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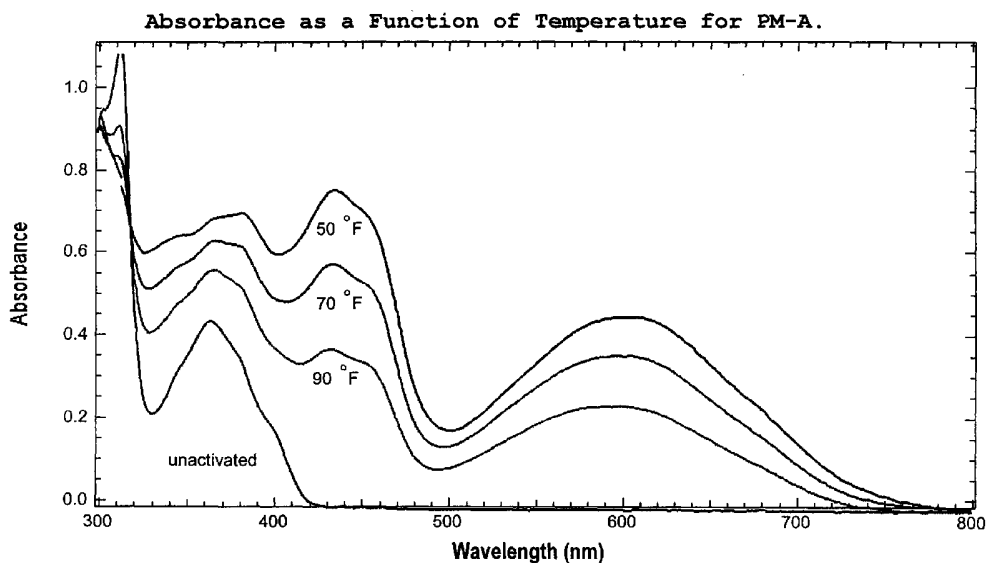
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GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
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[Continued on next page]

(54) Title: PHOTOCHROMIC ARTICLES WITH REDUCED TEMPERATURE DEPENDENCY AND METHODS FOR PREPA-
RATION



(57) Abstract: Described are photochromic articles that include a substrate and at least one photochromic material adopted to change from an unactivated form to an activated form upon exposure to actinic radiation. The activated form of the photochromic material changes from more absorbing to less absorbing of radiation in the absorption region of its unactivated form as the temperature increases from 10°C to 35°C. The photochromic article demonstrates a more consistent photochromic response, for example, an optical density response loss of 50 percent or less over a temperature range of from 10°C to 35°C as measured in the Photochromic Temperature Dependence Test. Methods for producing the aforescribed articles are also disclosed.



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INTERNATIONAL SEARCH REPORT

 International Application No
 PC 7 US2004/007874

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C09K11/06 C07D311/94

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 C09K C07D

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, CHEM ABS Data, 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.
X	US 6 296 785 B1 (CHOPRA ANU ET AL) 2 October 2001 (2001-10-02) cited in the application column 30, line 1 - line 3 column 56, line 41 - line 42; claims 1-23 column 49, line 6 - line 20 -----	1-78
X	WO 01/70719 A (TRANSITIONS OPTICAL INC) 27 September 2001 (2001-09-27) the whole document -----	1-5,8-78
X	US 2002/169315 A1 (WEIGAND UDO ET AL) 14 November 2002 (2002-11-14) the whole document -----	1-5,8-78
X	US 2003/008958 A1 (MOMODA JUNJI ET AL) 9 January 2003 (2003-01-09) the whole document -----	1-5,8-78
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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 :

"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

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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.

"&" document member of the same patent family

Date of the actual completion of the international search

20 December 2004

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INTERNATIONAL SEARCH REPORT

International Application No

PC US2004/007874

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 5 961 892 A (STEWART KEVIN J ET AL) 5 October 1999 (1999-10-05) cited in the application the whole document -----	1-5,8-78
X	US 5 955 520 A (HELLER HARRY G ET AL) 21 September 1999 (1999-09-21) cited in the application the whole document -----	1-5,8-78
X	US 5 723 072 A (KUMAR ANIL) 3 March 1998 (1998-03-03) cited in the application the whole document -----	1-5,8-78
X	US 5 645 767 A (VAN GEMERT BARRY) 8 July 1997 (1997-07-08) cited in the application the whole document -----	1-5,8-78
X	US 6 146 554 A (WEIGAND UDO ET AL) 14 November 2000 (2000-11-14) cited in the application the whole document -----	1-5,8-78
X	US 6 113 814 A (CHOPRA ANU ET AL) 5 September 2000 (2000-09-05) cited in the application the whole document -----	1-5,8-78
X	US 5 698 141 A (KUMAR ANIL) 16 December 1997 (1997-12-16) cited in the application the whole document -----	1-5,8-78

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2004/007874

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:
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 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.:
1 (part) - 78 (part)

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 II.2

Claims Nos.: -

Present claims 1-3 relate to a photochromic article defined by reference to a desirable characteristic or property, namely a photochromic article as claimed in claims 1-3 "being adapted to exhibit an activated optical density response loss" of a certain value as claimed in claims 1-3.

