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(54) Manufacturing process and structure of ink jet printhead

Herstellungsverfahren und Struktur eines Tintenstrahldruckkopfes

Procédé de fabrication et structure d'une tête d'impression à jet d'encre

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Description

[0001] The present invention is related to a manufacturing process and structure of an ink jet printhead, and especially to an improved manufacturing process and structure of an ink jet printhead with high quality, yield rate, and performance.

BACKGROUND OF THE INVENTION

[0002] Generally, the bubble ink jet printhead ejects ink through a nozzle by using resistor device to boil the ink. During the process for manufacturing the conventional ink jet printhead, some toxic gas is generated and some operational difficulties reduce the yield rate. In addition, the conventional ink jet printhead has a shorter lifetime resulting from the overall structure problem.

[0003] In order to understand the conventional process for manufacturing the conventional ink jet printhead, please refer to Fig. 1. A silicon dioxide layer 12 is formed on a silicon substrate 11 by thermal oxidation and a resistor 13 (e.g. tantalum-aluminum alloy) is formed on the silicon dioxide layer 12 through a sputtering process. Thereafter, an aluminum- conducting layer 14 is formed on a portion of the resistor 13 by sputtering process and then a passivation 15 is formed over the conducting layer 12 and the resistor 13, not covered by the conducting layer 14, by plasma enhanced chemical vapor deposition (PECVD). The passivation 15 is a silicon nitride (Si₃N₄) /silicon carbide (SiC) layer. Finally, an isolator 16 is formed on the passivation 15 and then a nozzle plate 17 is stuck on the isolator 16 by an adhesive agent.

[0004] In the conventional process, the resistor 13 is usually made of tantalum-aluminum alloy. Because the tantalum-aluminum alloy is a material with high resistance, a phenomenon of electron migration will be generated when a current passes through the resistor and is accumulated to cause the resistor at a high temperature so that the useful lifetime of the ink jet printhead is reduced. In addition, there are some toxic gas generated during the process for forming the silicon nitride (Si₃N₄) /silicon carbide (SiC) layer by PECVD. Therefore, an object of the present invention is to provide an improved process for manufacturing the ink jet printhead to avoid the above described defects of the conventional process

[0005] US-A-5,635,968 discloses a thermal inkjet printer printhead with offset heater resistors. However, this document does not describe forming a resistor made of tantalum nitride over a dielectric layer formed over a substrate, forming a doping layer over said resistor, and doping said resistor by a doping drive-in procedure using an element with an atomic radius which is 10-30% of that of tantalum as a dopant source.

[0006] JP-A-04086267 (Abstract) relates to the manufacture of a heat generating element for thermal head. To minimize the resistance value variations of said heat generating element a polysilicon film is used which is

obtained by a solid-phase growth of an amorphous silicon film as a boron-doped polysilicon film after injection of phosphorus ion or boron ion.

SUMMARY OF THE INVENTION

[0007] An object of the present invention is to provide a manufacturing process and structure of an ink jet printhead with low resistance in order to prolong the lifetime of the ink jet printhead and to avoid generating toxic gas upon manufacturing. The object is achieved by the processes of claims 1 and 13 and the device of claim 18. The process includes steps of: a) providing a substrate; b) forming a dielectric layer over the substrate; c) forming a resistor over the dielectric layer and forming a doping resistor layer after the resistor is doped through a doping drive-in procedure; d) forming a conducting layer over a portion of the resistor; e) forming a passivation over a portion of the conducting layer and another portion of the resistor not covered by the conducting layer; f) forming a hole over the passivation for storing an ink; and g) forming a nozzle over the hole for ejecting there-through the ink.

[0008] In accordance with one aspect of the present invention, the dielectric layer is formed by thermal oxidation.

[0009] In accordance with another aspect of the present invention, the dielectric layer is a silicon dioxide layer.

[0010] In accordance with the present invention, the resistor is a tantalum nitride (TaN) layer.

[0011] In accordance with the present invention, the doping drive-in procedure is a diffusion method or ion implantation.

[0012] In accordance with the present invention, the doping drive-in procedure uses an element with an atomic radius which is 10-30% of that of tantalum as a dopant source.

[0013] In accordance with another aspect of the present invention, the doping resistor layer is a metal layer containing an element selected from a group consisting of tantalum (Ta), indium (In), lead (Pb), praseodymium (Pr), and samarium (Sm).

[0014] In accordance with another aspect of the present invention, the conducting layer is formed by sputtering process, photolithography, and etching technique.

[0015] In accordance with another aspect of the present invention, the conducting layer is an aluminum metal layer.

[0016] In accordance with another aspect of the present invention, the passivation is formed by plasma enhanced chemical vapor deposition (PECVD) or direct current (DC) sputtering technique.

[0017] In accordance with another aspect of the present invention, the passivation is a silicon nitride layer.

[0018] In accordance with another aspect of the

present invention, after the step (e), the process further includes a step for forming a metal layer over another portion of the conducting layer not covered by the passivation.

