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C07D 235/06 (2006.01) *C09B 23/02* (2006.01)
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- (71) **Applicant (for all designated States except US):** **THE GENERAL HOSPITAL CORPORATION** [US/US]; 55 Fruit Street, Boston, Massachusetts 02114 (US).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** **HILDERBRAND, Scott A.** [US/US]; 31 Sculpin Way, Swampscott, Massachusetts 01907 (US). **WEISSELEDER, Ralph** [DE/US]; 11 Nicholes Lane, Peabody, Massachusetts 01960 (US). **SHAO, Fangwei** [CN/US]; 170 Gore Street, #106, Cambridge, Massachusetts 02141 (US).
- (74) **Agents:** **KUGLER DEYOUNG, Janice** et al.; Fish & Richardson P.C., P.O. Box 1022, Minneapolis, Minnesota 55440-1022 (US).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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— with international search report (Art. 21(3))

[Continued on next page]

(54) **Title:** MONOFUNCTIONAL CARBOCYANINE DYES FOR IN VIVO AND IN VITRO IMAGING

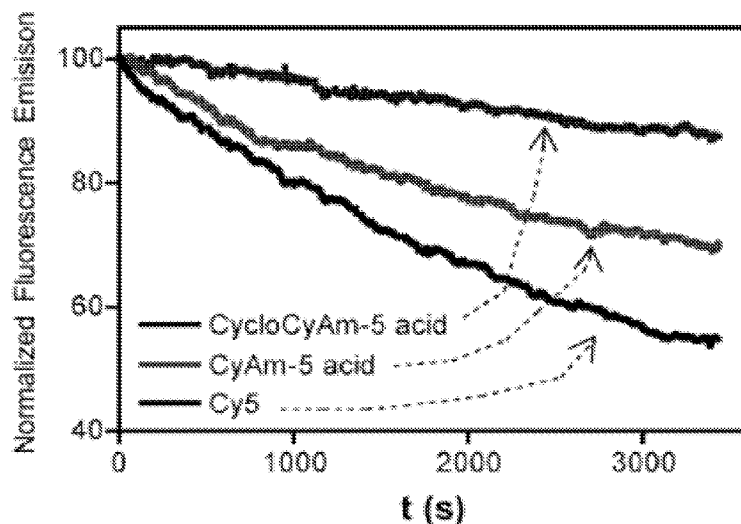


FIG. 7

(57) **Abstract:** The present invention provides symmetric carbocyanine dyes and dye precursors useful for fluorescence microscopy, and methods of making and using same.

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A. CLASSIFICATION OF SUBJECT MATTER*C07D 235/20(2006.01)i, C07D 235/06(2006.01)i, C07D 209/18(2006.01)i, C09B 23/02(2006.01)i*

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)

C07D 235/20; C07D 513/00; C12Q 1/68

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: carbocyanine&dye

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	HILDERBRAND A. SCOTT et al., Optimized pH-responsive cyanine fluorochromes for detection of acidic environments, Chem. Commun., 2007, pp.2747 - 2749 See Fig.1	1-6
A	LIN YUHUI et al., Novel Near-Infrared Cyanine Fluorochromes; Synthesis, properties and Bioconjugation, Bioconjugate Chem., 2002, vol.13, pp.605-610 See Fig.1-2	1-6
A	US 2007-0203343 A1 (RICHARD WEST et al.) 30 August 2007 See abstract	1-6
A	US 2002-0064794 A1 (WAI-YEE LEUNG et al.) 30 May 2002 See abstract and claims	1-6
A	MUJUMDAR R. SWATI et al.,Cyanine-Labeling Reagents:Sulfobenzindocyanine Succinimidyl Esters, Bioconjugate Chem., 1996, vol.7, pp.356-362 See Fig.3	1-6
PX	SHAO FANGWEI et al.,Monofunctional Carbocyanine Dyes for Bio- and Bioorthogonal Conjugation, Bioconju.Chem.,20 Nov. 2008, vol.19,no.12,pp.2487-2491 See Scheme 1	1-6

 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 application or patent 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 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

29 JUNE 2010 (29.06.2010)

Date of mailing of the international search report

01 JULY 2010 (01.07.2010)

Name and mailing address of the ISA/KR


 Korean Intellectual Property Office
 Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

YEO, Kyeong Sook

Telephone No. 82-42-481-5612



Box No. 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.: 7-12
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 7-12 pertain to methods for treatment of the human body by therapy/diagnostic methods, and thus relate to a subject matter which this International Searching Authority is not required, under Article 17(2)(a)(i) of the PCT and Rule 39.1(iv) of the Regulation under the PCT, to search.
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 No. 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:

The present application does not meet the requirements of unity of invention (Rule 13 PCT)

Group 1: Claims 1-6 Inventions related to a carbocyanine dye of Formula I or I(b), or a process for preparing them.

Group 2: Claim 13 Invention related to a carbocyanine dye precursor of Formula I-(2).

Group 3: Claim 14 Invention related to a malonaldehyde dianil of Formula I-(1).

(* claims 7-12 have found to be unsearchable under Article 17(2)(b))

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.: 1-6

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/063750

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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