

1) Family number: 66216503 (US2019003704A)

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Title: SUSTAINABLE OXYGEN CARRIERS FOR CHEMICAL LOOPING COMBUSTION WITH OXYGEN UNCOUPLING AND METHODS FOR THEIR MANUFACTURE

Abstract: An oxygen carrier (OC) for use in Chemical Looping technology with Oxygen Uncoupling (CLOU) for the combustion of carbonaceous fuels, in which commercial grade metal oxides selected from the group consisting of Cu, Mn, and Co oxides and mixtures thereof constitute a primary oxygen carrier component. The oxygen carrier contains, at least, a secondary oxygen carrier component which is comprised by low-value industrial materials which already contain metal oxides selected from the group consisting of Cu, Mn, Co, Fe, Ni oxides or mixtures thereof. The secondary oxygen carrier component has a minimum oxygen carrying capacity of 1 g of O₂ per 100 g material in chemical looping reactions. Methods for the manufacture of the OC are also disclosed.

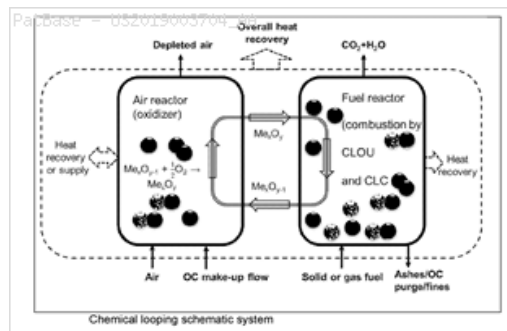
Classifications:

International (IPC 8-9): B01J23/00 B01J23/34 B01J23/74 B01J23/745 B01J23/889 B01J37/03 B01J37/04 B01J8/26 B01J8/32 C01B3/30 C01G45/02 C10G11/04 C10J3/00 C10J3/06 C10J3/72 F23C10/00 F23C10/01 (Advanced/Invention);

C01G45/02 C10J3/00 (Advanced/Non-invention)

International (IPC 1-7): B01J23/34 B01J23/74 B01J23/745 B01J23/889 B01J37/03 B01J37/04 B01J8/26 C01B3/30 C01G45/02 C10J3/00 F23C10/00

CPC: B01J23/34 B01J23/74 B01J23/745 B01J37/0009 B01J37/0063 C01G45/02 B01J8/32 B01J23/002 C10G11/04 C10J3/06 F23C10/01 C10J3/00 Y02E20/346 C01G3/02 C01G49/0018 C01G51/04 C01P2004/50 F23C99/00 C10J2300/0916 C10J2300/093 B01J2523/847 B01J2523/17 B01J2523/72 B01J2523/845 B01J2523/842 F23C10/005 B01J8/26 B01J23/8892 B01J37/035 B01J37/04 C10J3/725 F23C2900/99008

**Family:**

Publication number	Publication date	Application number	Application date
BR112018012797 A2	20181204	BR20181112797	20161222
EP3393656 A1	20181031	EP20160831588	20161222
NO20151775 A	20151222	NO20150001775	20151222
NO20151775 A	20170623	NO20150001775	20151222
US2019003704 AA	20190103	US20160065195	20161222
WO17111614 A1	20170629	WO2016N050267	20161222

Priority:

NO20150001775 20151222 WO2016N050267 20161222

Probable Assignee: INST ENERGITEKNIK

Assignee(s): (std): INST ENERGITEKNIK

Assignee(s): INSTITUTT FOR ENERGITEKNIKK

Inventor(s): (std): ANITA SKULIMOWSKA ; ARANDA ASUNCION ; ASUNCION ARANDA ; SKULIMOWSKA ANITA

Agent(s): CURO AS

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DJ DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KH KM KN KP KR KW KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

2) Family number: 71228014 (ES2682049A)

