

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 30583M	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2024/024054	International filing date (day/month/year) 11 April 2024 (11-04-2024)	(Earliest) Priority Date (day/month/year) 11 April 2023 (11-04-2023)
Applicant PROTOMER TECHNOLOGIES, INC.		

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 8 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))

☐

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)).

☒

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

☐

Certain claims were found unsearchable (See Box No. II)

☒

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

☐

none of the figures is to be published with the abstract

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Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.c of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of a sequence listing:
 - a. ☒ forming part of the international application as filed.
 - b. ☐ furnished subsequent to the international filing date for the purposes of international search (Rule 13*ter*.1(a)).

☐ accompanied by a statement to the effect that the sequence listing does not go beyond the disclosure in the international application as filed.
2. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this report has been established to the extent that a meaningful search could be carried out without a WIPO Standard ST.26 compliant sequence listing.
3. Additional comments:

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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.:
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:

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 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.:
22-25, 39, 40 (completely); 1-21, 26-32, 34, 36-38, 41-43, 48-65, 101-122
124-128, 130-132, 135-159, 164-172 (partially)

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 INV. A61K47/54 A61K38/28 A61P3/10 ADD.		
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) A61K A61P 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 practicable, search terms used) EPO-Internal, BIOSIS, CHEM ABS Data, COMPENDEX, EMBASE, INSPEC, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, P	WO 2023/225534 A1 (PROTOMER TECH INC [US]) 23 November 2023 (2023-11-23) examples 2, 7, 13, 14, 17, 20, 21, 22, 26, 28, 29, 32, 38, 39, 42 , 47, 50 examples 51, 53, 58, 60-63, 65, 66, 68, 71, 72, 73, 74, 77-79, 81, 86 examples 88-91, 93, 98, 99, 103, 105, 106, 108, 110, 111, 115 - 117, 120 examples 121, 124-126, 128, 134-139 compounds DSL-68, DSL-68A - / - -	1-32, 34, 36-43, 48-65, 101-122, 124-128, 130-132, 135-159, 164-172
☒ 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 6 August 2024	Date of mailing of the international search report 15/10/2024	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Villard, Anne-Laure	

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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.
X	example 87 claims ----- WO 2022/109078 A1 (PROTOMER TECH INC [US]) 27 May 2022 (2022-05-27) page 1, lines 14-20 page 72, lines 25-28 page 77, lines 9-21 page 134; compounds DS49-DS52 page 136; compounds DS64,DS65,DS67 page 137; compound DS70 page 138; compounds DS73,DS74 page 139; compound DS77 page 140; compounds DS78,DS79 examples 371,510,520,531,562-574,809,818-821 examples 155,239,370,377,383,398,399,406,421,422,425,431 examples 434,437,457,463,486,514,517 examples 589-595,605-612,804,805,810,823,829,831,839,844 examples 853,866,867 claims -----	1-32,34, 36-43, 48-65, 101-122, 124-128, 130-132, 135-159, 164-172
A	WO 2021/202802 A1 (PROTOMER TECH INC [US]) 7 October 2021 (2021-10-07) page 56, lines 5-15 modified insulin 4; page 82 -----	1-32,34, 36-43, 48-65, 101-122, 124-128, 130-132, 135-159, 164-172
A	WO 2022/235691 A1 (UNIV INDIANA TRUSTEES [US]) 10 November 2022 (2022-11-10) page 60 figure 6A -----	1,2,27, 28,53

