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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

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))  
— with sequence listing part of description (Rule 5.2(a))

(88) Date of publication of the international search report:

21 March 2013

(54) Title: PROCESSES FOR ENZYMIC REFINING OF PRETREATED CELLULOSIC MATERIAL FOR SACCHARIFICATION

(57) Abstract: The present invention relates to processes for processes for enzymatic refining of a pretreated cellulosic material for saccharification.



WO 2012/134626 A3

**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/US2012/023217

**A. CLASSIFICATION OF SUBJECT MATTER**  
 INV. C12P7/10 C12P19/02 C12P19/14 C08B1/00 C13K1/02  
 D21C5/00  
 ADD.  
 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)  
 C12P C08B C13K D21C C12Y

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)  
 EPO-Internal, WPI Data, BIOSIS, COMPENDEX, EMBASE, FSTA

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2009/042622 A2 (NOVOZYMES AS [DK]; DELOZIER GREGORY [US]; HAAGENSEN FRANK DROESCHER [U] 2 April 2009 (2009-04-02) cited in the application abstract; claims 1-32 page 4, lines 1-22 page 8, lines 1-7, 28-32 page 5, lines 18-22, 31-32 ----- -/--	1,2,7, 10, 12-16, 18-23

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	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"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	"&" document member of the same patent family

Date of the actual completion of the international search  31 October 2012	Date of mailing of the international search report  21/01/2013
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Schröder, Gunnar
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## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/023217

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>WO 2010/053838 A1 (NOVOZYMES INC [US]; BROWN KIMBERLY [US]; BOHAN DOREEN [US])  14 May 2010 (2010-05-14)  cited in the application  abstract; claims 15, 16  page 51, lines 24-30  page 52, lines 1-11  page 53, lines 28-36  page 81, lines 27-30  page 48, lines 18-20  page 49, lines 27-28</p> <p style="text-align: center;">-----</p>	<p>1,2,6,7,  10-16,  18-23</p>
X	<p>EP 1 752 533 A1 (AGRONOMIQUE INST NAT RECH [FR]; INST FRANCAIS DU PETROLE [FR])  14 February 2007 (2007-02-14)  cited in the application  abstract; claims 1, 7, 16  paragraph [0004]  paragraph [0077]  paragraph [0079]  paragraph [0042] - paragraph [0043]  paragraph [0088]</p> <p style="text-align: center;">-----</p>	<p>1-7,  10-16,  18-23</p>
X	<p>ISABELLE BENOIT ET AL: "Biotechnological applications and potential of fungal feruloyl esterases based on prevalence, classification and biochemical diversity", BIOTECHNOLOGY LETTERS, SPRINGER NETHERLANDS, DORDRECHT, vol. 30, no. 3, 1 November 2007 (2007-11-01), pages 387-396, XP019570012, ISSN: 1573-6776  abstract  page 392, right-hand column, last paragraph - page 393, right-hand column, paragraph 3; figure 2</p> <p style="text-align: center;">-----</p>	<p>1-6,  10-16,  18-23</p>
X	<p>TABKA M G ET AL: "Enzymatic saccharification of wheat straw for bioethanol production by a combined cellulase xylanase and feruloyl esterase treatment", ENZYME AND MICROBIAL TECHNOLOGY, STONEHAM, MA, US, vol. 39, no. 4, 2 August 2006 (2006-08-02), pages 897-902, XP027948824, ISSN: 0141-0229  [retrieved on 2006-08-02]  abstract  page 898, paragraphs 2.1, 2.3, 2.4  figure 2</p> <p style="text-align: center;">-----</p> <p style="text-align: center;">-/--</p>	<p>1-6,  10-16,  18-23</p>

## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/023217

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>KIM Y ET AL: "Enzyme hydrolysis and ethanol fermentation of liquid hot water and AFEX pretreated distillers' grains at high-solids loadings",            BIORESOURCE TECHNOLOGY, ELSEVIER BV, GB,            vol. 99, no. 12,            1 August 2008 (2008-08-01), pages            5206-5215, XP022654840,            ISSN: 0960-8524, DOI:            10.1016/J.BIORTECH.2007.09.031            [retrieved on 2007-11-19]            abstract            page 5208, right-hand column, paragraphs            1, 2            page 5211, left-hand column, last            paragraph - right-hand column, paragraph 2            page 5214, right-hand column, last            paragraph - page 5215, left-hand column,            paragraph 1</p>	1,2,6, 10-16, 18-23
X	<p>-----            FAULDS C B ET AL: "RELEASE OF FERULIC            ACID FROM WHEAT BRAN BY A FERULIC ACID            ESTERASE (FAE-III) FROM ASPERGILLUS            NIGER",            APPLIED MICROBIOLOGY AND BIOTECHNOLOGY,            SPRINGER VERLAG, BERLIN, DE,            vol. 43, no. 6,            1 January 1995 (1995-01-01), pages            1082-1087, XP000603403,            ISSN: 0175-7598, DOI: 10.1007/BF00166929            abstract            page 1083, left-hand column, paragraph 2-4</p>	1,2,6, 11-16
X	<p>-----            VRIES DE R P ET AL: "The faeA genes from            Aspergillus niger and Aspergillus            tubingensis encode ferulic acid esterases            involved in degradation of complex cell            wall polysaccharides",            APPLIED AND ENVIRONMENTAL MICROBIOLOGY,            AMERICAN SOCIETY FOR MICROBIOLOGY, US,            vol. 63, no. 12,            1 December 1997 (1997-12-01), pages            4638-4644, XP002203731,            ISSN: 0099-2240            abstract            page 4638, left-hand column, paragraph 1-2</p> <p>-----            -/--</p>	1-6, 10-16, 18-23

INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2012/023217

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DOMINIC W. S. WONG: "Feruloyl Esterase: A Key Enzyme in Biomass Degradation", APPLIED BIOCHEMISTRY AND BIOTECHNOLOGY, vol. 133, no. 2, 1 May 2006 (2006-05-01), pages 87-112, XP055042528, ISSN: 0273-2289, DOI: 10.1385/ABAB:133:2:87 abstract page 102, paragraph 1-3 page 108, paragraph 2 -----</p>	<p>1-6, 10-16, 18-23</p>
X,P	<p>WO 2011/153516 A2 (MASCOMA CORP [US]; BREVNOVA ELENA [US]; MCBRIDE JOHN E [US]; WISWALL E) 8 December 2011 (2011-12-08) abstract; claim 1 paragraph [0479]; figure 90; table 39 paragraphs [0206], [0207] examples 36, 37, 40 -----</p>	<p>1-6, 10-16, 18-23</p>

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2012/023217

## 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.:  
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:
  
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:

see additional sheet

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 fees, this Authority did not invite payment of additional fees.
  
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.:

1-16, 18-23(all partially)

### 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.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-16, 18-23(all partially)

Contacting a pretreated cellulosic material with an esterase, wherein the esterase comprises an amino acid sequence having at least 70% sequence identity with SEQ ID. NO. 133

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2-5. claims: 1-16, 18-23(all partially)

Contacting a pretreated cellulosic material with an esterase, wherein the esterase comprises an amino acid sequence having at least 70% sequence identity with: SEQ ID. NO. 134, 135, 136 or 137, respectively

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6. claims: 1-16, 21-23(all partially)

Separating a liquor from a pretreated cellulosic material and contacting the pretreated cellulosic material with an esterase

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7. claims: 17(completely); 21-23(partially)

Treating a liquor with a feruloyl esterase, wherein the liquor is obtained from a pretreated cellulosic material by formation of a solid/liquid mixture and separation of the liquor

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/023217

Patent document cited in search report	Publication date	Publication date	Patent family member(s)	Publication date
WO 2009042622	A2	02-04-2009	NONE	
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WO 2010053838	A1	14-05-2010	CA 2743049 A1	14-05-2010
			EP 2356136 A1	17-08-2011
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			WO 2010053838 A1	14-05-2010
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			BR PI0614631 A2	12-04-2011
			CA 2618734 A1	22-02-2007
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			DK 1913136 T3	23-07-2012
			EP 1752533 A1	14-02-2007
			EP 1913136 A1	23-04-2008
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			US 2009181431 A1	16-07-2009
			WO 2007019949 A1	22-02-2007
			ZA 200801168 A	24-06-2009
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WO 2011153516	A2	08-12-2011	NONE	
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