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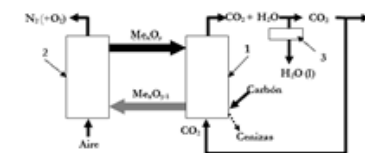
Title: PROCEDIMIENTO DE PREPARACION DE TRANSPORTADORES DE O₂, PRODUCTO ASI OBTENIDO Y SU USO Process for the preparation of O₂ transporters, PRODUCT THUS OBTAINED AND THEIR USE (Machine translation)

Abstract: Source: ES2682049A [ES] Procedimiento de preparacion de transportadores de O₂, producto asi obtenido y su uso. La presente invencion se refiere a un procedimiento para producir un material transportador de oxigeno mediante la mezcla de CuO y Mn₃O₄, preparado por granulacion en lecho fluidizado. El material asi obtenido presenta una elevada reactividad, alta resistencia mecanica, bajo indice de atricion y baja velocidad de atricion. Dicho material se aplica en un proceso CLOU de combustion de solidos con captura inherente de CO₂. **Machine translation:** Process for the preparation of O₂ transporters, product thus obtained and their use. The present invention relates to a process for producing a carrier of oxygen through the mixture of Mn₃O₄, CuO and prepared by fluidized bed granulation. The material thus obtained has a high reactivity, high mechanical strength, low rate of attrition attrition and low speed. Said material is applied in a process of combustion of solids with inherent capture CLOU of CO₂.

Classifications:

International (IPC 8-9): B01J23/889 F23C10/01 (Advanced/Invention)

CPC: B01J23/8892 F23C10/01



La siguiente figura está descrita en el estado del arte

Fig. 1

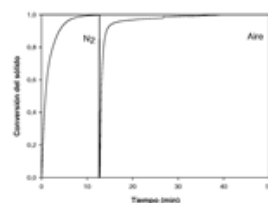


Fig. 2

20

Family:

Publication number	Publication date	Application number	Application date
ES2682049 AA	20180918	ES20170030355	20170316

Priority:

ES20170030355 20170316

Probable Assignee: CONSEJO SUPERIOR DE INVESTIG CIENTIFICAS

Assignee(s): (std): CONSEJO SUPERIOR DE INVESTIG CIENTIFICAS

Assignee(s): CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS

Inventor(s): (std): IZQUIERDO PANTOJA MARIA TERESA ; GAYAN SANZ PILAR ; GARCIA LABIANO FRANCISCO ; DE DIEGO POZA LUIS FRANCISCO ; ADANEZ RUBIO INAKI ; ADANEZ ELORZA JUAN ; ABAD SECADES ALBERTO

Inventor(s): ALBERTO ABAD SECADES ; FRANCISCO GARCIA LABIANO ; INAKI ADANEZ RUBIO ; JUAN ADANEZ ELORZA ; LUIS FRANCISCO DE DIEGO POZA ; MARIA TERESA IZQUIERDO PANTOJA ; PILAR GAYAN SANZ

Agent(s): PONS ANGEL

3) Family number: 52165629 (WO12140292A1)

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Title: O₂-CARRYING MATERIAL THAT CAN BE OBTAINED FROM CUO AND MGAL₂O₄ AND THE USE OF SAID MATERIAL IN THE COMBUSTION OF SOLIDS WITH INHERENT CO₂ CAPTURE

Abstract: The present invention relates to an oxygen-carrying material that can be obtained by means of a method that comprises: a) mixing 30 percent to 60 percent by weight of CuO and 40 percent to 70 percent by weight of MgAl₂O₄; b) subjecting the above mixture to a step of spray-drying; c) screening the material obtained in the preceding step until a particle size of between 100 and 500 microns is obtained; d) calcining the screened particles, resulting in the oxygen-carrying material. A further subject matter of the invention is the use of said material in a solid combustion process with inherent CO₂ capture.

