for housing can be better understood with reference to Figure 1. The emphasis of Figure 1 is placed upon clearly illustrating the principles of the surface treatment for housing.

[0005] Figure 1 is a flow chart of an exemplary embodiment of a surface treatment method for a housing.

DETAILED DESCRIPTION

[0006] Referring to Figure 1, a surface treatment method for a housing may include the steps S10 to S50.

[0007] In step S10, a metal housing is provided. The metal housing may be made of, e.g., stainless steel or copper. The metal housing may be a mobile phone, a digital camera, a personal digital assistant, or a note book computer's housing. The metal housing may also be a housing of a container.

[0008] In step S20, the metal housing is pretreated. The pre-treating step may comprise one or more of the following: degreasing, electrochemical cleaning, and acid treating the housing.

[0009] The degreasing process may be carried out by dipping the housing in a degreasing solution for about 5-15 minutes. The mass concentration of the degreasing agent is about 150-200 grams per liter (g/L). The temperature of the degreasing solution is about 55-65 °C.

[0010] After the degreasing process, the housing is removed from the degreasing solution to be electrochemically cleaned. Electrochemical cleaning the housing may be carried out in a first electrolyte. The first electrolyte may contain a sodium hydroxide component in a mass concentration of about 100-200 g/L and an activating agent(s) component in a mass concentration of about 40-80 g/L. The activating agent(s) may be dodecyl sulfonic acid sodium salt. The temperature of the first elec-

trolyte is about 55-65 °C. The electric current density through the first electrolyte is about 1-5 A/dm². Electrochemically cleaning the housing may last for about 4-10 minutes. The electrochemical cleaning step can further remove lipids adhering to the housing and smudges.

[0011] After the electrochemical cleaning process, the housing is dipped in a sulfuric acid solution for about 1-5 minutes to remove the residual basic liquid adhering to the housing's surface. The concentration by volume of the sulfuric acid in the solution is about 50-80 ml/L. The temperature of the sulfuric acid solution is about 20-30 °C. After the acid treatment, the housing is water washed; in this embodiment the housing is water washed three times.

[0012] In step S30, the housing is electroplated to form a hexavalent chromium coating on its surface. Electroplating the housing to form the hexavalent chromium coating may be carried out in a second electrolyte, with the metalized surface of the housing being a cathode, and a stannum (Sn) plumbum (Pb) alloy anode being provided and immersed in the second electrolyte. The second electrolyte may contain a chromium acid (H₂CrO₄) component in a mass concentration of about 240-350 g/L and a sulfuric acid component in a mass concentration of about 2-4 g/L. The second electrolyte may further contain additive agent(s), such as fluoride. The additive agent(s) may improve the forming of the hexavalent chromium coating on the surface of the housing. The mass concentration of the additive agent(s) in the second electrolyte is about 5-10 g/L. The electric current density through the second electrolyte is about 10-30 A/dm². Electroplating the housing with the hexavalent chromium coating may last for about 1-15 minutes. The hexavalent chromium coating bonds well with the housing because of having similar properties as copper or stainless steel. After the electroplating, the housing is bathed in water.

[0013] In step S40, the housing is electroplated to form a trivalent chromium coating on the hexavalent chromium coating. Electroplating the housing to form the trivalent chromium coating may be carried out in a third electrolyte, with the metalized surface of the housing being a cathode, and an iridium (Ir) tantalum (Ta) alloy anode being provided and immersed in the third electrolyte. The third electrolyte may contain a chromium sulphate (Cr₂(SO₄)₃) component in a mass concentration of about 240-300 g/L, and a boric acid component in a mass concentration of about 70-90 g/L. The third electrolyte may further contain additive agent(s) such as bromide and formate. The mass concentration of the bromide in the third electrolyte is about 15-20 g/L, and the mass concentration of the formate is about 70-90 g/L. The mass concentration of the trivalent chromium iron in the third electrolyte is about 3-10 g/L. The electric current density through the third electrolyte is about 5-15 A/dm². Electroplating the housing with the trivalent chromium coating may last for about 1-15 minutes. The trivalent chromium coating bond well with the hexavalent chromium coating for the two coat-

ings are all contain the chromium element. The trivalent chromium coating being formed on the hexavalent chromium coating prevents the problem that the trivalent chromium coating is tend to split for directly formed on the surface of the housing.

[0014] After electroplating, the housing is again bathed in water.

[0015] In step S50, the housing is subjected to neutralization treatment. The neutralization treatment is carried out by dipping the housing in a neutralization solution for about 1-3 minutes to remove any residual electrolyte adhering to the housing. The neutralization solution includes a sulfuric acid component in a concentration by volume of about 20-50 ml/L, and an oxydol component in a concentration by volume of about 50-100 ml/L. The temperature of the neutralization solution is about 20-30 °C. After receiving neutralization treatment, the housing is bathed once more in water.

[0016] The surface treatment method for housing described above forms a hexavalent chromium coating on the surface of the housing prior to forming the trivalent chromium coating, which prevents the tendency of the trivalent chromium coating to split when directly formed on the surface of the housing, and enhances the bonding between the trivalent chromium and the housing. The two chromium coatings can further enhance the rigidity of the housing and make the housing present more glossy appearance, thus producing better protected parts of the housing. Moreover, the two coatings do not contain nickel and so are more environmentally friendly.

