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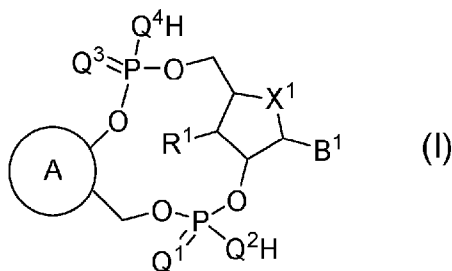
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, 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,

(54) Title: CYCLIC PURINE DINUCLEOTIDES AS STING (STIMULATOR OF INTERFERON GENES) AGONISTS



(57) Abstract: The present disclosure provides a compound having a STING (stimulator of interferon genes) agonistic activity, which may be expected to be useful as an agent for the prophylaxis or treatment of STING-related diseases, such as cancer. The present disclosure relates to a compound represented by the formula (I) wherein each symbol is as defined in the description, or a salt thereof.



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, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, 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))*
- *with sequence listing part of description (Rule 5.2(a))*

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

19 July 2018 (19.07.2018)

INTERNATIONAL SEARCH REPORT

International application No  
PCT/IB2017/057588

A. CLASSIFICATION OF SUBJECT MATTER  
 INV. C07H21/00 C07H21/02 A61K31/7084 A61P35/00  
 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)  
 C07H  
 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, CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2014/189805 A1 (AURO BIOTECH INC [US]; UNIV CALIFORNIA [US]) 27 November 2014 (2014-11-27) cited in the application	1-31
A	figure 2A; compounds 9a-9f claim 1	32-100, 144-200
X	WO 2014/179335 A1 (SLOAN KETTERING INST CANCER [US]; UNIV ROCKEFELLER [US]; UNIV RUTGERS) 6 November 2014 (2014-11-06) cited in the application	1-31
A	claims 1, 33	32-100, 144-200
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&amp;" document member of the same patent family</p>
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Date of the actual completion of the international search <b>17 May 2018</b>	Date of mailing of the international search report <b>06/06/2018</b>
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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 <b>Mezzato, Stefano</b>
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/IB2017/057588

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	WO 2017/027646 A1 (MERCK SHARP & DOHME [US]; ALTMAN MICHAEL D [US]; ANDRESEN BRIAN [US];) 16 February 2017 (2017-02-16) cited in the application page 388, last line; claim 22 page 389, line second; claim 22 -----	1-31
X,P	WO 2017/161349 A1 (IMMUNE SENSOR LLC [US]; UNIV TEXAS [US]) 21 September 2017 (2017-09-21) page 291; claim 10; compounds 2-3 page 292; claim 10; compounds 1-3 page 293; claim 10; compounds 1, 3 page 294; claim 10; compound 1 page 299; claim 10; compound 3 claims 28-31, 37 -----	1-31
X	WO 2016/096174 A1 (INVIVOGEN [FR]) 23 June 2016 (2016-06-23) cited in the application	101-141
A	claims 1-2 -----	32-100, 142-200
X	YAN H ET AL: "Synthesis and immunostimulatory properties of the phosphorothioate analogues of cdiGMP", BIOORGANIC & MEDICINAL CHEMISTRY LETTERS, PERGAMON, AMSTERDAM, NL, vol. 18, no. 20, 15 October 2008 (2008-10-15), pages 5631-5634, XP025562123, ISSN: 0960-894X, DOI: 10.1016/J.BMCL.2008.08.088 [retrieved on 2008-08-29]	101-104, 106,110, 121-125, 129-141
A	page 5632; compounds 7a, 7b -----	32-100, 144-200

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IB2017/057588

## 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.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

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

1. claims: 1-31

Compounds of formula (I)

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2. claims: 32-100

Compounds of formula (XIV)

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3. claims: 101-143

Compounds of formula (XL)

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4. claims: 144-200

Compounds of formula (XLI)

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2017/057588

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