Classifications:

International (IPC 8-9): B01J23/72 (Advanced/Invention)

CPC: B01J23/72 B01J23/002 B01J23/005 B01J35/023 B01J37/0045

B01J37/04 B01J37/08 B01J2523/00 C10J3/463 C10J3/725

C10J2300/1246 Y02P20/52

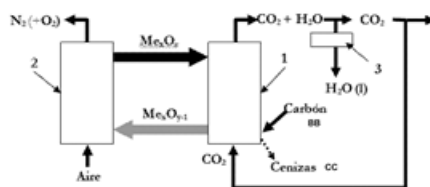


Fig. 1

AA Aire
BB Carbon
CC Ash

Family:

Publication number	Publication date	Application number	Application date
ES2390334 AA	20121112	ES20110030586	20110413
ES2390334 BA	20130917	ES20110030586	20110413
WO12140292 A1	20121018	WO2012ES70182	20120321

Priority:

Probable Assignee: CONSEJO SUPERIOR INVESTIGACION**Assignee(s):** (std): CONSEJO SUPERIOR INVESTIGACION ; DE DIEGO POZA LUIS FRANCISCO ; GAYAN SANZ PILAR ; GARCIA LABIANO FRANCISCO ; ABAD SECADES ALBERTO ; ADANEZ ELORZA JUAN**Assignee(s):** CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS CSIC**Inventor(s):** (std): ABAD SECADES ALBERTO ; ADANEZ ELORZA JUAN ; DE DIEGO POZA LUIS FRANCISCO ; GARCIA LABIANO FRANCISCO ; GAYAN SANZ PILAR**Inventor(s):** JUAN ADANEZ ELORZA ; LUIS FRANCISCO DE DIEGO POZA ; PILAR GAYAN SANZ ; FRANCISCO GARCIA LABIANO ; ALBERTO ABAD SECADES**Agent(s):** UNGRIA JAVIER; UNGRIA LOPEZ JAVIER**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT QA RO RS RU RW SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW**4) Family number: 42965658 (WO09022046A1)**

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Title: NIO/AL2O3 OXYGEN CARRIER, METHOD FOR OBTAINING SAME AND USE THEREOF**Abstract:** The invention relates to an oxygen carrier obtained by means of impregnation, comprising a nickel oxide on a thermally modified commercial?-alumina (Al2O3) substrate, as well as to the method for obtaining same. The oxygen carrier can be used for the indirect fluidised bed combustion of gas (methane, H2, CO, H2/CO) for the production of energy without CO2 emission (chemical-looping combustion, CLC) and for the production of synthesis gas (H2+CO) or H2 by partial oxidation of methane with inherent CO2 capture in a fluidised bed (chemical-looping reforming, CLR).**Classifications:****International (IPC 8-9):** B01J23/755 (Advanced/Invention);

C01B3/02 F23C10/00 (Advanced/Non-invention);

B01J23/755 (Core/Invention);

C01B3/00 F23C10/00 (Core/Non-invention)

CPC: Y02P30/30 C01B3/02 F23C10/00 F23C99/00 B01J21/04

B01J23/755 B01J37/0207 B01J37/08 C01B3/36 C01B2203/025

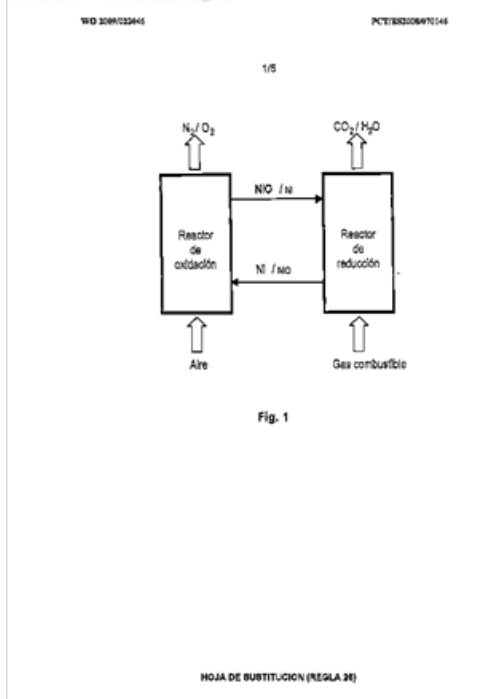
C01B2203/042 C01B2203/0475 C01B2203/1241 Y02E20/346

