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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:

12 April 2012

(54) Title: TRIAZOLIUM CARBENE CATALYSTS AND PROCESSES FOR ASYMMETRIC CARBON-CARBON BOND FORMATION

(57) Abstract: Provided herein are chiral triazolium catalysts useful for asymmetric C-C bond formation and processes for their preparation. Also provided are synthetic reactions in which these catalysts are used, in particular, in asymmetric C-C bond formation.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/043735**A. CLASSIFICATION OF SUBJECT MATTER****C07D 487/04(2006.01)i, C07D 207/263(2006.01)i, C07D 207/267(2006.01)i, C07D 213/55(2006.01)i, C07D 241/14(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 487/04; C07D 249/04; A61K 31/4196; C07D 249/08

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)

eKOMPASS(KIPO internal), CAplus, Google, PubMed

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DIROCCO, D. A. et al., 'Catalytic Asymmetric Intermolecular Stetter Reaction of Heterocyclic Aldehydes with Nitroalkenes: Backbone Fluorination Improves Selectivity', Journal of the American Chemical Society (2009), Vol. 131, No. 31, pp. 10872-10874, ISSN: 0002-7863 See chart 2.	1-20, 22-24
A	US 7550601 B1 (DRAKE, G. W. et al.) 23 June 2009 See the entire document.	1-20, 22-24
A	US 2006-0189670 A1 (KHILE, A. S. et al.) 24 August 2006 See the entire document.	1-20, 22-24

☐ 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

23 FEBRUARY 2012 (23.02.2012)

Date of mailing of the international search report

24 FEBRUARY 2012 (24.02.2012)

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/043735**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.: 21
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:

The 5-(t-butyl)-3-fluoropyrrolidin-2-one in claim 21 is not a compound of claim 1, but an intermediate for producing the compound of claim 1. Therefore, claim 21 is so unclear that the matter for which protection is sought is not clearly defined.
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 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

Information on patent family members

International application No.

PCT/US2011/043735

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7550601 B1	23.06.2009	None	
US 2006-0189670 A1	24.08.2006	None	