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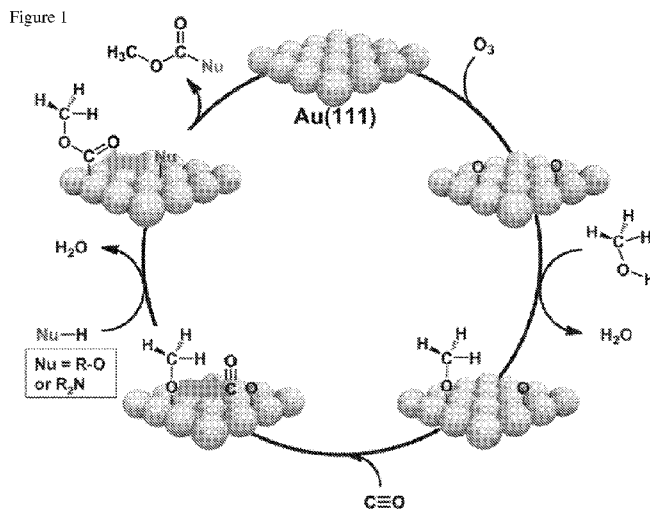
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(54) Title: GOLD-CATALYZED SYNTHESIS OF CARBONATES AND CARBAMATES FROM CARBON MONOXIDE



(57) Abstract: The invention provides a method for producing organic carbonates via the reaction of alcohols and carbon monoxide with oxygen adsorbed on a metallic gold or gold alloy catalyst.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/046944**A. CLASSIFICATION OF SUBJECT MATTER***C07C 68/04(2006.01)i, C07C 269/04(2006.01)i, C07C 271/08(2006.01)i, B01J 23/52(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)

C07C 68/04; C07C 51/12; C07C 68/00; C07C 53/08; C07C 68/08

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) & Keywords:gold catalyst, methanol, dimethyl carbonate, carbon monoxide

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 2085375 A1 (BP CHEMICALS LIMITED) 05 August 2009 See paragraphs [0001], [0025] and claims	1-5
A	WO 03-016256 A1 (GENERAL ELECTRIC COMPANY) 27 February 2003 See paragraphs [0002] - [0005], [0023] - [0027]; examples and claims	1-5
A	Ma Xinbin et al. Catalysis Today. 1996, vol.30, pp.201-206. See page 201	1-5
A	Yong Cao et al. Applied Catalysis A: General. 2004, vol.272, pp.15-22. See pages 15 - 17	1-5
A	A. Wittstock et al. Science. 15 January 2010, vol.327, pp.319-322. See the whole document	1-5
A	Raquel Juarez et al. Green Chem. 2009, vol.11, pp.949-952. See the whole document	1-5

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search

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Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2085375 A1	05.08.2009	CN 101903325 A	01.12.2010
		EP 2231579 A1	29.09.2010
		TW 200936557 A	01.09.2009
		US 2010-0267985 A1	21.10.2010
		WO 2009-081099 A1	02.07.2009
WO 03-016256 A1	27.02.2003	CN 1568300 A	19.01.2005
		CN 1568300 C0	04.10.2006
		CN 1568301 A	19.01.2005
		CN 1568301 C0	03.12.2008
		CN 1608044 A	20.04.2005
		CN 1608044 C0	14.02.2007
		EP 1419130 A1	19.05.2004
		EP 1419131 A1	19.05.2004
		EP 1419132 A1	19.05.2004
		JP 2005-500377 A	06.01.2005
		JP 2005-500377 T	06.01.2005
		JP 2005-500378 A	06.01.2005
		JP 2005-520784 A	14.07.2005
		KR 10-2004-0021699 A	10.03.2004
		KR 10-2004-0021700 A	10.03.2004
		KR 10-2004-0021701 A	10.03.2004
		TW 584630 A	21.04.2004
		TW 584630 B	21.04.2004
		TW 587075 A	11.05.2004
		TW 587075 B	11.05.2004
		US 2003-0055199 A1	20.03.2003
		US 2003-0060650 A1	27.03.2003
		US 2003-0092872 A1	15.05.2003
		US 2003-0153782 A1	14.08.2003
		US 2005-0019226 A1	27.01.2005
		US 2005-0033078 A1	10.02.2005
		US 2005-0033079 A1	10.02.2005
		US 2005-0033080 A1	10.02.2005
		US 2005-0065313 A1	24.03.2005
		US 6784277 B2	31.08.2004
		US 7345187 B2	18.03.2008
		US 7351848 B2	01.04.2008
		US 7514521 B2	07.04.2009
WO 03-016256 A1	27.02.2003		
WO 03-016257 A1	27.02.2003		
WO 03-016258 A1	27.02.2003		