European: B01J21/04 B01J23/755 B01J37/02B6 C01B3/02

C01B3/36 F23C10/00 F23C99/00 L01J37/08 M01B203/02D

M01B203/04F M01B203/04P4 M01B203/12B2D2

PatBase - WO09022046_A1

**Family:**

Publication number	Publication date	Application number	Application date
ES2319052 AA	20090501	ES20070002104	20070727
ES2319052 BA	20100215	ES20070002104	20070727
WO09022046 A1	20090219	WO2008ES70146	20080724

Priority:

ES20070002104 20070727

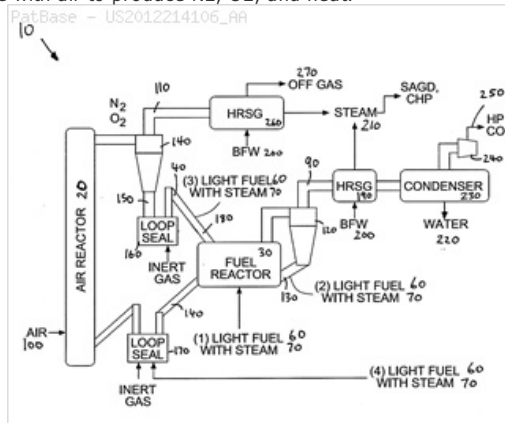
Probable Assignee: CONSEJO SUPERIOR INVESTIGACION**Assignee(s):** (std): CONSEJO SUPERIOR INVESTIGACION ; DE DIEGO POZA LUIS FRANCISCO ; GARCIA LABIANO FRANCISCO ; GAYAN SANZ PILAR ; ABAD SECADES ALBERTO ; ADANEZ ELORZA JUAN**Assignee(s):** CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS**Inventor(s):** (std): ABAD SECADES ALBERTO ; ADANEZ ELORZA JUAN ; DE DIEGO POZA LUIS FRANCISCO ; GARCIA LABIANO FRANCISCO ; GAYAN SANZ PILAR**Inventor(s):** JUAN ADANEZ ELORZA ; LUIS FRANCISCO DE DIEGO POZA ; PILAR GAYAN SANZ ; FRANCISCO GARCIA LABIANO ; ALBERTO ABAD SECADES**Agent(s):** PONS ARINO ANGEL**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: CHEMICAL LOOPING COMBUSTION

Abstract: A chemical looping combustion process for producing heat or steam or both from a hydrocarbon fuel. A metal oxide oxygen carrier is reduced from an initial oxidation state in a first reduction reaction with a hydrocarbon fuel to provide CO₂, H₂O, heat, and a reduced metal or metal oxide having a first reduced state, the first reduced state lower than the initial oxidation state, and then the reduced metal or metal oxide from the first reduced state is further reduced in a second reduction reaction with additional hydrocarbon fuel to provide CO₂, H₂O, heat, and a further reduced metal or metal oxide having a second reduced state, the second reduced state lower than the first reduced state. The further reduced metal or metal oxide is oxidized, substantially back to the initial oxidation state with air to produce N₂, O₂, and heat.

