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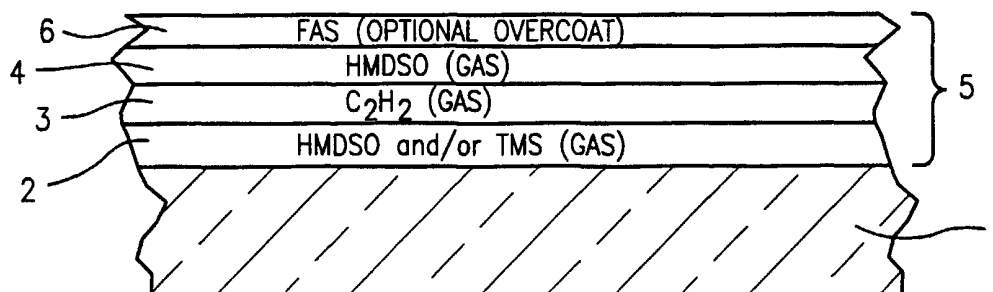
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(54) Title: COATED ARTICLE INCLUDING A DLC INCLUSIVE LAYER(S) AND A LAYER(S) DEPOSITED USING SILOXYNE GAS, AND CORRESPONDING METHOD



(57) Abstract: A substrate is coated with a coating system including at least one diamond-like carbon (DLC) inclusive layer. In certain embodiments, the coating system includes an anti-reflective layer, a DLC inclusive layer provided for hardness/durability purposes, a primer layer, and an FAS (fluoro alkyl silane) inclusive hydrophobic layer provided over the primer layer. The anti-reflective layer is provided in order to reduce visible light reflections off of the resulting coated article and thus to improve visible transmission of the article. In certain embodiments, the primer layer may be provided in order to enable improved adhesion between the FAS inclusive layer and the DLC inclusive layer that is provided for hardness/durability. In certain embodiments, each of the anti-reflective layer, the DLC inclusive layer, and/or the primer layer may include DLC for purposes described herein. In certain alternative embodiments, the primer and FAS layers need to be provided.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/27299

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C03C17/42 B32B9/00 C03C17/34

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)
IPC 7 C03C

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)

EP0-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|--------------------------|
| A | US 5 880 552 A (CHRISEY DOUGLAS BRIAN ET AL) 9 March 1999 (1999-03-09) abstract column 6, line 56 - column 7, line 7 column 7, line 26 - line 33 claims 1,10,11 --- | 1-27, 42-45, 53-61 |
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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"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

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Date of the actual completion of the international search

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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. |
|------------|---|--|
| X | US 6 086 962 A (BROWN DAVID WARD ET AL) 11 July 2000 (2000-07-11) abstract column 5, line 33 - line 43 | 34,37, 38,62-66 |
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| X | --- WO 00 47290 A (DIAMONEX INC) 17 August 2000 (2000-08-17) abstract page 12, line 16 -page 13, line 17 page 14, line 18 -page 15, line 4 example A | 34,38, 62,63, 65,66 |
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| P,X | --- US 6 280 834 B1 (VEERASAMY VIJAYEN S ET AL) 28 August 2001 (2001-08-28) abstract column 7, line 22 -column 8, line 20 column 13, line 29 - line 43 ----- | 28, 30-34, 37,38, 62-67 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/27299

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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:
see FURTHER INFORMATION sheet PCT/ISA/210
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 II Observations where unity of invention is lacking (Continuation of item 2 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.:

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

Continuation of Box I.2

Present claims 21-22, 24-25, 27, 42-43, 45, 53-59 relate to an extremely large number of possible products/methods. Support within the meaning of Article 6 PCT and/or disclosure within the meaning of Article 5 PCT is to be found, however, for only a very small proportion of the compounds/methods claimed. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Consequently, the search has been carried out for those parts of the claims which appear to be supported and disclosed, namely those parts relating to the compounds/methods comprising FAS (Fluoro Alkyl Silane) in the hydrophobic layer.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. Claims: 1-20 , 21-22 partially, 23, 24-25 partially, 26, 27 partially, 42-43 partially, 44, 45 partially, 53-59 partially, 60-61

A primer layer to improve bonding between a Diamond Like Carbon (DLC) and a Fluoro Alkyl Silane (FAS) layer.

2. Claims: 28-41, 46-52, 62-67

The combination of a siloxane anti-reflection coating with a specific refractive index on a substrate with a Diamond Like Carbon coating.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/27299

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