[0019] In accordance with another aspect of the present invention, the metal layer is a gold (Au) metal layer formed by sputtering process.

[0020] In accordance with another aspect of the present invention, the hole is defined by forming a photoresist over a portion of the passivation.

[0021] In accordance with another aspect of the present invention, the nozzle is formed by using a nozzle plate attached to the photoresist.

[0022] Another object of the present invention is to provide a preferable process for manufacturing an ink jet printhead.

[0023] In the preferred embodiment of the present invention, the process includes steps of: a) providing a substrate; b) forming a dielectric layer over the substrate; c) forming a first resistor made of tantalum nitride over the dielectric layer; d) forming a doping layer over the first resistor said doping layer containing an element with an atomic radius which is 10 - 30% of that of tantalum; e) forming a second resistor over the doping layer; f) forming a resistor layer after the doping layer is diffused to the first and second resistors; g) forming a conducting layer over a portion of the resistor layer; h) forming a passivation over a portion of the conducting layer and another portion of the resistor layer not covered by the conducting layer; i) forming a hole over the passivation for storing an ink; and j) forming a nozzle over the hole for ejecting therethrough the ink.

[0024] In accordance with one aspect of the present invention, the first resistor is formed by direct current (DC) sputtering technique.

[0025] In accordance with another aspect of the present invention, the doping layer is formed by direct current (DC) sputtering technique.

[0026] In accordance with another aspect of the present invention, the doping layer is a metal layer containing an element selected from a group consisting of indium (In), lead (Pb), praseodymium (Pr), and samarium (Sm).

[0027] In accordance with another aspect of the present invention, the second resistor is a tantalum nitride (TaN) layer formed by direct current (DC) sputtering technique.

[0028] In accordance with another aspect of the present invention, the resistor layer is formed through a rapid thermal process (RTP). Another object of the present invention is to provide a structure of an ink jet printhead.

[0029] The structure according to the present invention is defined by claim 1.

[0030] The present invention may best be understood through the following description with reference to the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

[0031]

Fig. 1 is a schematic diagram showing the conventional ink jet printhead;

Fig. 2 (a)-(f) are schematic diagrams showing a preferred embodiment of the processes for manufacturing an ink jet printhead according to the present invention; and

Fig. 3 (a)-(e) are schematic diagrams showing another preferred embodiment of the processes for forming a resistor of the ink jet printhead according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0032] Please refer to Fig. 2 (a)-(f) showing a preferred embodiment of the process for manufacturing an ink jet printhead according to the present invention. The detailed manufacturing processes are described as follows.

[0033] In Fig. 2 (a), a dielectric layer 22 is formed over a silicon substrate 21 by thermal oxidation. The dielectric layer 22 can be a silicon dioxide layer 22.

[0034] As shown in Fig. 2 (b), a resistor 23 is formed over the silicon dioxide layer 22 by direct current (DC) sputtering technique. The resistor 23 can be a tantalum nitride (TaN) layer. Compared with the conventional ink jet printhead, the TaN layer has a lower resistance in comparison with tantalum-aluminum alloy so that the lifetime of the ink jet printhead of the present invention can be extended.

[0035] The step shown in Fig. 2 (c) is to form a conducting layer 24 over a portion of the resistor 23 by sputtering process, photolithography, and etching technique. The conducting layer 24 can be an aluminum metal layer.

[0036] In Fig. 2 (d), a passivation 25 is formed over a portion of the conducting layer 24 and another portion of the resistor 23, not covered by the conducting layer 24, by plasma enhanced chemical vapor deposition (PECVD) or direct current (DC) sputtering technique. The passivation 25 can be a silicon nitride layer 25. If the silicon nitride layer 25 is formed by direct current (DC) sputtering technique, it can prevent from generating any toxic gas during the manufacturing process of the present invention. Moreover, if the silicon nitride layer 25 is formed by direct current (DC) sputtering technique, the process can be easily completed only by introducing nitrogen gas (N₂) therein. Therefore, they greatly improve the process for manufacturing the ink jet printhead.

[0037] As shown in Fig. 2 (e), a metal layer 26 is formed over another portion of the conducting layer 24 not covered by the passivation 25 by sputtering process. The metal layer 26 is a gold (Au) metal layer. Thereafter,

a photoresist 27 is formed over a portion of the passivation for forming a hole to store ink therein.

[0038] In Fig. 2 (f), a nozzle plate 28 is attached to the photoresist 27 for providing at least a nozzle to eject therethrough the ink.

[0039] In a preferred embodiment of the process of the present invention (not shown), the resistor 23 can be doped through a doping drive-in procedure to form a doping resistor layer. The doping drive-in procedure can be executed by diffusion method or ion implantation. The resistor 23 is a tantalum nitride (TaN) layer 23. The doping drive-in procedure uses an element with an atomic radius which is 10~30% of that of tantalum as a dopant source.

[0040] Preferably, the doping resistor layer can be a metal layer containing tantalum (Ta), indium (In), lead (Pb), praseodymium (Pr), or samarium (Sm).