Classifications:

International (IPC 8-9): B01J19/24 C01B13/02 C01B21/02 C01B3/34 C01B31/20 C01B32/50 C01B5/00 C09K3/00 F23C10/01 F23C13/00 (Advanced/Invention); C01G3/02 F22B33/18 (Advanced/Non-invention)
CPC: F23C2900/99008 F23C10/01 Y02E20/346
US: 252/183.14 252/183.140S 431/7 431/7P

**Family:**

Publication number	Publication date	Application number	Application date
CA2754948 AA	20120413	CA20112754948	20111013
US2012214106 AA	20120823	US20110272647	20111013

Priority:

US20100392764P 20101013 CA20112754948 20111013 US20110272647 20111013

Probable Assignee: CAO YAN630 FAIRDALE AVEBOWLING GREENKY42101US

Assignee(s): (std): CAO YAN ; PAN WEI PING ; SIT SONG

Assignee(s): SIT SONG216 MIDVALLEY WAY SECALGARYA1T2X 1K2CA ; PAN WEI PING3326 KYLE COURT BOWLING GREENKY42104US ; CAO YAN630 FAIRDALE AVEBOWLING GREENKY42101US

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Inventor(s): SIT SONG216 MIDVALLEY WAY SECALGARYA1T2X 1K2CA ; CAO YAN630 FAIRDALE AVEBOWLING GREENKY42101US ; PAN WEI PING3326 KYLE COURT BOWLING GREENKY42104US

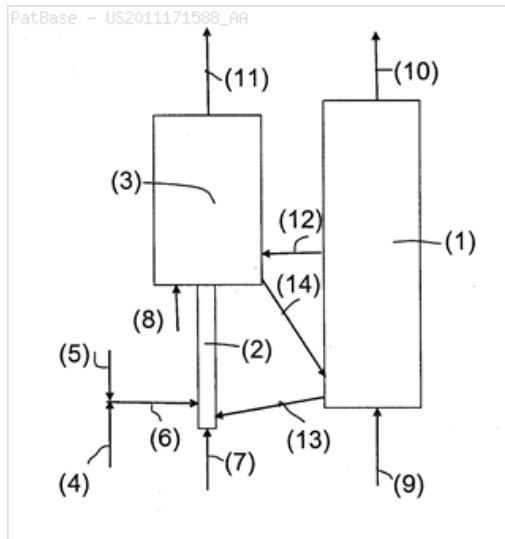
Agent(s): BORDEN LADNER GERVAIS LLP

Title: OPTIMISED METHOD AND DEVICE LOOP COMBUSTION ON LIQUID HYDROCARBON FEEDSTOCK

Abstract: The invention relates to a device and to an improved method for chemical looping combustion of at least one liquid hydrocarbon feed, comprising: mixing the liquid feed with an atomization gas so as to feed it into a metal oxide transport zone (2), upstream from combustion zone (3), through atomization means (6) allowing to form finely dispersed liquid droplets in the atomization gas; spraying the liquid feed in form of droplets into contact with at least part of the metal oxides in transport zone (2), the operating conditions in transport zone (2) being so selected that the superficial gas velocity after spraying the liquid feed is higher than the transport velocity of the metal oxide particles; sending all of the effluents from transport zone (2) to a combustion zone (3) allowing reduction of the metal oxides, said combustion zone (3) comprising at least one dense-phase fluidized bed. The invention can be advantageously applied to CO₂ capture and energy production.

Classifications:

International (IPC 8-9): B01J8/26 B01J8/38 B08B15/00 C10G11/18 F23C10/00 F23C10/01 F23C10/04 F23C10/22 F23C99/00 F23D3/40 F24J1/00 F24V30/00 (Advanced/Invention); C10G11/18 F23C10/00 F23C10/01 F23C99/00 (Advanced/Non-invention); B01J8/24 B08B15/00 C10G11/00 F23C10/00 F23C10/01 F23C99/00 (Core/Invention)
CPC: B01J8/26 B01J8/38 B01J2208/00902 F23C10/005 F23C2900/99008 Y02E20/346 F23C99/00 F23C10/01 F23C99/00D F23C10/01 F23C99/00 R23C900/99008
European: F23C10/00D F23C10/01 F23C99/00 R23C900/99008
US: 431/170 431/170S 431/7 431/7P

