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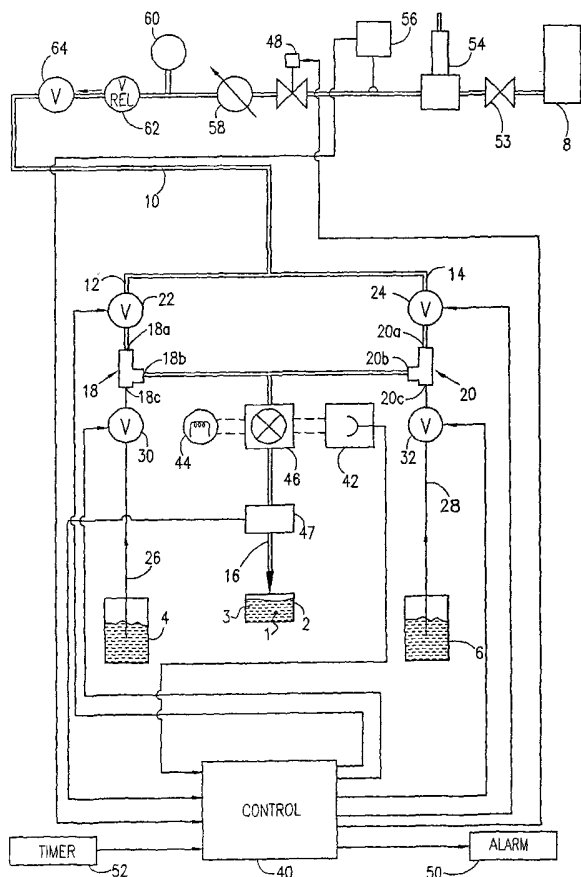
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[Continued on next page]

(54) Title: CONTROL OF DEVELOPMENT OF BIOFILMS IN INDUSTRIAL PROCESS WATER



(57) Abstract: There is provided a method of inhibiting the development of a biofilm adjacent a surface, the method comprising intermittently applying a biofilm inhibiting substance to a collection of microorganisms having biofilm developing potential. There is also provided a method of inhibiting the development of a biofilm adjacent a surface, the method comprising inhibiting the biofilm developing potential of a collection of microorganisms without completely eradicating said collection of microorganisms. Also provided are a system for inhibiting the development of a biofilm, and a method and system for inhibiting the production of an enzyme by a collection of microorganisms.

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GW, ML, MR, NE, SN, TD, TG).

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INTERNATIONAL SEARCH REPORT

Internat	Application No
PCT/IL 02/00637	

A. CLASSIFICATION OF SUBJECT MATTER		
IPC 7	C02F1/50	C02F1/68
	//C02F103/28	
	C02F1/76	C02F1/72
		D21C9/16
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)		
IPC 7	C02F	D21C
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)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 976 386 A (BARAK AYALA) 2 November 1999 (1999-11-02) column 1, line 1-18 column 2, line 29-41 column 3, line 36-67; figures 1,2 column 4, line 35-41 example 2	1-25, 27-145, 148-151, 153-177, 180,199, 204-207
X	WO 01 53216 A (ALBEMARLE CORP) 26 July 2001 (2001-07-26) page 8, line 14-25	1,27
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in 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	Date of mailing of the international search report	
5 March 2003	05.06.03	
Name and mailing address of the ISA	Authorized officer	
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Borello, E	

INTERNATIONAL SEARCH REPORT

Intern	Application No
	PCT/IL 02/00637

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 149 822 A (FABRI JON O ET AL) 21 November 2000 (2000-11-21) column 2, line 19-31 column 4, line 1-24 ---	1
X	US 6 106 730 A (HALE LAWRENCE C ET AL) 22 August 2000 (2000-08-22) column 2, line 12-38; figure 1 ---	1
X	US 5 607 544 A (SALZBURGER WOLFRAM ET AL) 4 March 1997 (1997-03-04) the whole document ---	138,144, 145,150, 151,154, 174,204, 205,207
X	WO 99 07826 A (OH JONG SUK) 18 February 1999 (1999-02-18) claims 1,6 ---	138
X	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 06, 31 July 1995 (1995-07-31) -& JP 07 061903 A (SUZUKI MOTOR CORP), 7 March 1995 (1995-03-07) abstract -----	192,195

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL 02/00637

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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.: 26, 152
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:
see FURTHER INFORMATION sheet PCT/ISA/210

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 II Observations where unity of invention is lacking (Continuation of item 2 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 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.:
1-25, 27-51, 52, 53-77, 78, 79-100, 101-123, 124-126, 127-129, 130-132, 133-135, 136, 137, 138-143, 144-145, 148-150, 151, 153, 154-173, 174-177, 180-185, 186-188, 189-191, 192-194, 195-201, 204, 205-207, 208

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 26, 152

1. In view of the large number and also the wording of the claims presently on file, which render it difficult, if not impossible, to determine the matter for which protection is sought, the present application fails to comply with the clarity and conciseness requirements of Article 6 PCT (see also Rule 6.1(a) PCT) to such an extent that a meaningful search is impossible.