[0041] Other steps for manufacturing the ink jet printhead of the present invention are the same as those described above.

[0042] In another preferred embodiment of the process of the present invention, a dielectric layer 22 is formed over a silicon substrate 21 by thermal oxidation and a resistor 23 is formed by processes as shown in Fig. 3 (a)~(e). First of all, a first resistor 231 is formed over the dielectric layer 22 by direct current (DC) sputtering technique, wherein the first resistor 231 is a tantalum nitride (TaN) layer. Thereafter, a doping layer 232 is formed over the first resistor 231 by direct current (DC) sputtering technique. The doping layer 232 is doped by an element with an atomic radius which is 10~30% of that of tantalum. Preferably, the doping layer 232 can be a metal layer containing indium (In), lead (Pb), praseodymium (Pr), or samarium (Sm). Thenceforth, a second resistor 233 is formed over the doping layer 232 by direct current (DC) sputtering technique. The second resistor 233 can be a tantalum nitride (TaN) layer. Finally, the resistor 23 can be obtained after the doping layer 232 is diffused to the first and second resistors 231 and 233 through a rapid thermal process (RTP). The following steps for completely manufacturing the ink jet printhead of the present invention are the same as those described above.

[0043] The present invention provides a rapid process for manufacturing the ink jet printhead. The resistor 23 can be effectively free from phenomenon of electron migration so that the resistor will not be damaged due to a long overheating time and the useful lifetime of the ink jet printhead can be elongated.

[0044] In conclusion, the present invention provides an improved manufacturing process and structure of an ink jet printhead with high quality, yield rate, and performance to avoid the defects of the conventional process such as uneasy control, generating toxic gas, short useful lifetime and so on. While the invention has been described in terms of what are presently considered to be the most practical and preferred embodiments, it is to be understood that the invention need not be limited

to the disclosed embodiment. On the contrary, it is intended to cover various modifications and similar arrangements included within the appended claims.

Claims

1. A process for manufacturing an ink jet printhead, comprising steps of:
 - a) providing a substrate (21);
 - b) forming a dielectric layer (22) over said substrate;
 - c) forming a resistor (23) made of tantalum nitride over said dielectric layer, forming a doping layer over said resistor, and doping said resistor by a doping drive-in procedure using an element with an atomic radius which is 10-30% of that of tantalum as a dopant source, wherein said doping drive-in procedure is a diffusion method or an ion implantation procedure;
 - d) forming a conducting layer (24) over a portion of said resistor;
 - e) forming a passivation (25) over a portion of said conducting layer and another portion of said resistor not covered by said conducting layer;
 - f) forming a hole over said passivation for storing an ink; and
 - g) forming a nozzle (28) over said hole for ejecting therethrough said ink.
2. A process according to claim 1 wherein in said step (b), said dielectric layer is formed by thermal oxidation.
3. A process according to claim 1 wherein in said step (b), said dielectric layer is a silicon dioxide layer.
4. A process according to claim 1 wherein said doping resistor layer is a metal layer containing an element selected from a group consisting of tantalum (Ta), indium (In), lead (Pb), praseodymium (Pr), and samarium (Sm).
5. A process according to claim 1 wherein in said step (d), said conducting layer is formed by sputtering process, photolithography, and etching technique.
6. A process according to claim 1 wherein said conducting layer is an aluminum metal layer.
7. A process according to claim 1 wherein in said step (e), said passivation is formed by one of plasma enhanced chemical vapour deposition (PECVD) and direct current (DC) sputtering technique.
8. A process according to claim 1 wherein said passi-

vation is a silicon nitride layer.

9. A process according to claim 1, further comprising a step after said step e); forming a metal layer over another portion of said conducting layer not covered by said passivation. 5
10. A process according to claim 9 wherein said metal layer is a gold (AU) metal layer formed by sputtering process. 10
11. A process according to claim 1 wherein in said step f), said hole is defined by forming a photoresist over a portion of said passivation. 15
12. A process according to claim 1 wherein in said step g), said nozzle is formed by using a nozzle plate attached to said photoresist.
13. A process for manufacturing an ink jet printhead, comprising steps of: 20
 - a) providing a substrate (21);
 - b) forming a dielectric layer (22) over said substrate; 25
 - c) forming a first resistor (231) made of tantalum nitride over said dielectric layer;
 - d) forming a doping layer (232) over said first resistor, said doping layer containing an element with an atomic radius which is 10-30% of that of tantalum; 30
 - e) forming a second resistor (233) over said doping layer;
 - f) forming a resistor layer (23) after said doping layer is diffused to said first and second resistor by using a rapid thermal process; 35
 - g) forming a conducting layer (24) over a portion of said resistor layer by a direct current sputtering technique;
 - h) forming a passivation (25) over a portion of said conducting layer and another portion of said resistor not covered by said conducting layer; 40
 - i) forming a hole over said passivation for storing an ink; and 45
 - j) forming a nozzle (28) over said hole for ejecting therethrough said ink.
14. A process according to claim 13 wherein said first resistor is formed by direct current (DC) sputtering technique. 50
15. A process according to claim 13 wherein said doping layer is formed by direct current (DC) sputtering technique. 55
16. A process according to claim 13 wherein said doping layer is a metal layer containing an element se-

lected from a group consisting of indium (IN), lead (Pb), praseodymium (Pr), and samarium (Sm).

