

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
09 August 2018 (09.08.2018)



(10) International Publication Number
WO 2018/141002 A3

(51) International Patent Classification:

C07D 471/04 (2006.01) A61K 31/506 (2006.01)
A61K 31/437 (2006.01) A61P 35/00 (2006.01)

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).

(21) International Application Number:

PCT/AU2018/000011

(22) International Filing Date:

01 February 2018 (01.02.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2017900290 01 February 2017 (01.02.2017) AU

(71) Applicant: UNIVERSITY OF SOUTH AUSTRALIA
[AU/AU]; North Terrace, Adelaide, S.A. 5000 (AU).

(72) Inventors: WANG, Shudong; 43/7 Liberman Close, Ade-
laide, S.A. 5000 (AU). AL HAJ DIAB, Sarah; 3/57
Seventh Avenue, St Peters, S.A. 5069 (AU). LONG, Yi; 20
Cardwell Street, Adelaide, S.A. 5000 (AU).

(74) Agent: MADDERNS PATENT & TRADE MARK AT-
TORNEYS; GPO Box 2752, Adelaide, S.A. 5001 (AU).

(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,
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,

Published:

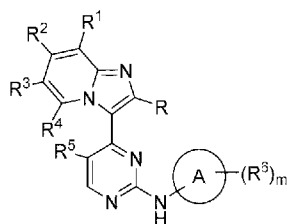
- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))

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

22 November 2018 (22.11.2018)

(54) Title: DERIVATIVES OF N-CYCLOALKYL/HETEROCYCLOALKYL-4-(IMIDAZO [1,2-a]PYRIDINE)PYRIMIDIN-2-AM
INE AS THERAPEUTIC AGENTS

(I)



(57) Abstract: A novel class of inhibitors of protein kinases that are useful in the
treatment of cell proliferative diseases and conditions, and especially those charac-
terised by over-expression of one or more CDK enzyme and/or by one or more aber-
rant CDK activity, including certain cancers of lung, breast, brain, ovary, prostate,
colorectal cancer and leukaemias. The inhibitors have the general structure (I).



WO 2018/141002 A3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2018/000011**A. CLASSIFICATION OF SUBJECT MATTER****C07D 471/04(2006.01)i, A61K 31/437(2006.01)i, A61K 31/506(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)

C07D 471/04; A61K 31/497; A61K 31/505; A61P 31/22; C07D 401/14; C07D 403/04; C07D 403/14; C07D 417/04; A61K 31/437; A61K 31/506; A61P 35/00

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), STN Express(Registry, Caplus) & Keywords: imidazol, pyridine, pyrimidine, cancer, proliferative cell, CDK, protein kinase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 8569306 B2 (BUETTELMAHN, B. et al.) 29 October 2013 See abstract; column 4, lines 53-57; columns 13-14, table 1; column 18, lines 45-50; column 19, lines 1-2.	1-9, 11, 12, 14, 16
X	ALAM, M. et al., "Synthesis and SAR of aminopyrimidines as novel c-Jun N-terminal kinase (JNK) inhibitors", Bioorganic & Medicinal Chemistry Letters, 2007 [Epub. 30 March 2007], Vol. 17, No. 12, pp. 3463-3467 See abstract; page 3465, table 1, left column; page 3466, left column, scheme 1.	1-8, 14, 16
X	WO 2015-154039 A2 (SYROS PHARMACEUTICALS, INC.) 8 October 2015 See abstract; paragraphs [816], [833], [835], [838]; claims 36-39.	1-9, 11, 12, 14, 16
X	WO 03-000682 A1 (MERCK & CO., INC.) 3 January 2003 See abstract; page 7, lines 3-5; page 20, lines 27-29; page 58, lines 27-35; page 59, table 1; page 179, line 5; page 184, table.	1-9, 11, 12, 14, 16
X	WO 2006-038001 A1 (CELLTECH R & D LIMITED) 13 April 2006 See page 1, lines 12-19; page 4, line 25; page 25, lines 21-22; page 69, lines 29-30.	1-9, 11, 12, 14, 16

☒ 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

22 October 2018 (22.10.2018)

Date of mailing of the international search report

22 October 2018 (22.10.2018)

Name and mailing address of the ISA/KR

International Application Division

Korean Intellectual Property Office

189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea



Facsimile No. +82-42-481-8578

Authorized officer

KAM, Yoo Lim

Telephone No. +82-42-481-3516



INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2018/000011

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.: 10,13,15
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 10, 13 and 15 pertain to methods for treatment of the human body by surgery or therapy, and thus relate to a subject matter which this International Searching Authority is not required, under PCT Article 17(2)(a)(i) and PCT Rule 39.1(iv), 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:

