

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
23 February 2012 (23.02.2012)

(10) International Publication Number
WO 2012/024282 A3

(51) International Patent Classification:

C07C 49/248 (2006.01) *A61K 31/121* (2006.01)
C07C 309/67 (2006.01) *A61P 35/00* (2006.01)
C07D 211/06 (2006.01)

(21) International Application Number:

PCT/US2011/047899

(22) International Filing Date:

16 August 2011 (16.08.2011)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/375,534 20 August 2010 (20.08.2010) US

(72) Inventors; and

(71) Applicants : **SHIH, Charles C-Y** [US/US]; 1129 Santa Madera Court, Solana Beach, California 92075 (US). **KI-TAMURA, Toshio** [JP/JP]; 6-16-20-406 Shirogane, Minato-ku, Tokyo (JP). **SHI, Qian** [US/US]; 210 River Birch Lane, Chapel Hill, North Carolina 27514 (US). **KAWASHIMA, Toshiyuki** [JP/US]; 1121 Santa Helena Court, Solana Beach, California 92075 (US). **WANG, Hui-Kang** [US/US]; 12946 Carmel Creek Road, #99, San Diego, California 92130 (US).

(74) Agent: **TSAO, Y. Rocky**; 10 Fawcett Street, Cambridge, Massachusetts 02138 (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, QA, RO, RS, RU, 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, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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

26 April 2012

(54) Title: 1,5-DIPHENYL-PENTA-1,4-DIEN-3-ONE COMPOUNDS

(57) Abstract: This invention relates to compounds of Formula (I), (II), or (III) as shown in the specification, which contain a 1,5-diphenylpenta-1,4-dien-3-one backbone. These compounds can be used to treat cancer, inflammatory disease, or autoimmune disease.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/047899**A. CLASSIFICATION OF SUBJECT MATTER***C07C 49/248(2006.01)i, C07C 309/67(2006.01)i, C07D 211/06(2006.01)i, A61K 31/121(2006.01)i, A61P 35/00(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)

C07C 49/248; G03F 7/004; A61K 31/12; A61P 35/00; G03F 7/022

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: diphenylpentadienone, curcumin, cancer, cytotoxic, inflammatory, autoimmune disease.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	YAMAKOSHI, HIROYUKI et al., "Structure-activity relationship of C5-curcuminoids and synthesis of their molecular probes thereof", Bioorg. Med. Chem. 2010, Vol. 18, 1083-1092. (23 December 2009)	1-4, 8-10, 17
Y	See abstract; Tables 1 & 3-5.	5-6
A		7, 11-16, 18-23
X	YOUSSEF, KHAIRIA M. et al., "Synthesis of curcumin analogues as potential antioxidant, cancer chemopreventive agents", Arch. Pharm. Pharm. Med. Chem. 2004, Vol. 337, 42-54.	18-23
Y	See Scheme 1; Table 1.	5-6
A		1-4, 7-17
X	WO 2007-000998 A1 (TOHOKU UNIVERSITY) 04 January 2007	1-2
A	See abstract; Figures 2 & 4.	3-23
X	JP 08-029977 A (NIPPON ZEON CO., LTD.) 02 February 1996	1-2, 7, 10-16
A	See Tables 1 & 2 in paragraphs [0016]-[0017].	3-6, 8-9, 17-23

☒ 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

09 MARCH 2012 (09.03.2012)

Date of mailing of the international search report

12 MARCH 2012 (12.03.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM, Dongseok

Telephone No. 82-42-481-8647



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/047899**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.: 24-29
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 24-29 relate to a method for treatment of the human body, which is a subject matter this International Searching Authority is not required to search under PCT Article 17(2)(a)i and Rule 39.1(iv).
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 an Extra 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 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/US2011/047899

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	YADAV, BABASAHEB et al., "Synthesis and cytotoxic potential of heterocyclic cyclohexanone analogues of curcumin", Bioorg. Med. Chem. 2010, Vol. 18, 6701-6707. (01 August 2010)	18-19
A	See Figure 2; Table 1.	1-17,20-23
X	ADAMS, BRIAN K. et al., "Synthesis and biological evaluation of novel curcumin analogs as anti-cancer and anti-angiogenesis agents", Bioorg. Med. Chem. 2004, Vol. 12, 3871-3883.	18-19
A	See Chart 1; Scheme 1.	1-17,20-23

INTERNATIONAL SEARCH REPORT

Information on patent family members

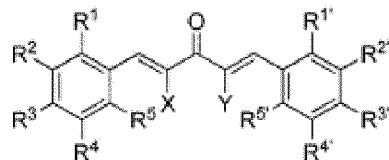
International application No.

PCT/US2011/047899

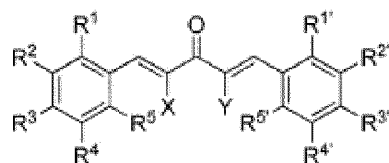
Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2007-000998 A1	04.01.2007	US 2010-0152493 A1	17.06.2010
JP 08-029977 A	02.02.1996	None	

Box III.

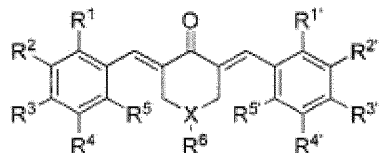
Invention group I (Claims 1-9): A compound of the formula in claim 1.



Invention group II (Claims 10-17): A compound of the formula in claim 10.



Invention group III (Claims 18-23): A compound of the formula in claim 18.



The common technical feature linking groups I-III together is 1,5-diphenylpenta-1,4-diene-3-one structure. However, the feature is already disclosed in the prior art documents, such as WO 2007/000998 A1 (04 January 2007) and JP 08-029977 A (02 February 1996). Thus, the invention groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because the above mentioned technical feature fails to contribute over the prior art within the meaning of PCT Rule 13.2.