17. A process according to claim 13 wherein said second resistor is a tantalum nitride (TaN) layer formed by direct current (DC) sputtering technique.
18. A structure of an ink jet printhead, comprising:
 - a substrate (21);
 - a dielectric layer (22) formed on said substrate;
 - a resistor (23) formed on said dielectric layer, said resistor (23) made of tantalum nitride doped with an element as a dopant source, said element having an atomic radius which is 10-30% of that of tantalum;
 - a conducting layer (24) formed over a portion of said resistor;
 - a passivation (25) formed over a portion of said conducting layer and another portion of said resistor not covered by said conducting layer;
 - a photoresist (27) formed over a portion of said passivation for providing a hole to store an ink therein;
 - a metal layer (26) formed over another portion of said conducting layer not covered by said passivation; and
 - a nozzle plate (28) positioned over said passivation for providing at least a nozzle corresponding to said hole to eject said ink.

Patentansprüche

1. Verfahren zum Herstellen von einem Tintenstrahl-Druckkopf, mit den Schritten:
 - a) Bereitstellen von einem Substrat (21);
 - b) Ausbilden einer dielektrischen Schicht (22) über dem Substrat;
 - c) Ausbilden von einem aus Tantalnitrid hergestellten Widerstand (23) über der dielektrischen Schicht, Ausbilden einer Dotierungsschicht über dem Widerstand, und Dotieren des Widerstands durch eine Drive-in-Dotierungsprozedur unter Verwendung eines Elements mit einem Atomradius, der 10-30 % von dem von Tantal als eine Dotierungsquelle beträgt, wobei die Drive-in-Dotierungsprozedur ein Diffusionsverfahren oder eine Ionen-Implantationsprozedur ist;
 - d) Ausbilden einer leitenden Schicht (24) über einem Bereich des Widerstands;
 - e) Ausbilden einer Passivierung (25) über einem Bereich der leitenden Schicht und einem anderen Bereich des Widerstands, der nicht durch die leitende Schicht überdeckt ist;
 - f) Ausbilden von einem Loch über der Passivie-

- rung zum Speichern von Tinte; und
 g) Ausbilden einer Düse (28) über dem Loch, um durch dieses die Tinte auszuspritzen.
2. Verfahren nach Anspruch 1, bei dem in Schritt (b) die dielektrische Schicht durch thermische Oxidation gebildet ist. 5
 3. Verfahren nach Anspruch 1, bei dem in Schritt (b) die dielektrische Schicht eine Siliziumdioxidschicht ist. 10
 4. Verfahren nach Anspruch 1, bei dem die Dotierungswiderstandsschicht eine Metallschicht ist, die ein Element enthält, das aus einer Gruppe ausgewählt ist, die Tantal (Ta), Indium (In), Blei (Pb), Praseodym (Pr) und Samarium (Sm) beinhaltet. 15
 5. Verfahren nach Anspruch 1, bei dem in Schritt (d) die leitende Schicht durch einen Sputter-Prozess, durch Photolithographie und durch Ätztechniken hergestellt ist. 20
 6. Verfahren nach Anspruch 1, bei dem die leitende Schicht eine Aluminiummetallschicht ist. 25
 7. Verfahren nach Anspruch 1, bei dem in Schritt (e) die Passivierung durch verbesserte Plasma-Chemical-Vapour-Deposition (PECVD) oder Sputter-Technik unter Verwendung von Gleichstrom (DC) hergestellt ist. 30
 8. Verfahren nach Anspruch 1, bei dem die Passivierung eine Siliziumnitritschicht ist. 35
 9. Verfahren nach Anspruch 1, außerdem mit einem Schritt nach Schritt (e):
 Ausbilden einer Metallschicht über einem anderen Bereich der leitenden Schicht, die nicht durch die Passivierung überdeckt ist. 40
 10. Verfahren nach Anspruch 9, bei dem die Metallschicht eine Goldmetallschicht (Au) ist, die durch einen Sputter-Prozess hergestellt ist. 45
 11. Verfahren nach Anspruch 1, bei dem in Schritt (f) das Loch durch Ausbilden von einem Photoresist über einem Bereich der Passivierung definiert ist. 50
 12. Verfahren nach Anspruch 1, bei dem in Schritt (g) die Düse unter Verwendung einer Düsenplatte gebildet ist, die an dem Photoresist angebracht ist.
 13. Verfahren zum Herstellen von einem Tintenstrahl-Druckkopf, mit den Schritten: 55
 - a) Bereitstellen von einem Substrat (21);
 - b) Ausbilden einer dielektrischen Schicht (22) über dem Substrat;
 - c) Ausbilden von einem aus Tantalnitrit hergestellten ersten Widerstand (23) über der dielektrischen Schicht;
 - d) Ausbilden einer Dotierungsschicht (232) über dem ersten Widerstand, wobei die Dotierungsschicht ein Element mit einem Atomradius enthält, der 10-30 % von dem von Tantal beträgt;
 - e) Ausbilden von einem zweiten Widerstand (233) über der Dotierungsschicht;
 - f) Ausbilden einer Widerstandsschicht (23), nachdem die Dotierungsschicht unter Verwendung von einem schnellen thermischen Prozess in den ersten und zweiten Widerstand diffundiert ist;
 - g) Ausbilden einer leitenden Schicht (24) über einem Bereich des Widerstands durch eine Gleichstrom-Sputter-Technik;
 - h) Ausbilden einer Passivierung (25) über einem Bereich der leitenden Schicht und einem anderen Bereich des Widerstands, der nicht durch die leitende Schicht überdeckt ist;
 - i) Ausbilden von einem Loch über der Passivierung zum Speichern von Tinte; und
 - j) Ausbilden einer Düse (28) über dem Loch, um durch dieses die Tinte auszuspritzen.
 14. Verfahren nach Anspruch 13, bei dem der erste Widerstand durch eine Sputter-Technik unter Verwendung von Gleichstrom (DC) hergestellt ist.
 15. Verfahren nach Anspruch 13, bei dem die Dotierungsschicht durch eine Sputter-Technik unter Verwendung von Gleichstrom (DC) hergestellt ist.
 16. Verfahren nach Anspruch 13, bei dem die Dotierungsschicht eine Metallschicht ist, die ein Element enthält, das aus einer Gruppe ausgewählt ist, die Indium (In), Blei (Pb), Praseodym (Pr) und Samarium (Sm) beinhaltet.
 17. Verfahren nach Anspruch 13, bei dem der zweite Widerstand eine Tantalnitrit-Schicht (TaN) ist, die durch eine Sputter-Technik unter Verwendung von Gleichstrom (DC) hergestellt ist.
 18. Struktur von einem Tintenstrahl-Druckkopf, mit:
 einem Substrat (21);
 einer dielektrischen Schicht (22), die auf dem Substrat ausgebildet ist;
 einem Widerstand (23), der auf der dielektrischen Schicht ausgebildet ist, wobei der Widerstand (23) aus Tantalnitrit hergestellt ist, dotiert mit einem Element als Dotierungsquelle, wobei das Element einen Atomradius hat, der 10-30