The claims cover all a photochromic articles having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and disclosure within the meaning of Article 5 PCT for only a very limited number of such articles. 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.

Present claim 9 relates to a photochromic article defined by reference to a desirable characteristic or property, namely a photochromic article as claimed in claims 1 and "being adapted to exhibit an activated optical density response loss" of a certain value as claimed in claim 1 and "being adapted to exhibit a neutral activated colour" as claimed in claim 9.

The claim covers all a photochromic articles having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and disclosure within the meaning of Article 5 PCT for only a very limited number of such articles. 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.

Present claims 43 and 44 relate to a photochromic article defined by reference to a desirable characteristic or property, namely a photochromic article as claimed in claim 43 "being adapted to exhibit an activated state luminous transmittances" of a certain value as claimed in claims 43 and 44.

The claims cover all a photochromic articles having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and disclosure within the meaning of Article 5 PCT for only a very limited number of such articles. 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.

Independent of the above reasoning, the claims 1-3, 9, 43, 44 also lack clarity (Article 6 PCT). An attempt is made to define the photochromic articles by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to the photochromic articles as described by means of their technical features as disclosed in claims 4-7, namely photochromic articles, which are defined by their structural formulae as they are mentioned in claims

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

4-7.

Present claim 77 relates to a method for producing a photochromic article defined by reference to a desirable characteristic or property, namely by obtaining a photochromic article "being adapted to change from an unactivated form to an activated form upon exposure to actinic radiation" as claimed in claim 77.

The claim covers all methods for producing photochromic articles having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and disclosure within the meaning of Article 5 PCT for only a very limited number of such articles. 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.

Independent of the above reasoning, the claim also lacks clarity (Article 6 PCT). An attempt is made to define the method for producing photochromic articles by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claim which appear to be clear, supported and disclosed, namely those parts relating to the method for producing photochromic articles as described by means of their technical features as disclosed in claims 4-7, namely photochromic articles, which are defined by their structural formulae as they are mentioned in claims 4-7.

As a result, all claims depending on claims 1-3, 9, 43, 44 or 77 have been searched incompletely as well with a restriction to the structural formulae as they are mentioned in claims 4-7.

The applicant's attention is drawn to the fact that 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. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

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 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (a) as disclosed in claim 6 or formula (a) as disclosed in claim 7 and method of its production.

2. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (b) as disclosed in claim 6 or formula (b) as disclosed in claim 7 and method of its production.

3. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (c) as disclosed in claim 6 or formula (c) as disclosed in claim 7 and method of its production.

4. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (d) as disclosed in claim 6 or formula (d) as disclosed in claim 7 and method of its production.

5. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (e) as disclosed in claim 6 or formula (e) as disclosed in claim 7 and method of its production.

6. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (f) as disclosed in claim 6 or formula (f) as disclosed in claim 7 and method of its production.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

7. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (g) as disclosed in claim 6 or formula (g) as disclosed in claim 7 and method of its production.

8. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (h) as disclosed in claim 6 or formula (h) as disclosed in claim 7 and method of its production.

9. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (i) as disclosed in claim 6 or formula (i) as disclosed in claim 7 and method of its production.

10. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (k) as disclosed in claim 6 or formula (p) as disclosed in claim 7 and method of its production.

11. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (l) as disclosed in claim 6 or formula (n) as disclosed in claim 7 and method of its production.

12. claims: 1 (part) - 6(part), 8 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (m) as disclosed in claim 6 and method of its production.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

13. claims: 1 (part) - 6(part), 8 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (n) as disclosed in claim 6 and method of its production.

14. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (o) as disclosed in claim 6 or formula (k) as disclosed in claim 7 and method of its production.

15. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (p) as disclosed in claim 6 or formula (r) as disclosed in claim 7 and method of its production.

16. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (q) as disclosed in claim 6 or formula (t) as disclosed in claim 7 and method of its production.

17. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (r) as disclosed in claim 6 and method of its production.

18. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material (b) of the graphic formula I as disclosed in claim 4 wherein the photochromic material is represented by formula (1) (s) as disclosed in claim 6 or formula (u) as disclosed in claim 7 and method of its production.

19. claims: 1 (part) - 6(part), 8 (part) - 78 (part)

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

A photochromic article comprising a photochromic material
(b) of the graphic formula II as disclosed in claim 4 and
method of its production.

20. claims: 1 (part) - 6(part), 8 (part) - 78 (part)

A photochromic article comprising a photochromic material
(b) of the graphic formula III as disclosed in claim 4 and
method of its production.

21. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material
(b) of the graphic formula IV as disclosed in claim 4 and
method of its production.

22. claims: 1 (part) - 6(part), 8 (part) - 78 (part)

A photochromic article comprising a photochromic material
(b) of the graphic formula V as disclosed in claim 4 and
method of its production.

23. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material
(b) of the graphic formula VI as disclosed in claim 4 and
method of its production.

24. claims: 1 (part) - 6(part), 8 (part) - 78 (part)

A photochromic article comprising a photochromic material
(b) of the graphic formula VII as disclosed in claim 4 and
method of its production.

25. claims: 1 (part) - 78 (part)

A photochromic article comprising a photochromic material
(b) of the graphic formula VIII as disclosed in claim 4 and
method of its production.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PO/US2004/007874

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