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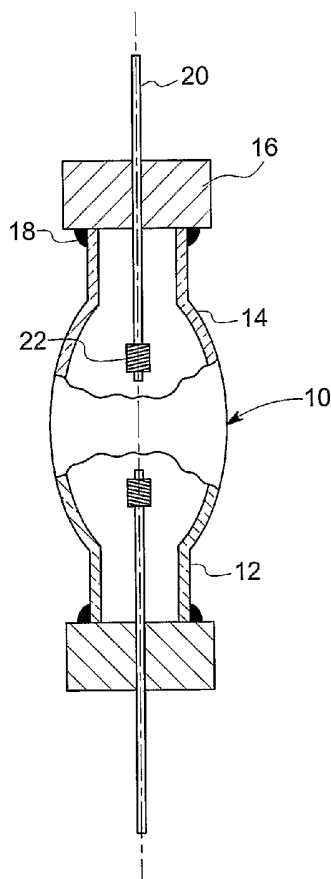
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(54) Title: CONDUCTIVE ELEMENT AND METHOD OF MAKING



(57) Abstract: A conductive element comprises a metal core (20) and a coating (24), wherein the coating (24) comprises at least one layer of aluminum, an aluminum alloy, an aluminide, silicon, a silicon alloy, a silicide, and combinations thereof, and wherein the at least one layer has a predetermined thickness. A method of making a conductive element comprises depositing a coating material on a metal core (20) to form a coated metal core and heating the coated metal core to a predetermined temperature to form at least one layer of aluminum, an aluminum alloy, an aluminide, silicon, a silicon alloy, a silicide, and combinations thereof.

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**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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## INTERNATIONAL SEARCH REPORT

International application No

PCT, JS2005/026019

## A. CLASSIFICATION OF SUBJECT MATTER

INV. C23C30/00 H01J5/32 H01J9/28 H01J61/36

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C23C H01J H01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                   | Relevant to claim No.                                                                      |
|-----------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| X         | US 3 753 768 A (INOUE Y, JA ET AL)<br>21 August 1973 (1973-08-21)<br>abstract; examples 1,2<br>----- | 1, 41, 45,<br>46, 62                                                                       |
| X         | US 3 668 391 A (STEPHEN F. KIMBALL)<br>6 June 1972 (1972-06-06)                                      | 1, 2, 6,<br>13, 16,<br>17,<br>20-22,<br>26, 33,<br>36,<br>39-41,<br>43-45,<br>62, 63<br>18 |
| Y         | abstract<br>column 1, line 6 - column 2, line 76<br>-----<br>-/--                                    |                                                                                            |

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

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## INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                 | Relevant to claim No.                             |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| A         | US 6 384 533 B1 (GIESEL THOMAS ET AL)<br>7 May 2002 (2002-05-07)<br>abstract; figure 1; examples 2-9<br>-----                                                                      | 1,2,16,<br>19-22                                  |
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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2005/026019

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

see extra sheet

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 16, 41 (second alternative); when dependent thereon:  
2, 6, 7, 13-15, 17-22, 26, 27, 33-40,  
43-46, 62, 63

A conductive element, or a structure comprising two such conductive elements as conductive feedthroughs, or a method of making such a conductive element; the conductive element comprising a metal core and a coating, wherein the coating comprises at least one layer of an aluminum alloy, and wherein the at least one layer has a predetermined thickness.

- 1.1. claims: 1, 16, 41 (first and third alternatives)

A conductive element, or a structure comprising two such conductive elements as conductive feedthroughs, or a method of making such a conductive element; the conductive element comprising a metal core and a coating, wherein the coating comprises at least one layer of aluminum or an aluminide, and wherein the at least one layer has a predetermined thickness.

- 1.2. claims: 2, 22, 43 (second and third alternatives)

The conductive element according to Claim 1, or the structure according to Claim 16, or the method according to Claim 41, wherein the metal core comprises tungsten or molybdenum..

- 1.3. claims: 6, 7, 26, 27

The conductive element according to Claim 1, or the structure according to Claim 16, or the method according to Claim 41, wherein the aluminide layer has been formed from a layer of aluminum or an aluminum alloy coating on the metal core.

- 1.4. claims: 13, 33

The conductive element according to Claim 1, or the structure according to Claim 16, wherein the predetermined thickness of the at least one layer is about 5 micrometers to about 500 micrometers.

- 1.5. claim: 17

The structure according to Claim 16, wherein the sealed envelope comprises a material selected from the group consisting of quartz, polycrystalline alumina, micro grain polycrystalline alumina, yttria, yttrium aluminum garnet, and ytterbium aluminum

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

## 1.6. claims: 18, 19

The structure according to Claim 16, wherein the at least two electrode tips comprises molybdenum or tungsten.

## 1.7. claims: 20, 21; 36-39; 63 (first alternative)

The structure according to Claim 16 further comprising a dosing substance disposed within the sealed envelope; or wherein the structure is a (particular kind of) lamp.

## 1.8. claim: 40

The structure according to Claim 16, wherein the sealed envelope and the conductive feedthrough are exposed to air.

## 1.9. claim: 44

The method according to Claim 41, wherein the depositing comprises a method selected from the group consisting of chemical vapor deposition, physical vapor deposition, slurry coating, spray coating, pack cementation, and combinations thereof.

## 1.10. claim: 45

The method according to Claim 41, wherein the predetermined temperature is in a range from about 100°C to about 1500°C.

## 1.11. claim: 46

The method according to Claim 41, wherein the inert atmosphere comprises argon, helium, neon, krypton, xenon, and combinations thereof.

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2. claims: 1, 16, 41 (fourth to sixth alternatives); when dependent thereon: 2, 8-15, 17-22, 28-40, 42-46, 62, 63

A conductive element, or a structure comprising two such conductive elements as conductive feedthroughs, or a method of making such a conductive element; the conductive element comprising a metal core and a coating, wherein the coating comprises at least one layer of silicon, a silicon alloy, a silicide, and wherein the at least one layer has a predetermined thickness.

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## 3. claims: 2,22,43 (first alternative)

The conductive element according to Claim 1, or the structure according to Claim 16, or the method according to Claim 41, wherein the metal core comprises niobium.

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## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

## 4. claims: 3-5,23-25,42

The conductive element according to Claim 1, or the structure according to Claim 16, or the method according to Claim 41, wherein the aluminide comprises an aluminide of at least one of chromium, titanium, niobium, zirconium, hafnium, iron, tin, yttrium, combinations thereof, and alloys thereof.

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## 5. claims: 14,15,34,35

The conductive element according to Claim 1, or the structure according to Claim 16, wherein the predetermined thickness of the at least one layer is about 30 micrometers to about 300 micrometers.

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## 6. claims: 47-61

A method of making a conductive feedthrough for a lamp, the method comprising:  
providing a niobium alloy core; providing at least one precursor of a coating material in a slurry; depositing the slurry on the niobium alloy core such that the niobium alloy core is covered by the slurry; and heating the niobium alloy core covered by the slurry at a predetermined temperature in an inert atmosphere for a predetermined period of time to form a coating on the niobium alloy core.

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## 7. claim: 63 (second to fourth alternatives)

An article of manufacture comprising the conductive element of Claim 1; wherein the article of manufacture is selected from a group consisting of electric motors, sensors, and thermocouples.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT 52005/026019

| Patent document<br>cited in search report |    | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
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