2. In particular the search has not been carried out completely for the claims 21, 23, 47, 75, 80, 98, 103, 121, 172, failing to comply with the clarity requirements of Article 6 PCT, because of the inconsistency between the following claimed features: they claim a "continuous" injection of the generated biofilm-inhibiting substance to the microorganisms, whilst the claims to which they refer to claim an "intermittent" application to the microorganisms of a biofilm-inhibiting substance. Consequently the feature <"continuous" injection of the generated biofilm-inhibiting substance to the microorganisms> has not been searched.

3. Present claims 124, 127, 130 and 133 relate to a compound defined by reference to a desirable characteristic or property, namely an <concentration and respectively duration effective to inhibit or to destroy biofilm developing potential> : An attempt is made to define the compound by reference to a result to be achieved. Again this lack of clarity (Article 6 PCT) of these claims is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely <a compound comprising a collection of microorganisms and the biofilm inhibiting substance, e.g. bromide activated chloramine>.

4. Present claims 26 and 152 relate to methods defined by reference to a desirable characteristic, namely <inhibiting the biofilm developing potential> and respectively <inhibiting the enzyme producing potential>: An attempt is made to define the compound by reference to a result to be achieved. Again this lack of clarity (Article 6 PCT) of these claims is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has not been carried out for these claims, but only for their dependent claims, which define the methods in meaningful ways.

5. Present claims 186, 189, 192 and 195 relate to a compound defined by reference to a desirable characteristic or property, namely an <concentration and respectively duration effective to inhibit production of an enzyme> : An attempt is made to define the compound by reference to a result to be achieved. Again this lack of clarity (Article 6 PCT) of these claims is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely <a compound comprising a collection of microorganisms

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

and the enzyme production inhibiting substance, e.g. bromide activated chloramine>.

6. In particular the term <bromide activated chloramine> is not clear in terms of Art. 6 PCT and accordingly it has not been searched completely. It has been searched as defined as product-by-process, e.g. at page 20 lines 15-20 of the description. The claims affected by this clarity objection are: claims 25, 51, 77, 78, 79, 102, 124, 127, 136, 137, 149, 174, 175, 186, 189, 202, 206, 208, 209-213.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. Claims: 1-25, 27-51, 52, 53-77, 78, 79-100, 101-123, 124-126, 127-129, 130-132, 133-135, 136, 137, 138-143, 144-145, 148-150, 151, 153, 154-173, 174-177, 180-185, 186-188, 189-191, 192-194, 195-201, 204, 205-207, 208

- 1.1. Claims: 1-25, 27-51, 52, 78, 79-100, 101-123, 137

The invention defined in claims 1-25, 27-51, 52, 78, 79-100, 101-123, 137 and 208 relates to a method for:

- A) inhibiting the development of a biofilm adjacent surface comprising
- B) applying a biofilm inhibiting substance E) to
- F) a collection of microorganisms having biofilm development potential.

- 1.2. Claims: 53-77, 136

The invention defined in claims 53-77 and 136 relates to an apparatus for carrying out the method of claim 1.

- 1.3. Claims: 124-126, 127-129, 130-132, 133-135

The invention defined in claims 124-126, 127-129, 130-132, 133-135 relates to a product comprising:

- E) a biofilm inhibiting substance
- F) a collection of microorganisms having biofilm development potential.

- 1.4. Claims: 138-143, 150, 151, 153, 174-175, 180

The invention defined in claims 138-143, 150, 151-153, 174-175, 180 relates to a method for:

- H) inhibiting the production of an enzyme by a collection F) of microorganisms attached to a surface,
- I) using a substance P) which inhibits the production of an enzyme by F)
- C) applied intermittently.

- 1.5. Claims: 144-145, 176-177, 180, 204, 205-207

The invention defined in claims 144-145, 176-177, 180, 204, 205-207 relates to a method for:

- H) inhibiting the production of an enzyme
- H1) being a hydrogen peroxide-degrading enzyme by a collection F) of microorganisms attached to a surface,
- I) using a substance P) which inhibits the production of an enzyme by F)

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

C) applied intermittently.

1.6. Claims: 154-173

The invention defined in claim 154-173 relates to an apparatus for carrying out the steps of claims 139-153.

1.7. Claims: 186-188, 189-191, 192-194, 195-201

The invention defined in claims 186-188, 189-191, 192-194, 195-201 relates to a product comprising:

- P) an enzyme production inhibiting substance
- F) a collection of microorganisms.

2. Claims: 202, 203, 209-213

The invention defined in claims 202 and 203 relates to a method for:

- A) inhibiting the development of a biofilm adjacent a surface comprising
- B) applying a biofilm inhibiting substance E) to a biofilm developmentn of microorganisms having potential
- Q) and a peroxide
- C) intermittently.

The invention defined in claims 209-213 relates to a composition comprising:

- E) a bromide activated chloramine and
- Q) a peroxide

3. Claims: 146-147, 178-179, 180

The invention defined in claims 146-147, 178-179, 180 relates to a method for :

- H) inhibiting the production of an enzyme
- H2) being a starch-degrading enzyme
- by a collection F) of microorganisms attached to a surface,
- I) using a substance P) which inhibits the production of an enzyme by F)
- C) applied intermittently.

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat

Application No

PCT/IL 02/00637

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