

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION		see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT /TH18/00040	International filing date (<i>day/month/year</i>) 07 September 2018 (07.09.2018)	(Earliest) Priority Date (<i>day/month/year</i>) 28 September 2017 (28.09.2017)	
Applicant NATIONAL SCIENCE AND TECHNOLOGY DEVELOPMENT AGENCY			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- the international application in the language in which it was filed.
 a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. **Certain claims were found unsearchable** (see Box No. II).

3. **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

- the text is approved as submitted by the applicant.
 the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- the text is approved as submitted by the applicant.
 the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. _____
 as suggested by the applicant.
 as selected by this Authority, because the applicant failed to suggest a figure.
 as selected by this Authority, because this figure better characterizes the invention.
- b. none of the figures is to be published with the abstract.

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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.: 11, 30, 32-33, and 38-39
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 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.:

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.

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC - B29C 64/124, 64/135, 35/00; B33Y 30/00 (2018.01)
 CPC - B29C 64/124, 64/135, 35/00; B33Y 30/00; G03F 7/0037, 7/70416

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)

See Search History document

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

See Search History document

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

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	(PINTON, NJ et al.) Effect Of Eplacing Carbon Black With Surfactant-modified Silica Clay On Mechanical Properties Of Natural Rubber Composites. IOP Conference Series: Materials Science and Engineering. 11-13 March 2017. Volume 201. Pages 1-6; page 2, 3rd paragraph; table 2a	1-2, 3/1-2, 4/3/1-2, 5/3/1-2, 6/5/3/1-2, 7/6/5/3/1-2, 8/7/6/5/3/1-2, 9/7/6/5/3/1-2, 10/7/6/5/3/1-2, 12/4/3/1-2, 13/12/4/1-2, 14/13/12/4/3/1-2, 15/13/12/4/3/1-2, 16/13/12/4/3/1-2, 17/13/12/4/1-2, 18/13/12/4/3/1-2, 19/12/4/3/1-2, 20/19/12/4/3/1-2, 21/19/12/4/3/1-2, 22/19/12/4/3/1-2, 23/19/12/4/3/1-2, 24/12/4/3/1-2, 25/24/12/4/3/1-2, 26/24/12/4/3/1-2, 27-28, 29/27-28, 31, 34-36, 37/35-36
Y	US 6,103,176 A (NGUYEN, HD et al.) 15 August 2000; title; abstract; column 11, lines 11-13, 19-22, 25-29, 39-40, 44-46, 48-54	1, 35-36, 37/35-36

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	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"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

16 December 2018 (16.12.2018)

Date of mailing of the international search report

17 JAN 2019

Name and mailing address of the ISA/

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
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Authorized officer

Shane Thomas

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

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International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2010/0304100 A1 (FONG, JW) 2 December 2010; title; paragraphs [0008], [0069]-[0071], [0099]; claim 20	1-2, 3/1-2, 4/3/1-2, 5/3/1-2, 6/5/3/1-2, 7/6/5/3/1-2, 8/7/6/5/3/1-2, 9/7/6/5/3/1-2, 10/7/6/5/3/1-2, 12/4/3/1-2, 13/12/4/1-2, 14/13/12/4/3/1-2, 15/13/12/4/3/1-2, 16/13/12/4/3/1-2, 17/13/12/4/1-2, 18/13/12/4/3/1-2, 19/12/4/3/1-2, 20/19/12/4/3/1-2, 21/19/12/4/3/1-2, 22/19/12/4/3/1-2, 23/19/12/4/3/1-2, 24/12/4/3/1-2, 25/24/12/4/3/1-2, 26/24/12/4/3/1-2, 27-28, 29/27-28, 31, 34
Y	US 4,012,332 A (BEHRENS RA) 15 March 1977; column 1, lines 39-41; column 2, lines 37-38, 44-57; table 1, 3-4	7/6/5/3/1-2, 8/7/6/5/3/1-2, 9/7/6/5/3/1-2
Y	US 2,288,779 A (BRADLEY, TF et al.) 7 July 1942; column 1, lines 5-16	7/6/5/3/1-2, 10/7/6/5/4/3/1-2
Y	US 2014/0350237 A1 (STEMMATTERS, BIOTECNOLOGIA E MEDICINA REGENERATIVA SA) 27 November 2014; paragraph [0027]	15/13/12/4/3/1-2
Y	WO 2009/147033 A1 (BASF SE) 10 December 2009; page 1, lines 1-2; page 18, lines 3-4	16/13/12/4/3/1-2
Y	✓ CN104910207 A (TIANJIN MOSEN TECHNOLOGY CO LTD) 16 September 2015; abstract	17/13/12/4/3/1-2
Y	✓ EP 1 153 905 B1 (AUTEX, INC.) 4 August 2004; paragraphs [0008], [0028]	18/13/12/4/3/1-2
Y	US 4,218,294 (BRACK, K) 19 August 1980; column 4, lines 38-40; column 14, lines 10-11; column 29, lines 4-6; claim 3	19/12/4/3/1-2, 20/19/12/4/3/1-2
Y	US 3,933,754 A (KITAGAWA, C et al.) 20 January 1976; claims 2-7	19/12/4/3/1-2, 21/19/12/4/3/1-2
Y	US 3,244,683 A (KLINE, RH et al.) 5 April 1966; claims 1-2	24/12/4/3/1-2, 25/24/12/4/3/1-2
Y	US 7,342,070 B2 (TSUKIMAWASHI, K et al.) 11 March 2008; column 11, lines 55-56; column 41, lines 19-20; column 42, lines 18-19	24/12/4/3/1-2, 26/24/12/4/3/1-2
Y	US 2,598,127 A (KECKLER, NF) 27 May 1952; column 5, lines 13-40	28, 29/27-28
Y	WO 2009/025675 A1 (YULEX CORPORATION) 26 February 2009; paragraph [0052]	34
Y	✓ EP 2 784 045 A1 (OSSEOMATRIX) 01 October 2014; paragraphs [0058], [0063], [0065]	37/35-36