% von dem von Tantal beträgt;
 einer leitenden Schicht (24), die über einem Bereich des Widerstands ausgebildet ist;
 einer Passivierung (25), die über einem Bereich der leitenden Schicht und einem anderen Bereich des Widerstands ausgebildet ist, der nicht durch die leitende Schicht überdeckt ist;
 einem Photoresist (27), das über einem Bereich der Passivierung ausgebildet ist, um ein Loch vorzusehen, um darin Tinte zu speichern;
 einer Metallschicht (26), die über einem anderen Bereich der leitenden Schicht ausgebildet ist, der nicht durch die Passivierung überdeckt ist; und
 einer Düsenplatte (28), die über der Passivierung angeordnet ist, um zumindest eine Düse vorzusehen, die dem Loch zugehörig ist, um die Tinte auszuspritzen.

Revendications

1. Procédé de fabrication d'une tête d'impression à jet d'encre, comprenant les étapes consistant à :

a) fournir un substrat (21) ;
 b) former une couche de diélectrique (22) sur ledit substrat ;
 c) former une résistance (23) constituée de nitrure de tantale sur ladite couche de diélectrique, formant une couche dopante sur ladite résistance, et doper ladite résistance grâce à une opération d'implantation dopante utilisant un élément ayant un rayon atomique qui est compris entre 10 et 30 % de celui du tantale comme source dopante, ladite opération d'implantation dopante étant un procédé de diffusion ou une opération d'implantation d'ion ;
 d) former une couche conductrice (24) sur une partie de ladite résistance ;
 e) former une passivation (25) sur une partie de ladite couche conductrice et une autre partie de ladite résistance non recouverte par ladite couche conductrice ;
 f) former un orifice sur ladite passivation afin de stocker une encre ; et
 g) former une buse (28) par dessus ledit orifice afin d'éjecter ladite encre à travers celui-ci.

2. Procédé selon la revendication 1, dans lequel, au cours de ladite étape (b), ladite couche de diélectrique est formée par oxydation thermique.
3. Procédé selon la revendication 1, dans lequel, au cours de ladite étape (b), ladite couche de diélectrique est une couche de dioxyde de silicium.
4. Procédé selon la revendication 1, dans lequel ladite

couche de résistance dopante est une couche métallique contenant un élément choisi parmi un groupe consistant en tantale (Ta), indium (In), plomb (Pb), praséodyme (Pr), et samarium (Sm).

5. Procédé selon la revendication 1, dans lequel, au cours de ladite étape (d), ladite couche conductrice est formée grâce à un procédé de pulvérisation, une photolithographie et une technique d'attaque chimique.