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 any 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/AU2018/000011

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 03-000689 A1 (SMITHKLINE BEECHAM CORPORATION) 3 January 2003 See abstract; page 3, lines 2-6; page 8, lines 18-20; page 33, lines 18-24; page 37, lines 16-17; page 71, lines 11-17.	1-9, 11, 12, 14, 16
X	WO 03-031446 A1 (SMITHKLINE BEECHAM CORPORATION) 17 April 2003 See abstract; page 3, lines 2-6; page 29, lines 6-13; page 66, lines 9-11.	1-9, 11, 12, 14, 16
X	PALMER, W. S. et al., "Development of amino-pyrimidine inhibitors of c-Jun N-terminal kinase (JNK): Kinase profiling guided optimization of a 1,2,3-benzotriazole lead", Bioorganic & Medicinal Chemistry Letters, 2013 [Epub. 22 December 2012], Vol. 23, No. 5, pp. 1486-1492 See page 1488, left column, table 2.	1-8, 14, 16
X	BUCKLEY, G. M. et al., "IRAK-4 inhibitors. Part II: A structure-based assessment of imidazo[1,2-a]pyridine binding", Bioorganic & Medicinal Chemistry Letters, 2008 [Epub. 22 April 2008], Vol. 18, No. 11, pp. 3291-3295 See page 3291, right column.	1-8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2018/000011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 8569306 B2	29/10/2013	CA 2749236 A1	02/09/2010
		CN 102325771 A	18/01/2012
		CN 102325771 B	29/10/2014
		EP 2401274 A1	04/01/2012
		EP 2401274 B1	22/10/2014
		ES 2525756 T3	30/12/2014
		JP 2012-518668 A	16/08/2012
		JP 5518905 B2	11/06/2014
		SG 173792 A1	28/10/2011
		US 2011-0306618 A1	15/12/2011
		WO 2010-097335 A1	02/09/2010
WO 2015-154039 A2	08/10/2015	AU 2015-240535 A1	20/10/2016
		CA 2944669 A1	08/10/2015
		CN 106458990 A	22/02/2017
		EP 3126352 A2	08/02/2017
		JP 2017-510651 A	13/04/2017
		KR 10-2017-0003553 A	09/01/2017
		MX 2016012967 A	10/05/2017
		PH 12016501935 A1	09/01/2017
		SG 11201608242 A	28/10/2016
		US 2017-0183355 A1	29/06/2017
		WO 2015-154038 A1	08/10/2015
		WO 2015-154039 A3	03/12/2015
		WO 2015-154039 A8	08/10/2015
WO 03-000682 A1	03/01/2003	CA 2450555 A1	03/01/2003
		US 2004-0176396 A1	09/09/2004
		US 7196095 B2	27/03/2007
WO 2006-038001 A1	13/04/2006	None	
WO 03-000689 A1	03/01/2003	AT 337316 T	15/09/2006
		BR 0210464 A	20/07/2004
		CA 2451008 A1	03/01/2003
		CN 1518550 A	04/08/2004
		CO 5540312 A2	29/07/2005
		CZ 20033518 A3	12/05/2004
		DE 60214179 T2	04/01/2007
		EP 1401836 A1	31/03/2004
		EP 1401836 B1	23/08/2006
		ES 2271273 T3	16/04/2007
		HU 0400266 A2	30/08/2004
		JP 2005-500315 A	06/01/2005
		KR 10-2004-0018281 A	02/03/2004
		MX PA03011906 A	26/03/2004
		PL 366827 A1	07/02/2005
		US 2005-0228004 A1	13/10/2005
		US 2006-167252 A1	27/07/2006

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2018/000011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03-031446 A1	17/04/2003	US 2007-135451 A1	14/06/2007
		US 7186714 B2	06/03/2007
		ZA 200308726 B	10/02/2005
		AT 326466 T	15/06/2006
		DE 60211539 T2	21/09/2006
		EP 1432712 A1	30/06/2004
		EP 1432712 B1	17/05/2006
		ES 2262893 T3	01/12/2006
		JP 2005-508955 A	07/04/2005
		US 2004-0248917 A1	09/12/2004
		US 2008-0139594 A1	12/06/2008
		US 7244740 B2	17/07/2007