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CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
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OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
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GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,

(54) Title: FATTY AMMONIUM SALT STARCH COMPLEXES AS ANTIMICROBIALS, PLANT WOUND, AND WOOD PRO-
TECTANTS

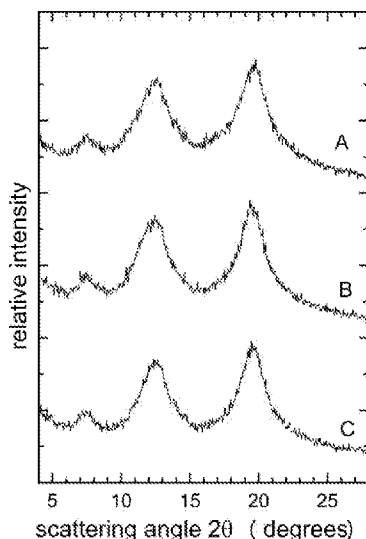


FIG. 1

(57) Abstract: Provided herein are fatty-ammonium salt / starch inclu-
sion complexes comprising one or more of a variety of fatty amines.
Such complexes can be combined with film-forming agents, such as
poly(vinyl) alcohol (PVOH) and plasticizing agents. The inclusion
complexes of the present invention can be utilized as antimicrobial
agents, preventing microbial growth on organic and inorganic surfaces.
In specific embodiments, inclusion complexes of the present invention
are applied to vegetable or fruit surfaces in order to impede microbial
growth. Inclusion complexes of the present invention can be applied to
wood in order to impede microbial growth and insect consumption and
to wound dressings.



MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
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KM, ML, MR, NE, SN, TD, TG).

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- *with international search report (Art. 21(3))*
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2018/041285**A. CLASSIFICATION OF SUBJECT MATTER****A01N 33/12(2006.01)i, A01G 7/06(2006.01)i, A01N 25/00(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
A01N 33/12; A01G 7/06; A01N 25/00Documentation 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 modelsElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: fatty-ammonium salt polysaccharide inclusion complex, antimicrobial property, poly(vinyl) alcohol, plant**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FANTA, GEORGE F. et al., "Poly(vinyl alcohol) composite films with high percent elongation prepared from amylose-fatty ammonium salt inclusion complexes", Journal of Applied Polymer Science, 2016, Vol. 133, No. 42, Article No. 44110, Internal pages 1-8 See abstract; and internal pages 1-4.	1-8,10-17,22-29 ,31-33,38-45,47-49 ,56,57
Y	POUR, ZAHRA SEKHAVAT et al., "Performance properties and antibacterial activity of crosslinked films of quaternary ammonium modified starch and poly(vinyl alcohol)", International Journal of Biological Macromolecules, 2015, Vol. 80, pages 596-604 See abstract; and pages 596-599.	1-8,10-17,22-29 ,31-33,38-45,47-49 ,56,57
Y	HAY, WILLIAM T. et al., "Rheological characterization of solutions and thin films made from amylose-hexadecylammonium chloride inclusion complexes and polyvinyl alcohol", Carbohydrate Polymers, 2017 (Online published date: 05 January 2017), Vol. 161, pages 140-148 See abstract; and pages 140-142.	1-8,10-17,22-29 ,31-33,38-45,47-49 ,56,57
Y	HAY, WILLIAM T. et al., "Effect of spray drying on the properties of amylose-hexadecylammonium chloride inclusion complexes", Carbohydrate Polymers, 2017 (Online published date: 23 October 2016), Vol. 157, pages 1050-1056 See abstract; and pages 1050-1052.	1-8,10-17,22-29 ,31-33,38-45,47-49 ,56,57

 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 application or patent 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

28 February 2019 (28.02.2019)

Date of mailing of the international search report

28 February 2019 (28.02.2019)

Name and mailing address of the ISA/KR

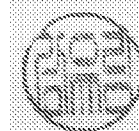
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2018/041285**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.: 19-21, 35-37, 51-53, 55
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:
Claims 19-21, 35-37 and 51-53 do not comply with PCT Rule 6.4(a) because multiple dependent claims should not serve as a basis for any other multiple dependent claim.
Claim 45 relates to "composition", but claim 55 dependent on claim 45 relates to "method". Therefore, claim 55 is not clear and concise contrary to PCT Article 6.
3. Claims Nos.: 9, 18, 30, 34, 46, 50, 54
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 fees, this Authority did not invite payment of any 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.:

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/US2018/041285

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	<p>ELLER, F.J. et al., "Hexadecyl ammonium chloride amylose inclusion complex to emulsify cedarwood oil and treat wood against termites and wood-decay fungi", International Biodeterioration & Biodegradation, 2018 (Online published date: 07 February 2018), Vol. 129, pages 95-101 See abstract; pages 95-100; and figures 3, 4.</p>	<p>1-8,10-17,22-29 ,31-33,38-45,47-49 ,56,57</p>

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2018/041285

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
None			