**Family:**

Publication number	Publication date	Application number	Application date
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BRPI0919078 A2	20151215	BR2009PI19078	20090921
CA2737105 AA	20100401	CA20092737105	20090921
CA2737105 C	20161115	CA20092737105	20090921
DE602009030041 D1	20150430	DE200960030041T	20090921
EP2344811 A2	20110720	EP20090741326	20090921
EP2344811 B1	20150318	EP20090741326	20090921
ES2539034 T3	20150625	ES20090741326T	20090921
FR2936301 A1	20100326	FR20080005220	20080923
FR2936301 B1	20100910	FR20080005220	20080923
IN02574CN2011 A	20120817	IN2011CN02574	20110418
IN297096 B	20180601	IN2011CN02574	20110418
JP2012503168 T2	20120202	JP20110528385T	20090921
JP5583674 B2	20140903	JP20110528385T	20090921
KR101457261 B1	20141031	KR20117009095	20090921
KR20110074551 A	20110630	KR20117009095	20090921
RU2011116238 A	20121027	RU20110116238	20090921
RU2496054 C2	20131020	RU20110116238	20090921
US2011171588 AA	20110714	US20090120185	20090921
US9638412 BB	20170502	US20090120185	20090921
WO10034900 A2	20100401	WO2009FR01113	20090921
WO10034900 A3	20110303	WO2009FR01113	20090921

Priority:

FR20080005220 20080923 EP20090741326 20090921 WO2009FR01113 20090921

Probable Assignee: IFP ENERGIES NOUVELLES

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Assignee(s): TOTAL S A ; IFP

Inventor(s): (std): HOTEIT ALI ; GAUTHIER THIERRY ; FORRET ANN ; FORRE ANN ; OTEIT ALI ; GOT E T ERRI

Inventor(s): ALI HOTEIT ; ANN FORRET ; THIERRY GAUTHIER

Agent(s): ROBIC ; ISERN JORGE ; IFP ; IFP ENERGIES NOUVELLES ; FITCH EVEN TABIN AND FLANNERY LLP ; ELMALEH ALFRED

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

7) Family number: 57763714 (US2015010873A)

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Title: CHEMICAL LOOPING COMBUSTION METHOD AND APPARATUS FOR SOLID FUELS USING DIFFERENT OXYGEN CARRIERS

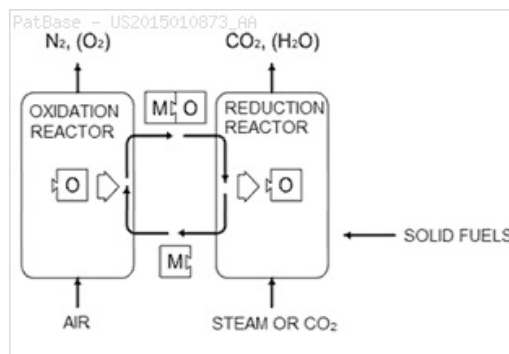
Abstract: A chemical looping combustion apparatus for solid fuels using different oxygen carriers is provided. The chemical looping combustion apparatus includes: a solid fuel chemical looping combustor configured to receive solid fuels and to produce carbon dioxide and steam by combustion of the solid fuels; a gaseous fuel chemical looping combustor configured to receive gaseous fuels and to produce carbon dioxide and steam by combustion of the gaseous fuels; and a devolatilization reactor configured to produce solids and gases by devolatilizing the solid fuels, and the solid fuels received by the solid fuel chemical looping combustor and the gaseous fuels received by the gaseous fuel chemical looping combustor are the solids and the gases produced by the devolatilization reactor, respectively. Accordingly, a reaction rate and an amount of oxygen transfer can increase, and necessity for low-priced oxygen carriers and a make-up cost of low-priced oxygen carriers can be reduced.

