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3,354,334

STORAGE TUBE TARGET AND METHOD FOR MAKING SAME

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The present invention relates to a process for manufacturing storage tube targets and to the targets produced thereby. More particularly, it relates to a process for manufacturing targets having induced conductivity is characterized by preliminarily activating an insulating material with an activating metal. The present invention also concerns targets of induced conductivity having a porous insulating layer exhibiting induced conductivity properties and a remanence that may be accurately predetermined.

Known in connection with storage tubes are the so-called induced conductivity targets, that is, targets comprising a metallic layer in contact with an insulating layer made of a dielectric material, such as zinc sulfide, having the property of becoming momentarily conductive when electrons quickly traverse the insulating layer, by liberating along the paths thereof a large quantity of secondary electrons.

It is also known that if the electrons which bombard the target carry a signal, this signal is inscribed in the form of a voltage relief on the insulating face of the target. The length of time of subsistence of the relief in this presence of read-out is called the remanence of the target. This remanence conserves a certain minimum value even if one proceeds to erase or rub out the potential relief by depositing positive charges on the insulating face of the target.

A process for the manufacture of these targets has already been described in the U.S. Patent No. 2,998,331 to R. Rigot et al., assigned to the assignee of the present application, in which an insulation with induced conductivity was vaporized on a film of collodion containing a certain amount of activating impurities which became lodged, after the destruction of the collodion, within the surface of the insulating layers of slightly below its surface.

Experience and tests indicate that the targets manufactured in accordance with this prior art process possess a minimum remanence, during the erasing or rubbing out procedure, in excess to the values desired, and that. These targets did not lend themselves to the establishment of a predetermined remanence of subsistence of the relief within a desirable range, but could only be manufactured with a single remanence value, within very narrow manufacturing deviations.

The present invention is directed to a manufacturing process which produces a target substantially free from these shortcomings, that is, a target which has a substantially reduced minimum remanence during erasure, and which may be manufactured with a predetermined value for the remanence of subsistence of the relief and which can be selected from a large range of desirable remanences.

Accordingly, it is an object of the present invention to provide a process for the manufacture of induced conductivity targets for storage tubes which eliminates the shortcomings and drawbacks encountered in the prior art.

Another object of the present invention resides in a process for the manufacture of induced conductivity targets for storage tubes wherein the various steps may

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be so chosen and controlled as to provide a suitable selection from a substantial number of different remanences.

Still a further object of the present invention resides in a process for the manufacture of induced conductivity targets which readily lends itself to the manufacture of targets having a predetermined remanence which may be readily controlled and maintained within desired limits.

Another object of the present invention resides in a method for producing induced conductivity targets for storage tubes which possess a minimum remanence, during erasure, which is compatible with values desired in practice.

A further object of the present invention resides in an improved target with induced conductivity for storage tubes having remanence characteristics which are very satisfactory for practical applications.

Still another object of the present invention resides in a target with induced conductivity wherein the remanence may be predetermined and is of such a value that it is suitable for practical use.

These and other objects, features and advantages of the present invention will become more obvious from the following description of the process in accordance with the present invention, and the target resulting therefrom.

The process according to the present invention comprises utilizing the insulating material having the property of induced conductivity and activated, in that state by an activating metal, such as manganese, copper or analogous material, this metal being present in an amount of 0.1 to 10% by weight, depending on the desired value of the remanence. This activated substance is then deposited on the metallic layer, for example, aluminum or on a film of collodion which is utilized as a temporary support between the metallic layer and the insulating layer. The activated substance is deposited on the metallic layer by vaporization under vacuum using conditions such that the deposited insulating layer is porous.

It will be readily understood that the porosity of the insulating layer produces the desired effect on the minimum remanence during erasure. Since the capacity of a porous structure is reduced with respect to that of a dense structure of the same materials and dimensions in such a manner that the time constant of discharge is reduced, the erasure requires less time. However, if this porous structure were made of a dielectric material such as pure zinc sulfide, its remanence of subsistence of the relief would also be very slight with respect to a dense structure, and would find itself outside of the range of desirable remanences. The addition of an activator such as Mn or Cu or an analogous material to the primary material intended to be vaporized under vacuum permits the reestablishment of this remanence and brings the same back within the limits of the desirable range. Furthermore, since the value of the remanence within this range is a function of the dosage of the activator, by a suitable choice of the dosage it is possible to manufacture a target with predetermined remanence.

