

(51) International Patent Classification:
C09K 11/06 (2006.01)

(21) International Application Number:

PCT/EP2015/072110

(22) International Filing Date:

25 September 2015 (25.09.2015)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

14187173.1 30 September 2014 (30.09.2014) EP

(71) Applicant: SICPA HOLDING SA [CH/CH]; Avenue de Florissant 41, CH-1008 Prilly (CH).

(72) Inventors: MILOS-SCHOUWINK, Mia; Chemin de la Vénardaz 4, CH-1110 Morges (CH). KAPALKA, Agnieszka; Chemin du Vieux-Collège 24, CH-1008 Prilly (CH). DORIER, Jean-Luc; Chemin de Cocagne 10, CH-1030 Bussigny (CH). SIRIGU, Lorenzo; Chemin des Aubépines 9, CH-1004 Lausanne (CH). GIOVANOLA, Lucia; Viale Biella 27, I-10015 Ivrea (IT). SCHINA, Paolo; Via Cardinal Massaia 42, I-10100 Torino (IT). DISEGNA, Irma; Via Grivola 18, I-10015 Ivrea (IT). BALDI, Silvia;

Via Provinciale 23, I-10010 Samone (IT). TORI, Silvano; Viale Kennedy 37, I-10015 Ivrea (IT).

(74) Agents: PRUSS, TIMO, HOFFMANN EITEL PATENT- UND RECHTSANWÄLTE PARTMBB et al.; Arabellastraße 30, 81925 Munich (DE).

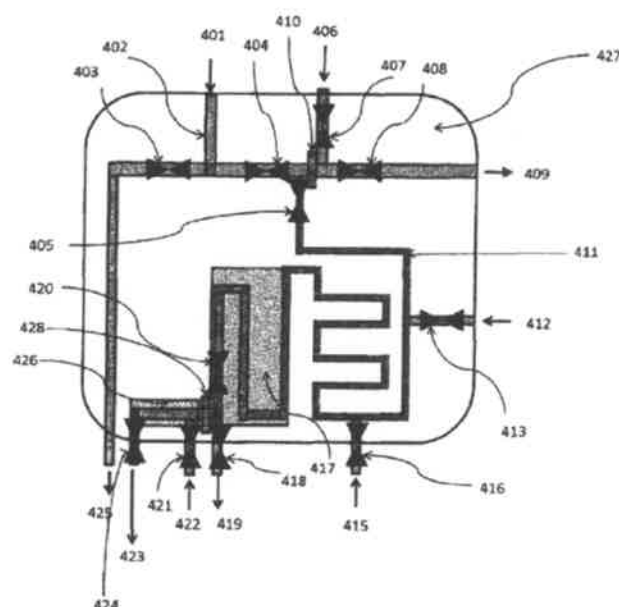
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, 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, RS, SE, SI, SK,

[Continued on next page]

(54) Title: LIQUID CONTAINING POLYMER MARKER, USE OF A POLYMER MARKER AS AUTHENTICATION TOOL, AND METHOD AND DEVICE FOR DETECTING A POLYMER MARKER DISSOLVED IN A LIQUID

Figure 2. LOC design



(57) Abstract: The present invention relates to markers for liquids that can be used to authenticate the origin and genuineness of a liquid, preferably a bulk liquid such as fuel. For this purpose, the present invention teaches the use of a polymer capable of forming a semiconducting polymer particle (pdot) in the liquid in small amounts. The invention encompasses a liquid comprising a) a polymer that is capable of forming a semiconducting polymer particle (pdot), the concentration of the polymer being 10 ppm by weight or less, and b) an organic substance in an amount of 90% by weight or more. The invention furthermore envisages the use of such a polymer as an authenticating marker in a liquid, preferably a fuel, and a method for authenticating the genuineness and/or origin of a liquid comprising a polymer capable of forming a semiconducting polymer particle (pdot), comprising the steps i. concentrating, isolating and/or extracting the polymer capable of forming a semiconducting polymer particle (pdot); ii. aggregating the polymer or the polymer obtained in Step i. to form semiconducting polymer dots (pdots); iii. irradiating the formed pdots with electromagnetic radiation capable of exciting the pdots to emit electromagnetic radiation by fluorescence and/or phosphorescence, and iv. observing the electromagnetic radiation emitted in response to the exciting irradiation of step iii.

WO 2016/050637 A2



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG). **Published:**

— without international search report and to be republished upon receipt of that report (Rule 48.2(g))

ADVANCE E-MAIL

From the INTERNATIONAL BUREAU

PCTNOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

PRUSS, Timo
HOFFMANN EITL PATENT- UND
RECHTSANWÄLTE PARTMBB
Arabellastraße 30
81925 Munich
ALLEMAGNE

Date of mailing (day/month/year) 29 September 2016 (29.09.2016)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 184157aa/ea	
International application No. PCT/EP2015/072110	International filing date (day/month/year) 25 September 2015 (25.09.2015)

1. The following indications appeared on record concerning: ☐ the applicant ☒ the inventor ☐ the agent ☐ the common representative		
Name and Address MILOS-SCHOUWINK, Mia Chemin de la Vénardaz 4 CH-1110 Morges Switzerland	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	E-mail address	
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning: ☐ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence		
Name and Address MILOS-SCHOUWINK, Mia Rue de l'Ancien Stand 8 1820 Montreux Switzerland	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	E-mail address ☐ Notifications by e-mail authorized	
3. Further observations, if necessary:		
4. A copy of this notification has been sent to: ☒ the receiving Office ☐ the International Preliminary Examining Authority ☒ the International Searching Authority ☒ the designated Offices concerned ☐ the Authority(ies) specified for supplementary search ☐ the elected Offices concerned ☐ other:		