Classifications:

International (IPC 8-9): C10L1/12 F23C10/00 F23C10/01 F23C10/08 F23C10/18 F23C13/08 F23C99/00 F23D3/40 F23L7/00 F27D1/04 (Advanced/Invention)

CPC: F23C99/00 F23C10/005 F23C2900/99008 Y02E20/346

US: 431/170



Family:

Publication number	Publication date	Application number	Application date
KR101458872 B1	20141107	KR20130077710	20130703
US2015010873 AA	20150108	US20140320805	20140701
US9683737 BB	20170620	US20140320805	20140701

Priority:

KR20130077710 20130703

Probable Assignee: KOREA INST OF ENERGY RESEARCH

Assignee(s): (std): KOREA ENERGY RESEARCH INST

Assignee(s): KOREA INST OF ENERGY RESEARCH ; KOREA INSTITUTE OF ENERGY RESEARCH

Inventor(s): (std): BAE DAL HEE ; JIN GYOUNG TAE ; JO SUNG HO ; JOO JI BONG ; LEE DONG HO ; LEE SEUNG YONG ; MOON JONG HO ; PARK JAE HYEON ; PARK YOUNG CHEOL ; PARK YOUNGCHEOL ; RYU HO JUNG ; SHUN DO WON ; SUN DO WON ; YI CHANG KEUN

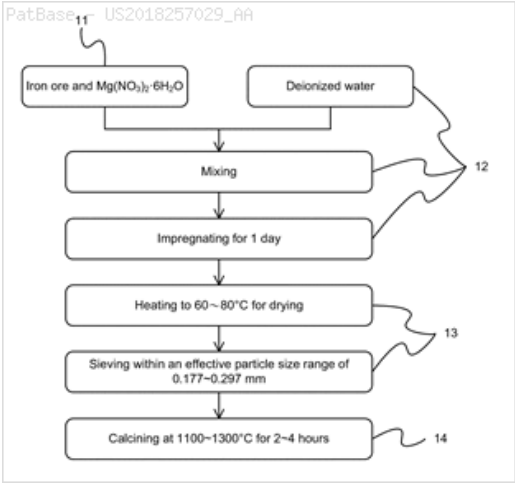
8) Family number: 71114368 (US2018257029A) © PatBase

Title: MAGNESIUM-IRON COMPLEX OXIDE FOR SEPARATING AND PURIFYING CARBON DIOXIDE AND FABRICATION METHOD THEREOF

Abstract: A method is provided for making a magnesium(Mg)-iron(Fe) complex oxide. The Mg-Fe complex oxide is used for separating and purifying carbon dioxide (CO₂). The present invention solves the problem of using iron ore in chemical looping combustion. The present invention comprises the following steps: At first, iron ore and magnesium nitrate (Mg(NO₃)₂·6H₂O) are impregnated for reaction. After sieving within a fixed range of size, calcination is processed to obtain the Mg-Fe complex oxide. Not only the problem of using iron ore in chemical combustion loop is effectively solved; but also the whole procedure can be looped for a long time with a high CO₂ conversion rate.

Classifications:

International (IPC 8-9): B01D53/62 (Advanced/Invention)
CPC: B01D2251/402 B01D2251/602 C01B32/50 B01D53/62
C01G49/0036 Y02C10/04 C01G49/06 C01P2002/32 C01P2002/50
C01P2002/72 C01P2004/03



Family:

Publication number	Publication date	Application number	Application date
US2018257029 AA	20180913	US20170455274	20170310

Priority:

US20170455274 20170310

Probable Assignee: OF NUCLEAR ENERGY RES ATOMIC ENERGY COUNCIL EXECUTIVE YUAN R O C INST

Assignee(s): (std): OF NUCLEAR ENERGY RES ATOMIC ENERGY COUNCIL EXECUTIVE YUAN R O C INST

Assignee(s): OF NUCLEAR ENERGY RESEARCH ATOMIC ENERGY COUNCIL EXECUTIVE YUAN ROC INST

Inventor(s): (std): CHYOU YAU PIN ; HUANG CHING YING ; HUANG WEI CHEN ; KUO YU LIN ; SU YU MING ; YU JEN CHUN