6. Procédé selon la revendication 1, dans lequel ladite couche conductrice est une couche métallique d'aluminium.

7. Procédé selon la revendication 1, dans lequel, au cours de ladite étape (e), ladite passivation est formée grâce à l'une des techniques de dépôt chimique en phase vapeur utilisant du plasma (PECVD) et de pulvérisation par courant continu (CC).

8. Procédé selon la revendication 1, dans lequel ladite passivation est une couche de nitrure de silicium.

9. Procédé selon la revendication 1, comprenant en outre une étape, exécutée après ladite étape e) consistant à :

former une couche métallique sur une autre partie de ladite couche conductrice non recouverte par ladite passivation.

10. Procédé selon la revendication 9, dans lequel ladite couche métallique est une couche métallique d'or (AU) formée grâce à un procédé par pulvérisation.

11. Procédé selon la revendication 1, dans lequel, au cours de ladite étape f), ledit orifice est défini par la formation d'une résine photosensible sur une partie de ladite passivation.

12. Procédé selon la revendication 1, dans lequel, au cours de ladite étape g), ladite buse est formée en utilisant une plaque de buse fixée sur ladite résine photosensible.

13. Procédé de fabrication d'une tête d'impression à jet d'encre comprenant les étapes consistant à :

a) fournir un substrat (21) ;
 b) former une couche de diélectrique (22) sur ledit substrat ;
 c) former une première résistance (231) constituée de nitrure de tantale sur ladite couche de diélectrique,
 d) former une couche dopante (232) sur ladite première résistance, ladite couche dopante contenant un élément ayant un rayon atomique

qui est compris entre 10 et 30 % de celui du tantale ;

e) former une seconde résistance (233) sur ladite couche dopante ;

f) former une couche résistante (23) après que ladite couche dopante a été diffusée vers lesdites première et seconde résistances en utilisant un procédé thermique rapide ; 5

g) former une couche conductrice (24) sur une partie de ladite couche résistante grâce à une technique de pulvérisation par courant continu ; 10

h) former une passivation (25) sur une partie de ladite couche conductrice et une autre partie de ladite résistance non recouverte par ladite couche conductrice ; 15

i) former un orifice sur ladite passivation afin de stocker une encre ; et

j) former une buse (28) par dessus ledit orifice afin d'éjecter ladite encre à travers celui-ci. 20

14. Procédé selon la revendication 13, dans lequel ladite première résistance est formée grâce à une technique de pulvérisation par courant continu (CC). 25

15. Procédé selon la revendication 13, dans lequel ladite couche dopante est formée grâce à une technique de pulvérisation par courant continu (CC). 30

16. Procédé selon la revendication 13, dans lequel ladite couche dopante est une couche métallique contenant un élément choisi parmi un groupe consistant en indium (In), plomb (Pb), praséodyme (Pr), et samarium (Sm). 35

17. Procédé selon la revendication 13, dans lequel ladite seconde résistance est une couche de nitrure de tantale (TaN) formée grâce à une technique de pulvérisation par courant continu (CC). 40

18. Structure de tête d'impression à jet d'encre comprenant :

un substrat (21) ; 45

une couche de diélectrique (22) formée sur ledit substrat ;

une résistance (23) formée sur ladite couche de diélectrique, ladite résistance (23) étant constituée de nitrure de tantale dopé avec un élément, comme source dopante, ledit élément ayant un rayon atomique qui est compris entre 10 et 30 % de celui du tantale ; 50

une couche conductrice (24) formée sur une partie de ladite résistance ; 55

une passivation (25) formée sur une partie de ladite couche conductrice et une autre partie de ladite résistance non recouverte par ladite cou-

che conductrice ;

une résine photosensible (27) formée sur une partie de ladite passivation afin de fournir un orifice permettant de stocker une encre, à l'intérieur de celui-ci ;

une couche métallique (26) formée sur une autre partie de ladite couche conductrice non recouverte par ladite passivation ; et

une plaque de buse (28) placée sur ladite passivation afin de fournir au moins une buse correspondant audit orifice afin d'éjecter ladite encre.

