Abstract: Compositions and methods relating to partially hydrolyzed fucoidan for use in skin care compositions are described. Fucoidan from brown seaweeds is partially hydrolyzed and then mixed with other ingredients for use as a skin care composition in cream, lotion, ointment, or other form. The fucoidan is partially hydrolyzed with acid and heat. The partially hydrolyzed fucoidan may also be sulfonated. Other ingredients that may be included in the skin care composition include anti-wrinkle compounds, radiation protecting agents, fragrances, proteins, colorants or coloring agents, lipids, vitamins, botanical extracts, glycolipids, polymers, and copolymers, and the like. An article with skin-protecting and moisturizing compound includes a tissue substrate, a base, and partially hydrolyzed fucoidan.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61 K 8/73 (2007.01)

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(8) - A61 K 8/73 (2007 01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

PUBWEST, GOOGLE SCHOLAR

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PUBWEST/PGPB (USPTO, USOC, EPAB, UPAB), GOOGLE SCHOLAR, fucoidan, sulfated polysaccharide, hydrolyzed, endo-fucoidan-lyase, cosmetic, cream, lotion, salve, emulsion, kombu, tongan limu, mozuku, silicon, cellulose

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 2003/0039670 A1 (Mizutani et al.) 27 Feb 2003 (27.02.2003) para [0006], [0007], [0012]; [0036]; [0038]; [0039]; [0058]; [0059]; [0060]; [0078]; [0123]; [0137]; and [0162]</td>
<td>1-3, 5, 6, 9-15 and 18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4, 7, 8, 16, 17, 19 and 20</td>
</tr>
<tr>
<td>Y</td>
<td>US 2004/0057913 A1 (Sone et al.) 25 Mar 2004 (25.03.2004) para [0005], [0021]; [0024]; and [0025] 7, 8, and 16</td>
<td>7, 8 and 16</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

"A" 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

Date of the actual completion of the international search
03 Nov 2007 (02 11 2007)

Date of mailing of this international search report
06 DEC 2007

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer: Lee W. Young

PCT Hldesk: 571-272-4300
PCT OSP: 571-272-7774

Form PCT/ISA/2 10 (second sheet) (April 2007)
**INTERNATIONAL SEARCH REPORT**

**PCT/US 07/01536**

**INTERNATIONAL APPLICATION**

**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:

<table>
<thead>
<tr>
<th>Box No.</th>
<th>Claims Nos</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>because they relate to subject matter not required to be searched by this Authority, namely</td>
</tr>
</tbody>
</table>

**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:

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1

- Group I - Claims 1-20, are directed to a skin care composition (claims 1-17) or a method of making such a composition (claims 18-20), comprising a partially hydrolyzed fucoidan and a base
- Group II - Claims 21-40, are directed to a skin care composition for the care of wrinkles comprising partially hydrolyzed fucoidan, a base, and an anti-wrinkle compound (claims 21-39) or a method of making such a composition (claim 40)
- Group III - Claims 41-68, are directed to a composition for skin protection form ultraviolet damage to be applied to skin or hair, comprising either a mixture of partially hydrolyzed fucoidan (claims 41-57) or a mixture of sulfonated and partially hydrolyzed fucoidan derived from Tongan limu moui (claims 58-69), and further comprising a base, and a radiation protecting agent
- Group IV - Claims 69-75, are directed to a method of making an article with skin-protecting and moisturizing compound comprising providing a first tissue paper web applying a base to the first tissue paper web, and applying a of partially hydrolyzed fucoidan to the tissue paper web

<table>
<thead>
<tr>
<th>Box No.</th>
<th>As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees</td>
</tr>
<tr>
<td>3</td>
<td>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 1-20</td>
</tr>
<tr>
<td>4</td>
<td>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 1-20</td>
</tr>
</tbody>
</table>

**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

Form PCT/ISA/210 (continuation of first sheet (2)) (April 2007)