



(51) International Patent Classification:
C12N 9/42 (2006.01)

(21) International Application Number:
PCT/US2009/046159

(22) International Filing Date:
3 June 2009 (03.06.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/059,506 6 June 2008 (06.06.2008) US

(71) Applicant (for all designated States except US): **DANISCO US INC., GENENCOR DIVISION** [US/US]; 925 Page Mill Road, Palo Alto, CA 94304 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CASCAO-PEREIRA, Luis, G.** [BR/US]; Danisco US Inc., Genencor Division, 925 Page Mill Road, Palo Alto, CA 94304 (US). **KAPER, Thijs** [NL/US]; Danisco US Inc., Genencor Division, 925 Page Mill Road, Palo Alto, CA 94304 (US). **KELEMEN, Bradley, R.** [US/US]; Danisco US Inc., Genencor Division, 925 Page Mill Road, Palo Alto, CA 94304 (US). **LIU, Amy** [CA/US]; Danisco US Inc., Genencor Division, 925 Page Mill Road, Palo Alto, CA 94304 (US).

(74) Agent: **KOLMAN, Michael, F.**; Danisco US Inc., Genencor Division, 925 Page Mill Road, Palo Alto, CA 94304 (US).

(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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

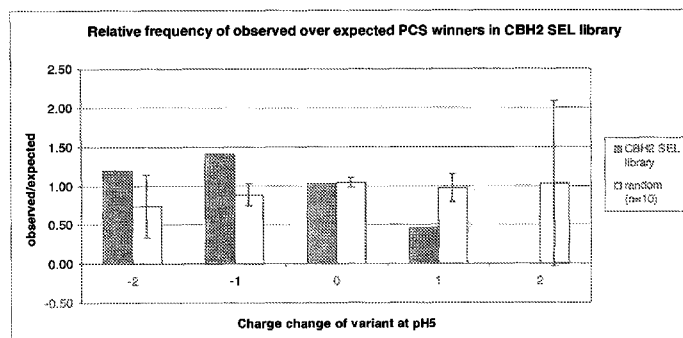
Published:

- 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))

(88) Date of publication of the international search report:
8 April 2010

(54) Title: COMPOSITIONS AND METHODS COMPRISING CELLULASE VARIANTS WITH REDUCED AFFINITY TO NON-CELLULOSIC MATERIALS

Figure 4



(57) Abstract: The present disclosure relates to cellulase variants. In particular the present disclosure relates to cellulase variants having reduced binding to non-cellulosic materials. Also described are nucleic acids encoding the cellulase, compositions comprising said cellulase, methods of identifying cellulase variants and methods of using the compositions.

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/046159

A. CLASSIFICATION OF SUBJECT MATTER

INV. C12N9/42

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)

C12N

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 practical, search terms used)

EPO-Internal, WPI Data, BIOSIS, EMBASE, Sequence Search

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/074005 A (GENENCOR INT [US]; AEHLE WOLFGANG [US]; CALDWELL ROBERT M [US]; DANKME) 13 July 2006 (2006-07-13) abstract paragraphs [0003], [0015] - [0022], [0114] - [0143], [0234]; examples 1,13 -----	1-17
X	WO 2004/056981 A (NOVOZYMES AS [DK]; WU WENPING [CN]; LANGE LENE [DK]; SKOVLUND DOMINIQUE) 8 July 2004 (2004-07-08) abstract page 1, lines 5-9 page 2, line 1 - page 6, line 30 page 14, line 9 - page 15, line 18 page 24, line 22 - page 25, line 3 ----- -/--	1-17



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

"E" earlier document 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

23 September 2009

Date of mailing of the international search report

19/02/2010

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

Chavanne, Franz

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/046159

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 276 644 A (AM SAFE INC [US]) 22 January 2003 (2003-01-22) abstract paragraphs [0011], [0015], [0030], [0033], [0037], [0078] - [0081] examples 8-10 -----	1-17
A	WO 2008/025164 A (IOGEN ENERGY CORP [CA]; ST-PIERRE PATRICK [CA]; MASRI NABIL N [CA]; FO) 6 March 2008 (2008-03-06) abstract paragraphs [0001], [0005] - [0008], [0011], [0024], [0043], [0061] -----	1-17
X,P, L	WO 2008/153925 A (DANISCO US INC GENENCOR DIVISI [US]; CASCAO-PEREIRA LUIS GUSTAVO [US];) 18 December 2008 (2008-12-18) L:discloses the invention of the application. abstract paragraphs [0004], [0009], [0010], [0049], [0144], [0218], [0358], [0397] examples 7,14 -----	1-17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/046159

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.:

Invention 1

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:

Invention 1

Claims 1-17 (partially)

Isolated cellulase variant comprising a substitution at position 63, wherein the substitution causes the cellulase variant to have a more negative net charge, method of converting biomass to sugars or of producing fuel using said cellulase variant.

Inventions 2, 4, 5, 7, 9-16, 18, 19, 21, 22, 24 and 25

Claims 1-17 (partially)

Isolated cellulase variant comprising a substitution at position 77, 147, 153, 161, 197, 203, 237, 239, 247, 254, 281, 285, 289, 294, 339, 344, 378 and 382, respectively, wherein the substitution causes the cellulase variant to have a more negative net charge, method of converting biomass to sugars or of producing fuel using said cellulase variant.

Inventions 3, 6, 8, 17, 20 and 23

Claims 1-23 (partially)

Isolated cellulase variant comprising a substitution at position 129, 157, 194, 288, 327 and 356, respectively, wherein the substitution causes the cellulase variant to have a more negative net charge, method of converting biomass to sugars or of producing fuel using said cellulase variant.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2009/046159

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2006074005 A	13-07-2006	BR PI0519456 A2 CA 2592550 A1 EP 1838849 A2 JP 2008526206 T	27-01-2009 13-07-2006 03-10-2007 24-07-2008
WO 2004056981 A	08-07-2004	AT 438711 T AU 2003291962 A1 CN 1729287 A CN 101555472 A DK 1578964 T3 EP 1578964 A2 EP 2128247 A1 ES 2331067 T3	15-08-2009 14-07-2004 01-02-2006 14-10-2009 23-11-2009 28-09-2005 02-12-2009 21-12-2009
EP 1276644 A	22-01-2003	DE 60125745 T2 WO 0168411 A1 US 6439600 B1	08-11-2007 20-09-2001 27-08-2002
WO 2008025164 A	06-03-2008	AU 2007291864 A1 CA 2666741 A1 EP 2057269 A1 US 2008076152 A1	06-03-2008 06-03-2008 13-05-2009 27-03-2008
WO 2008153925 A	18-12-2008	WO 2008153934 A2 WO 2008153935 A2	18-12-2008 18-12-2008