US009409864B2

(12) **United States Patent**
**Fruttarolo et al.**

(10) **Patent No.: US 9,409,864 B2**
(45) **Date of Patent: Aug. 9, 2016**

(54) **SULFONAMIDE TRPA1 RECEPTOR ANTAGONISTS**

(71) Applicant: **ARIO PHARMA LIMITED**, Cambridge (GB)

(72) Inventors: **Francesca Fruttarolo**, Ferrara (IT); **Maria Giovanna Pavani**, Vigarano Mainarda (IT); **Serena Bencivenni**, Cento (IT); **Raffaele Gatti**, Ferrara (IT); **Mauro Napoletano**, Milan (IT)

(73) Assignee: **ARIO PHARMA LIMITED**, Cambridge (GB)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/772,622**

(22) PCT Filed: **Mar. 6, 2014**

(86) PCT No.: **PCT/EP2014/054310**
§ 371 (c)(1),
(2) Date: **Sep. 3, 2015**

(87) PCT Pub. No.: **WO2014/135617**
PCT Pub. Date: **Sep. 12, 2014**

(65) **Prior Publication Data**

US 2016/0024009 A1 Jan. 28, 2016

(30) **Foreign Application Priority Data**

Mar. 6, 2013 (EP) ..... 13158046

(51) **Int. Cl.**

| | |
|---|---|
| ***A61K 31/505*** | (2006.01) |
| ***C07D 213/56*** | (2006.01) |
| ***C07D 213/74*** | (2006.01) |
| ***C07D 333/34*** | (2006.01) |
| ***C07C 311/19*** | (2006.01) |
| ***C07D 409/12*** | (2006.01) |
| ***C07D 213/40*** | (2006.01) |
| ***C07D 213/64*** | (2006.01) |
| ***C07C 311/20*** | (2006.01) |
| ***C07D 213/73*** | (2006.01) |
| ***C07D 213/89*** | (2006.01) |
| ***C07D 401/04*** | (2006.01) |
| ***C07D 409/14*** | (2006.01) |

(52) **U.S. Cl.**
CPC ..... ***C07D 213/56*** (2013.01); ***C07C 311/19*** (2013.01); ***C07C 311/20*** (2013.01); ***C07D 213/40*** (2013.01); ***C07D 213/64*** (2013.01); ***C07D 213/73*** (2013.01); ***C07D 213/74*** (2013.01); ***C07D 213/89*** (2013.01); ***C07D 333/34*** (2013.01); ***C07D 401/04*** (2013.01); ***C07D 409/12*** (2013.01); ***C07D 409/14*** (2013.01)

(58) **Field of Classification Search**
CPC .. C07D 213/56; C07D 213/40; C07D 213/64; C07D 213/73; C07D 213/74; C07D 213/89; C07D 333/34; C07D 401/04; C07D 409/12; C07D 409/14; C07C 311/19; C07C 311/20
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | | |
|---|---|---|---|---|
| 2009/0170867 | A1* | 7/2009 | Kurose | C07D 401/04 514/253.01 |
| 2009/0264474 | A1* | 10/2009 | Branum | C07D 333/36 514/342 |
| 2010/0160289 | A1* | 6/2010 | Macielag | C07C 311/32 514/210.19 |
| 2014/0005393 | A1* | 1/2014 | Tsuzuki | C07D 217/22 544/333 |
| 2015/0197509 | A1* | 7/2015 | Brotherton-Pleiss | C07D 231/18 514/255.05 |

FOREIGN PATENT DOCUMENTS

| | | |
|---|---|---|
| WO | WO 2010/141805 A1 | 12/2010 |
| WO | WO 2014/049047 | 4/2014 |

OTHER PUBLICATIONS

International Preliminary Report on Patentability and Written Opinion issued Sep. 8, 2015 in PCT/EP2014/054310.
International Search Report dated Jul. 1, 2014 in International Application No. PCT/EP2014/054310.
European Search Report dated Jul. 18, 2013 in Application No. EP 13158046.

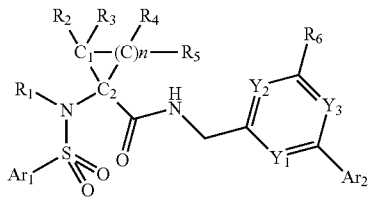
* cited by examiner

*Primary Examiner* — Alexander R Pagano
(74) *Attorney, Agent, or Firm* — Baker Botts L.L.P.

(57) **ABSTRACT**

The invention discloses compounds of Formula (I). The compounds of formula (I) are TRPA1 antagonists and are useful as active ingredients of pharmaceutical compositions for the treatment of pain and other conditions ameliorated by the inhibition of TRPA1 receptors.

(I)



**15 Claims, No Drawings**