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Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2023225534 A1	23-11-2023	AR 129357 A1	14-08-2024
		TW 202409070 A	01-03-2024
		US 2023374045 A1	23-11-2023
		WO 2023225534 A1	23-11-2023
WO 2022109078 A1	27-05-2022	AU 2021382599 A1	22-06-2023
		CA 3198757 A1	27-05-2022
		CO 2023006369 A2	19-05-2023
		DO P2023000097 A	29-09-2023
		EC SP23036608 A	30-06-2023
		EP 4247429 A1	27-09-2023
		IL 302775 A	01-07-2023
		JP 2024500284 A	09-01-2024
		KR 20230110505 A	24-07-2023
		PE 20231948 A1	05-12-2023
		TW 202237188 A	01-10-2022
		WO 2022109078 A1	27-05-2022
WO 2021202802 A1	07-10-2021	AU 2021247169 A1	20-10-2022
		BR 112022019687 A2	20-12-2022
		CA 3173417 A1	07-10-2021
		CL 2022002662 A1	21-07-2023
		CN 115843257 A	24-03-2023
		CO 2022014157 A2	27-03-2023
		CR 20220555 A	23-01-2023
		EC SP22076278 A	30-12-2022
		EP 4126058 A1	08-02-2023
		GB 2610490 A	08-03-2023
		IL 296804 A	01-11-2022
		JP 2023520049 A	15-05-2023
		KR 20220161422 A	06-12-2022
		PE 20230457 A1	10-03-2023
		US 2023134116 A1	04-05-2023
		WO 2021202802 A1	07-10-2021
WO 2022235691 A1	10-11-2022	CN 117337299 A	02-01-2024
		EP 4334338 A1	13-03-2024
		WO 2022235691 A1	10-11-2022

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 22-25, 39, 40 (completely); 1-21, 26-32, 34, 36-38, 41-43, 48-65, 101-122, 124-128, 130-132, 135-159, 164-172 (partially)

Compound comprising at least one diboronate Z1c which is selected from formulae FF12A, FF12B, FF12C or FF12D of claim 1 and is linked to X1 through at least one linker moiety Z1b;

Compound comprising at least one diboronate falling within the scope of FF12 of claim 101 and being linked to X1 indirectly;

Pharmaceutical compositions and medical uses of said compounds;

Intermediate of claim 156 comprising a diboronate falling with the scope of formula FF12.

2. claims: 1-21, 26-32, 34, 36-38, 41-43, 48-65, 101-122, 124-128, 130-132, 135-159, 164-172 (all partially)

Compound comprising at least one diboronate Z1c which is selected from formulae FF116A, FF116B, FF116C or FF116D of claim 1 and is linked to X1 through at least one linker moiety Z1b;

Compound comprising at least one diboronate falling within the scope of FF116 of claim 101 and being linked to X1 indirectly;

Pharmaceutical compositions and medical uses of said compounds;

Intermediate of claim 156 comprising a diboronate falling with the scope of formula FF116.

3. claims: 33 (completely); 1-21, 26-32, 34, 36-38, 48-65, 101-122, 124-132, 135-159, 164-172 (partially)

Compound comprising at least one diboronate Z1c which is selected from formulae FF225 or FF227 of claim 1 wherein at least one B1/B2 is of formula B7 with Y10 not being H, and which is linked to X1 through at least one linker moiety Z1b;

Compound comprising at least one diboronate falling within the scope of formulae FF225 or FF227 wherein B1 and B2 are not a boronic acid or an F2 or F6 aromatic boron-containing moiety as referred to in claim 101, and being linked to X1 indirectly;

Pharmaceutical compositions and medical uses of said compounds;

Intermediate of claim 156 comprising a diboronate falling with the scope of formulae FF225 or FF227 wherein B1 and B2 are not a boronic acid or an F2 or F6 aromatic boron-containing moiety as referred to in claim 156.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

4. claims: 35, 44-47, 160-163 (completely); 57-65 (partially)

Insulin polypeptides, pharmaceutical compositions and medical uses thereof.

5. claims: 66-100

Compound comprising at least one diboronate comprising two covalently attached aromatic boron-containing groups, wherein one aromatic boron-containing group is selected from formulae F3-F11 of claim 66 and the other aromatic boron-containing group is selected from formulae F1-F11 of claim 66.

6. claims: 101-107, 113-122, 124-126, 128-159, 164, 165, 167, 172 (all partially)

Compound comprising at least one diboronate falling within the scope of formulae FF1 to FF231 of claim 101 and being linked to X1 directly;
Pharmaceutical compositions and medical uses of said compounds;
Intermediate of claim 156 comprising a diboronate falling with the scope of formulae FF1-FF11, FF13-FF115, FF17-FF224, FF226, FF228-FF231.

7. claims: 123 (completely); 101-122, 124-155, 159, 164-172 (partially)

Compound comprising at least one diboronate falling within the scope of formulae FF1-FF11, FF13-FF115, FF117-FF224, FF226, FF228-FF231 of claim 101 and being linked to X1 indirectly;
Pharmaceutical compositions and medical uses of said compounds.