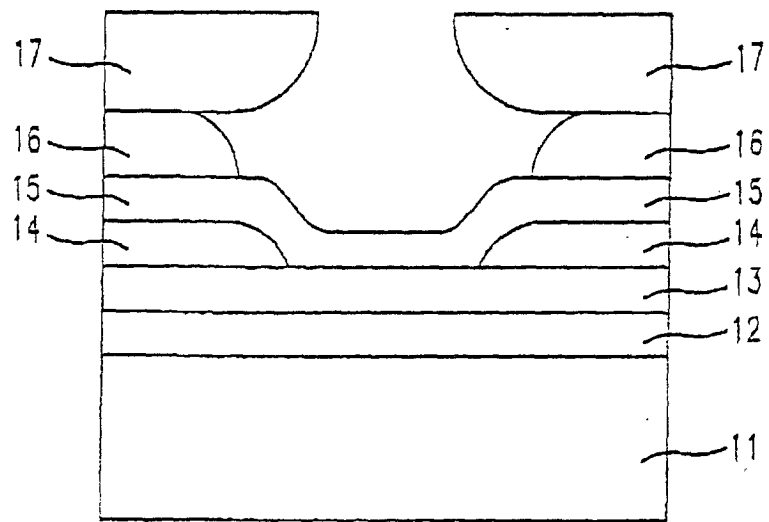


Fig. 1

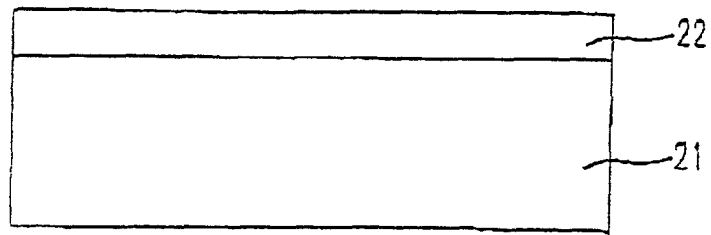


Fig. 2a

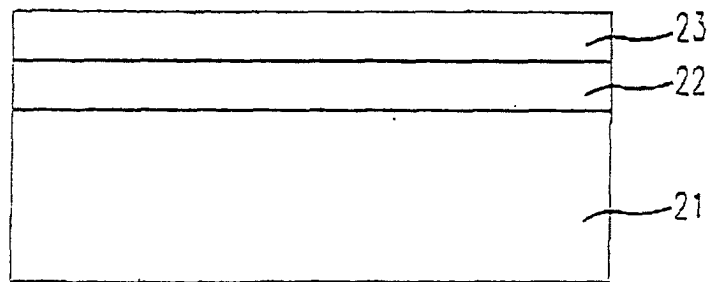


Fig. 2b

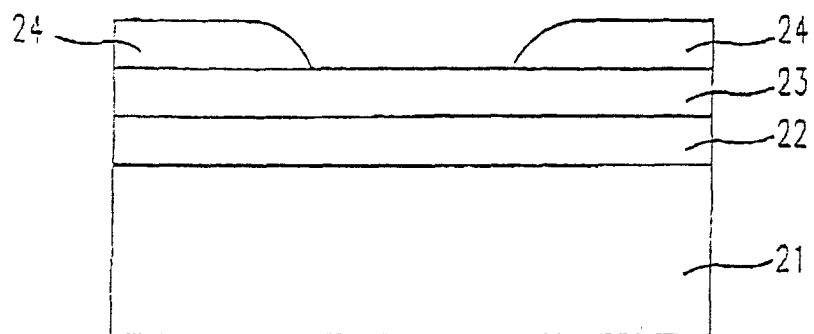


Fig. 2c

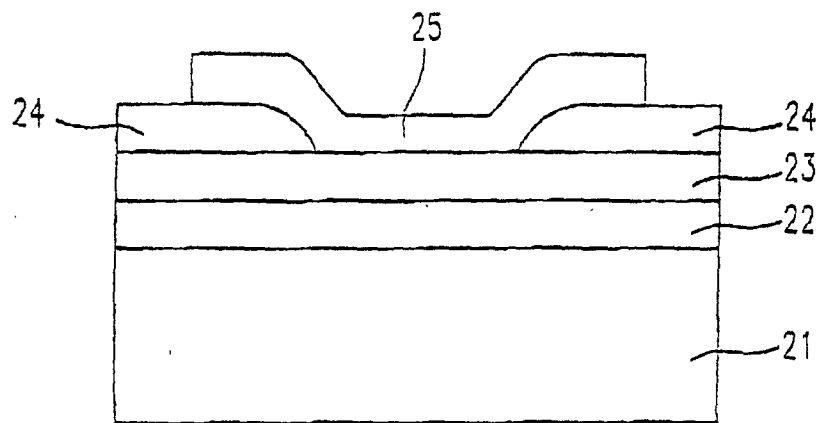


Fig. 2d

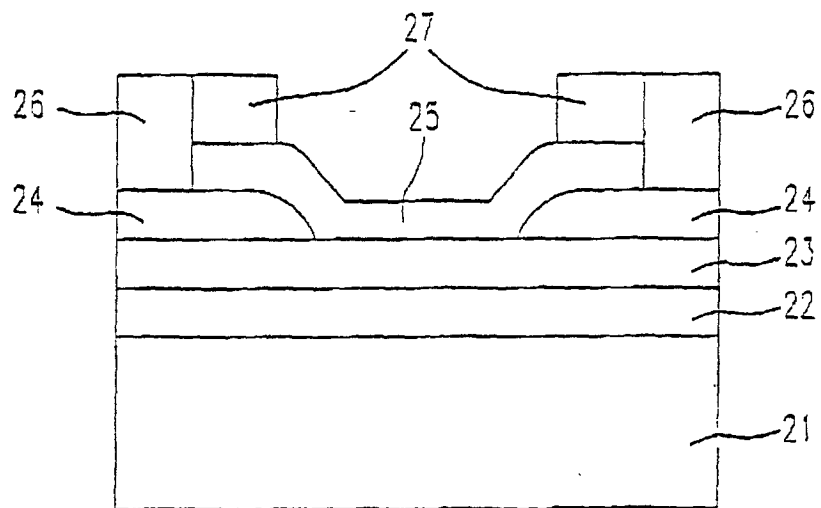


Fig. 2e