[0017] It is believed that the present embodiment and its advantages will be understood from the foregoing description, and it will be apparent that various changes may be made thereto without departing from the spirit and scope of the disclosure or sacrificing all of its advantages, the examples hereinbefore described merely being preferred or exemplary embodiment of the disclosure.

Claims

1. A surface treatment method for a housing, comprising:

providing a metal housing and pre-treating it to be cleaned;
electroplating the housing to form a hexavalent chromium coating on a surface of the housing;
and
electroplating the housing to form a trivalent chromium coating on the hexavalent chromium coating.

2. The surface treatment method as claimed in claim 1, wherein the metal housing is made of stainless steel or copper.

3. The surface treatment method as claimed in claim

1, wherein electroplating the housing to form the hexavalent chromium coating is carried out in a second electrolyte containing a chromium acid component in a mass concentration of about 240-350 g/L and a sulfuric acid component in a mass concentration of about 2-4 g/L.

4. The surface treatment method as claimed in claim 3, wherein the second electrolyte further contains fluoride additive agent(s) in a mass concentration of about 5-10 g/L.

5. The surface treatment method as claimed in claim 4, wherein the electric current density through the second electrolyte is about 10-30 A/dm², and the electroplating last for about 1-15 minutes.

6. The surface treatment method as claimed in claim 1, wherein electroplating the housing to form the trivalent chromium coating is carried out in a third electrolyte containing a chromium sulphate component and a boric acid component, the mass concentration of the trivalent chromium iron in the third electrolyte is about 3-10 g/L.

7. The surface treatment method as claimed in claim 6, wherein the electric current density through the third electrolyte is about 5-15 A/dm², and the electroplating last for about 1-15 minutes.

8. The surface treatment method as claimed in claim 1, wherein the housing is subjected to neutralization treatment after the electroplating process in a neutralization solution including a sulfuric acid component and an oxydol component.

9. The surface treatment method as claimed in claim 1, wherein pre-treating the housing includes degreasing, electrochemical cleaning and acid treating the housing.

10. The surface treatment method as claimed in claim 9, wherein electrochemical cleaning the housing is carried out in a first electrolyte containing a sodium hydroxide component, the temperature of the first electrolyte is about 55-65 °C, the electric current density through the first electrolyte is about 1-5 A/dm², and the electrochemical cleaning last for about 4-10 minutes.

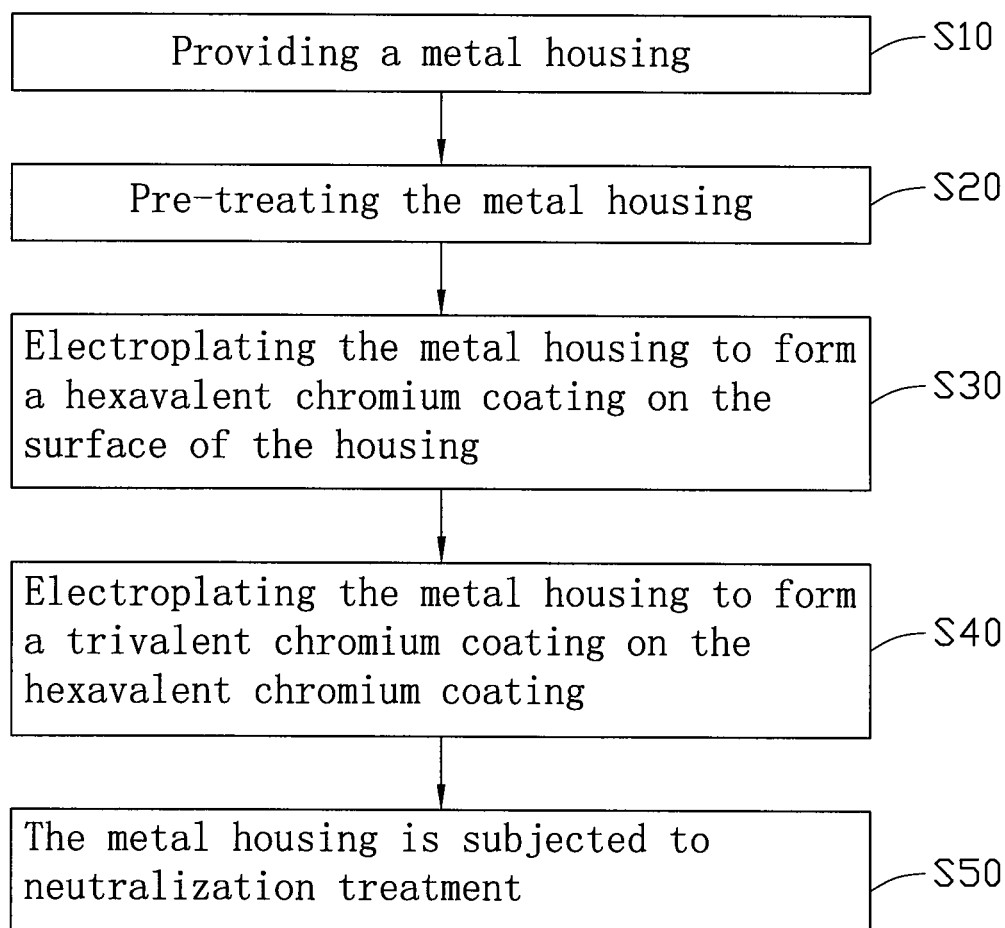


FIG. 1