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 89 75	Authorized officer Poupel Sylvie e-mail pt05.pct@wipo.int Telephone No. +41 22 338 74 05
---	--

ADVANCE E-MAIL

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING SUBMISSION,
OBTENTION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

PRUSS, TIMO, HOFFMANN EITLE PATENT- UND
RECHTSANWÄLTE PARTMBB
Arabellastraße 30
81925 Munich
ALLEMAGNE

Date of mailing (day/month/year) 08 October 2015 (08.10.2015)	
Applicant's or agent's file reference 184157aa/ea	IMPORTANT NOTIFICATION
International application No. PCT/EP2015/072110	International filing date (day/month/year) 25 September 2015 (25.09.2015)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 30 September 2014 (30.09.2014)
Applicant SICPA HOLDING SA	

The applicant is hereby notified of the date of receipt (or of obtaining by the International Bureau) of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to the date of receipt, **the priority document concerned was submitted or transmitted to or obtained by the International Bureau in compliance with Rule 17.1(a), (b) or (b-bis)**. This Form replaces any previously issued notification concerning submission, transmittal or obtaining of priority documents.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
30 September 2014 (30.09.2014)	14187173.1	EP	02 October 2015 (02.10.2015)

The letters "NR" denote a priority document which, on the date of mailing of this Form, had not yet been received or obtained by the International Bureau in compliance with Rule 17.1(a), (b) or (b-bis). Where the applicant has failed to either submit, request to prepare and transmit, or to request the International Bureau to obtain the priority document within the applicable time limit under that Rule, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

An asterisk "*" next to a date of receipt, denotes a priority document submitted or transmitted to or obtained by the International Bureau but not in compliance with Rule 17.1(a), (b) or (b-bis) (the priority document was received after the time limit prescribed in Rule 17.1(a); the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b) or the request to the International Bureau to obtain the priority document was made after the applicable time limit under Rule 17.1(b-bis)). Even though the priority document was not furnished in compliance with Rule 17.1(a), (b) or (b-bis), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as the priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 89 75	Authorized officer Nora Lindner e-mail pt05.pct@wipo.int Telephone No. +41 22 338 74 05
---	--

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 184157aa/ea	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/EP2015/072110	International filing date (<i>day/month/year</i>) 25 September 2015 (25-09-2015)	(Earliest) Priority Date (<i>day/month/year</i>) 30 September 2014 (30-09-2014)
Applicant SICPA HOLDING SA		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6**bis**(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☒ **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 2
☒ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☐ as selected by this Authority, because this figure better characterizes the invention
b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2015/072110

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.:
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 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:

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 fees, this Authority did not invite payment of additional fees.
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 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

International application No
PCT/EP2015/072110

A. CLASSIFICATION OF SUBJECT MATTER
INV. C09K11/06 C10L1/00 C10L1/16 G01N21/64
ADD.

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)
C09K C10L G01N B82Y B01L

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 practicable, search terms used)

EPO-Internal, COMPENDEX, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/154647 A1 (NGUYEN MY T [CA] ET AL) 21 August 2003 (2003-08-21) paragraph [0008]; claims 1-16 -----	1-9
A	US 2013/234068 A1 (CHIU DANIEL T [US] ET AL) 12 September 2013 (2013-09-12) cited in the application paragraph [0104] claims 1-84; examples 1-11 -----	1-9, 17, 18
X	US 2005/129580 A1 (SWINEHART PHILIP R [US] ET AL) 16 June 2005 (2005-06-16) paragraphs [0019], [0021] - [0023], [0027], [0045], [0046], [0050], [0052], [0060], [0078] figures 2A-C, 3A-B, 6A-B, 7, 8 -----	10-16
A	-/--	17, 18



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 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

21 June 2016

Date of mailing of the international search report

12/07/2016

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

D'Alessandro, Davide

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/072110

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2014/031902 A2 (UNIV CALIFORNIA [US]) 27 February 2014 (2014-02-27) figure 2 paragraphs [0133], [0136], [0143] - [0152]	10-18
A	----- WO 2007/150030 A2 (MASSACHUSETTS INST TECHNOLOGY [US]; BRIGHAM & WOMENS HOSPITAL [US]; KA) 27 December 2007 (2007-12-27) paragraphs [0051] - [0054], [0058], [0079], [0096], [0138] -----	10-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2015/072110

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003154647	A1	21-08-2003	NONE
US 2013234068	A1	12-09-2013	AU 2011317142 A1 11-04-2013 CA 2814790 A1 26-04-2012 CN 103261087 A 21-08-2013 EP 2630077 A2 28-08-2013 EP 2944605 A1 18-11-2015 JP 2014500891 A 16-01-2014 US 2013234067 A1 12-09-2013 US 2013234068 A1 12-09-2013 WO 2012054525 A2 26-04-2012
US 2005129580	A1	16-06-2005	US 2005129580 A1 16-06-2005 WO 2004076056 A2 10-09-2004
WO 2014031902	A2	27-02-2014	CA 2881841 A1 27-02-2014 EP 2888392 A2 01-07-2015 US 2015192518 A1 09-07-2015 WO 2014031902 A2 27-02-2014
WO 2007150030	A2	27-12-2007	US 2010022680 A1 28-01-2010 WO 2007150030 A2 27-12-2007

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-9

Method for authenticating a liquid comprising a polymer capable of forming a semiconducting polymer particle.

2. claims: 10-18

Lab-on-chip detection device and system comprising a lab-on-chip detection device.
