

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
30 May 2003 (30.05.2003)

PCT

(10) International Publication Number  
WO 03/044877 A3

(51) International Patent Classification<sup>7</sup>: H01L 51/30,  
H05B 33/14, C07C 13/465, C09K 11/06

Lane, Yarnton, Oxford OX5 1PF (GB). **FRAMPTON, Michael, John** [GB/GB]; CDT Oxford Limited, 8 Begbroke Business & Science Park, Sandy Lane, Yarnton, Oxford OX5 1PF (GB).

(21) International Application Number: PCT/GB02/05176

(22) International Filing Date:  
15 November 2002 (15.11.2002)

(74) Agent: **EASTWOOD, Simon, Christopher**; Stevens Hewlett & Perkins, 1 St. Augustine's Place, Bristol BS1 4UD (GB).

(25) Filing Language: English

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, 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, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(26) Publication Language: English

(30) Priority Data:  
0127461.2 16 November 2001 (16.11.2001) GB  
0220844.5 7 September 2002 (07.09.2002) GB

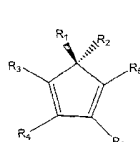
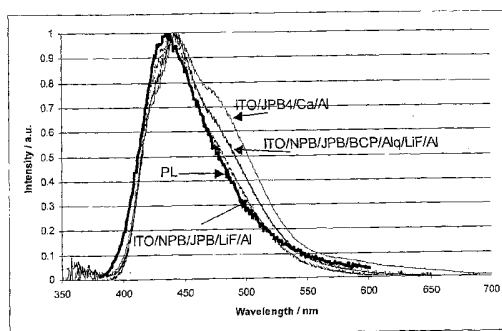
(71) Applicant (*for all designated States except US*): **CDT OXFORD LIMITED** [GB/GB]; 8 Begbroke Business & Science Park, Sandy Lane, Yarnton, Oxford OX5 1PF (GB).

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

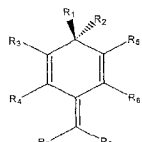
(72) Inventors; and  
(75) Inventors/Applicants (*for US only*): **PILLOW, Jonathan, Nigel, Gerard** [GB/GB]; CDT Oxford Limited, 8 Begbroke Business & Science Park, Sandy Lane, Yarnton, Oxford OX5 1PF (GB).

[Continued on next page]

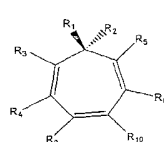
(54) Title: LIGHT EMITTING DEVICE AND COMPOUNDS FOR USE THEREIN



(I)



(II)



(III)

(57) Abstract: There is disclosed a light emitting device comprising at least one compound of formula (I), (II) or (III): wherein R<sub>1</sub> and R<sub>2</sub>, which may be the same or different, are organic substituents not including H, and wherein R<sub>3</sub> and R<sub>5</sub> are each independently selected from halo and organic substituents not including H, and wherein R<sub>4</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub> and R<sub>10</sub> are each independently selected from H, halo, and organic substituents, wherein any two or more of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub> and R<sub>10</sub> may optionally be fused together to form a ring system, provided that one of R<sub>3</sub> and R<sub>5</sub> is not part of a fused ring system, and provided that R<sub>1</sub> and R<sub>2</sub> are not fused to each other to form a ring system, and wherein one but not both of either (a) R<sub>3</sub> and R<sub>4</sub>, or (b) R<sub>5</sub> and R<sub>6</sub>, are fused to each other to form a ring system.



WO 03/044877 A3



**Published:**

— *with international search report*

**(88) Date of publication of the international search report:**

30 October 2003

*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/GB 02/05176

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01L51/30 H05B33/14 C07C13/465 C09K11/06

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 H01L H05B C07C C09K

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)

CHEM ABS Data, WPI Data, PAJ, EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	C.F. KOELSCH : "Syntheses with Triarylvinylmagnesium Bromides. Pentarylallyl Alcohols" JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, vol. 54, 1932, pages 3384-3389, XP002241625 DC US page 3384; example III page 3388	27-34
A	C.F.H. ALLEN ET AL. : "The Structures of Certain Highly Arylated Indenones and their Behaviour with Bromine" JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, vol. 64, 1942, pages 2127-2130, XP002241626 DC US page 2129	27-34



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.
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

19 May 2003

Date of mailing of the international search report

30/05/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Paissdor, B

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 02/05176

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 97 33323 A (UNIAX CORP) 12 September 1997 (1997-09-12) abstract; claims ---	1-34
A	EP 0 676 461 A (HOECHST AG) 11 October 1995 (1995-10-11) cited in the application page 41 -page 43; claims 1-4; examples ---	1-34
A	US 5 077 142 A (HASHIMOTO MITSURU ET AL) 31 December 1991 (1991-12-31) cited in the application abstract; examples 5,54-62 ---	1-34
A	PATENT ABSTRACTS OF JAPAN vol. 015, no. 409 (C-0876), 18 October 1991 (1991-10-18) & JP 03 168294 A (RICOH CO LTD), 22 July 1991 (1991-07-22) cited in the application abstract ---	1-34
A	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 03, 3 April 2002 (2002-04-03) & JP 2001 307880 A (TORAY IND INC), 2 November 2001 (2001-11-02) cited in the application abstract ---	1-34
A	US 5 085 946 A (SAITO SHOGO ET AL) 4 February 1992 (1992-02-04) cited in the application column 5 -column 18; table I abstract column 22 -column 23; example 2 -----	1-34

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB 02/05176

## 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:

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 27-32 relate to an extremely large number of possible compounds. 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 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 as defined by claim 33, i.e. the search was not only restricted to compounds prepared in the examples.

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.

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 02/05176

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9733323	A	12-09-1997	EP 0885461 A1	23-12-1998
			JP 2000506916 T	06-06-2000
			WO 9733323 A1	12-09-1997
			US 5900327 A	04-05-1999
-----				
EP 0676461	A	11-10-1995	DE 4411969 A1	19-10-1995
			DE 4442063 A1	30-05-1996
			DE 4446818 A1	04-07-1996
			CN 1112951 A	06-12-1995
			DE 59510315 D1	19-09-2002
			EP 0676461 A2	11-10-1995
			JP 7278537 A	24-10-1995
			US 5840217 A	24-11-1998
-----				
US 5077142	A	31-12-1991	NONE	
-----				
JP 03168294	A	22-07-1991	NONE	
-----				
JP 2001307880	A	02-11-2001	NONE	
-----				
US 5085946	A	04-02-1992	JP 2223188 A	05-09-1990
			JP 2289675 A	29-11-1990
			JP 2291696 A	03-12-1990
			JP 2869446 B2	10-03-1999
-----				