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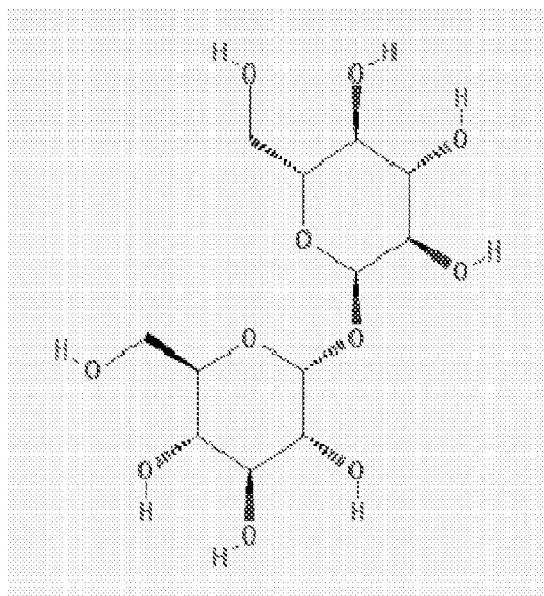
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— with international search report (Art. 21(3))

[Continued on next page]

(54) Title: COMPOSITIONS AND METHODS TO PREVENT AND TREAT BIOFILMS

Fig. 1a Trehalose Chemical Structure (C₁₂H₂₂O₁₁)

(57) Abstract: Compositions and methods to treat biofilms are disclosed based on the discovery of the role of the disaccharide trehalose in microbial biofilm development. In various embodiments to treat body-borne biofilms systemically and locally, the method includes administering trehalase, the enzyme which degrades trehalose, in combination with other saccharidases for an exposition time sufficient to adequately degrade the biofilm gel matrix at the site of the biofilm. The method also includes administering a combination of other enzymes such as proteolytic, fibrinolytic, and lipolytic enzymes to break down proteins and lipids present in the biofilm, and administering antimicrobials for the specific type(s) of infectious pathogen(s) underlying the biofilm. Additionally, methods are disclosed to address degradation of biofilms on medical device surfaces and biofilms present in industrial settings.



— *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:**
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/040408**A. CLASSIFICATION OF SUBJECT MATTER****A61L 2/16(2006.01)i, A61F 2/24(2006.01)i, A61F 2/20(2006.01)i, A61L 27/00(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)

A61L 2/16; A61K 38/46; A61K 38/54; A61K 38/47; A61K 9/16; A61K 31/703; A61K 38/48; C12N 15/56; C12N 1/20

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: biofilm, trehalase, medical device, pipeline, HVAC, marine surface, food storage surface, infection, chewing gum, time-delayed release, composition, ocular infection, contact lens.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 2011-0129454 A1 (OLMSTEAD, STEPHEN FRANCIS) 02 June 2011 See abstract; claims 19-20, 24, 26-28, 31.	67-69, 81, 84 86 1-20, 57-66, 70-80 , 82-83, 85, 87-101 , 104-106
Y A	US 6759040 B1 (MANYAK, DAVID M. et al.) 06 July 2004 See abstract; paragraph [0011]; claims 6, 13, 20-21, 32.	86 1-20, 57-85, 87-101 , 104-106
X A	WO 2006-032011 A2 (ELIXIR PHARMACEUTICALS, INC.) 23 March 2006 See claims 37, 40; page 7, lines 21-31; and page 13, lines 1-11.	104-106 1-20, 57-101
A	US 2006-0121019 A1 (BUDNY, JOHN et al.) 08 June 2006 See abstract; and claims 1-2, 5, 18.	1-20, 57-101 , 104-106
A	US 2009-0202516 A1 (OLMSTEAD, STEPHEN F.) 13 August 2009 See abstract; and claims 1-3, -7, 11, 17.	1-20, 57-101 , 104-106



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"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

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/040408**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.: 21-56, 102-103
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 21-56 and 102-103 pertain to a method for treatment of the human body by therapy, which is a subject matter this International Searching Authority is not required, under Article 17(2)(a)(i) of the PCT and Rule 39.1(iv) of the Regulation, to search.
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:

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 fee, this Authority did not invite payment of any additional fee.
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.:

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.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/040408

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0820516 B1 (BETZDEARBORN, INC.) 06 March 2002 See claims 1-3 & 7-8.	1-20, 57-101 , 104-106

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/040408

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