As an illustrative example, zinc sulfide is activated with manganese in an amount of about 0.1% to 10% by weight, to obtain a target in which the remanence of subsistence of the relief is equal to 2 to 20 times the time required by the signal to attain one-half of its initial value, depending on the amount of activator used. The activated zinc sulfide is then vaporized, for example, on a film of aluminum or collodion under the conditions well known to one skilled in the art to obtain a porous deposit. Well known process conditions include, for example, a vacuum of about 10^{-4} mm. Hg. and a relatively low temperature of about 950° C. The minimum remanence during the erasure of this target is less than two seconds. For pur-

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poses of comparison it should be noted that the targets manufactured by the process of the aforementioned prior art patents have a minimum remanence during erasure of not less than 8 seconds, and the remanence of subsistence of the relief was always fixed, except for deviations in manufacture, to the same value, for example in tens of seconds, and was not controllable or adjustable.

While we have described one embodiment in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible to numerous changes and modifications within the spirit and scope thereof, as known to a person skilled in the art, and we therefore do not wish to be limited to the details shown and described herein but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

We claim:

1. A method for controlling, during manufacture, the remanence time of a storage tube target having a porous insulating layer providing induced conductivity properties, comprising the steps of:

selecting a predetermined amount of activating metal selected from the group consisting of manganese and copper and adding the same to the insulating layer prior to forming said layer.

2. A method for controlling, during manufacture, the remanence time of a storage tube target having a porous insulating layer providing induced conductivity properties, comprising the steps of:

selecting by weight of about a predetermined amount of activating metal selected from the group consisting of manganese and copper and adding same to the insulating layer prior to forming said layer.

3. A storage tube target having a predetermined remanence comprising a thin aluminum layer support and a porous insulating layer deposited on said thin aluminum layer support, said insulating layer having induced conductivity properties and consisting essentially of a zinc sulfide insulating material mixed with about 0.1 to 10% by weight of an activating metal selected from the group consisting of manganese and copper, said activating metal having activating properties for the zinc sulfide.

4. A process for producing storage tube targets which comprises coating one surface of an aluminum layer with an insulating layer having induced conductivity properties and consisting essentially of a zinc sulfide insulating

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material mixed with about 0.1 to 10% by weight of an activating metal having activating properties for said insulating material, said activating metal selected from the group consisting of manganese and copper, and vaporizing said insulating layer in a vacuum and at a temperature sufficient to produce a porous insulating layer.

5. The process of claim 4, wherein a film of collodion is utilized as a temporary support between the metallic layer and the insulating layer.

6. The process of claim 4, wherein the vacuum is about 10^{-4} mm. Hg and the temperature is about 950° C.

7. A process for producing storage tube targets which comprises coating one surface of an aluminum layer with an insulating layer having induced conductivity properties and consisting essentially of a zinc sulfide insulating material mixed with about 0.1 to 10% by weight of an activating metal having activating properties for said insulating material, said activating metal selected from the group consisting of manganese and copper, and vaporizing said insulating layer in a vacuum of about 10^{-4} mm. Hg and at a temperature of about 950° C.

8. A process for producing storage tube targets which comprises coating one surface of a film of collodion with a metallic layer of aluminum, coating the other surface of said film with an insulating layer having induced conductivity properties and consisting essentially of a zinc sulfide insulating material mixed with about 0.1 to 10% by weight of an activating metal having activating properties for said insulating material, said activating metal selected from the group consisting of manganese and copper, vaporizing said insulating layer in a vacuum at a temperature sufficient to produce a porous insulating layer, and baking said coated film at a temperature sufficient to eliminate said collodion film, whereby said insulating layer directly coats said metallic layer.

9. The process of claim 8, wherein the vacuum is about 10^{-4} mm. Hg and the vaporizing temperature is about 950° C.

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