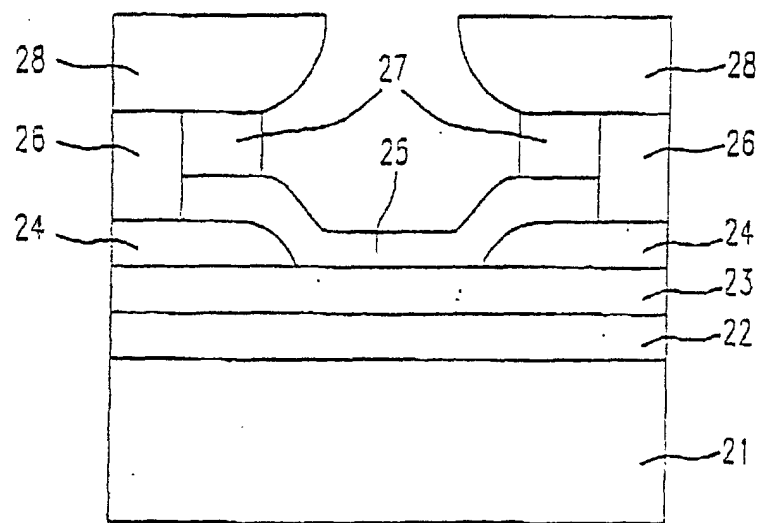


Fig. 2f

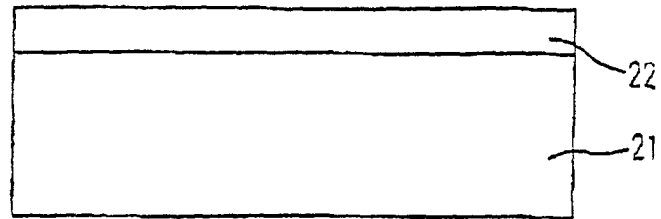


Fig. 3a

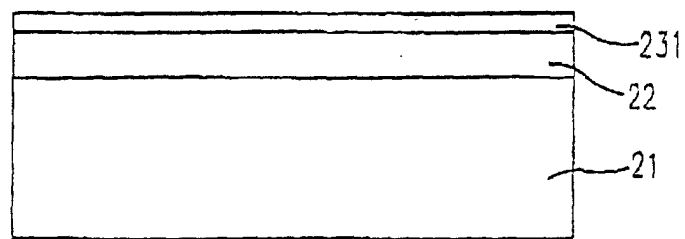


Fig. 3b

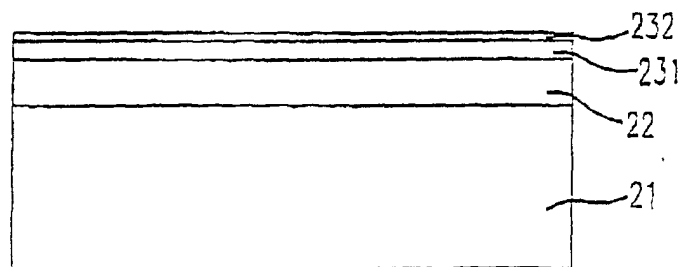


Fig. 3c

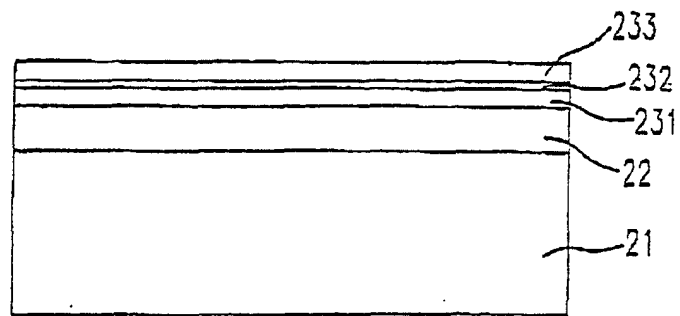


Fig. 3d

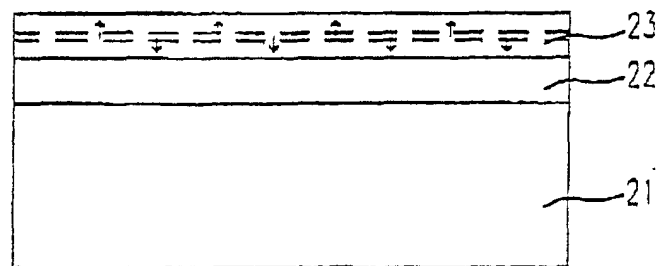


Fig. 3e