

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/039986

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - C01B 31/08 (2013.01)

USPC - 252/502

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)

IPC(8) - B01B 1/00; B01J 19/00, 20/20, 20/30, 20/34, 21/18; C01B 31/00, 31/08, 31/10; C07C 1/00, 4/00; C09K 3/00; C10B 49/00, 49/02; C10L 5/00, 5/44, 8/00; C22B 4/00; H01B 1/00, 1/04 (2013.01)

USPC - 44/500, 589, 605; 75/10.1; 252/182.32, 182.33, 182.35, 502; 429/231.8; 502/423, 437

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

CPC - B01J 20/20, 20/30, 20/3078, 20/3466; C01B 31/00, 31/02, 31/081, 31/10; C10L 5/04 (2013.01)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Orbit, Google Patents, Google Scholar,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2010/0178624 A1 (SRINIVASACHAR) 15 July 2010 (05.07.2010) entire document	1-46
Y	US 4,679,268 A (GURRIES et al) 14 July 1987 (14.07.1987) entire document	1-46
Y	US 4,632,731 A (BODLE et al) 30 December 1986 (30.12.1986) entire document	5
Y	US 2005/0095183 A1 (REHMAT et al) 05 May 2005 (05.05.2005) entire document	13, 16-18
Y	US 2011/0132737 A1 (JADHAV) 09 June 2011 (09.06.2011) entire document	16, 19, 20
Y	US 5,187,141 A (JHA et al) 16 February 1993 (16.02.1993) entire document	25, 30
Y	WO 2011/053668 A1 (KYRLIDIS et al) 05 May 2011 (05.05.2011) entire document	26, 32, 34, 35, 38-46
Y	US 2011/0002086 A1 (FEAVER et al) 06 January 2011 (06.01.2011) entire document	31
Y	WO 02/069351 A1 (MILLER et al) 06 September 2002 (06.09.2002) entire document	33, 43, 46
Y	WO 2011/162727 A1 (LOH et al) 29 December 2011 (29.12.2011) entire document	36, 39-42

☐ Further documents are listed in the continuation of Box C.

* 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

16 October 2013

Date of mailing of the international search report

25 OCT 2013

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