

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference <b>P1004647WO01</b>	<b>FOR FURTHER ACTION</b>		See item 4 below
International application No. <b>PCT/JP2017/044301</b>	International filing date ( <i>day/month/year</i> ) <b>11 December 2017 (11.12.2017)</b>	Priority date ( <i>day/month/year</i> ) <b>28 December 2016 (28.12.2016)</b>	
International Patent Classification (8th edition unless older edition indicated) <b>See relevant information in Form PCT/ISA/237</b>			
Applicant <b>PANASONIC INTELLECTUAL PROPERTY MANAGEMENT CO., LTD.</b>			

<p>1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.</p>																								
<p>3. This report contains indications relating to the following items:</p> <table> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> <p>4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).</p>	<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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	Date of issuance of this report <b>02 July 2019 (02.07.2019)</b>
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**PATENT COOPERATION TREATY**

**TRANSLATION**

From the  
INTERNATIONAL SEARCHING AUTHORITY

**PCT**

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing (day/month/year)	<b>20.02.2018</b>
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Applicant's or agent's file reference <b>P1004647WO01</b>	<b>FOR FURTHER ACTION</b> See paragraph 2 below
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International application No. <b>PCT/JP2017/044301</b>	International filing date (day/month/year) <b>11.12.2017</b>	Priority date (day/month/year) <b>28.12.2016</b>
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International Patent Classification (IPC) or both national classification and IPC  
**H01M10/052 (2010.01) i, H01M4/13 (2010.01) i, H01M4/36 (2006.01) i, H01M4/485 (2010.01) i, H01M4/505 (2010.01) i, H01M4/525 (2010.01) i, H01M4/587 (2010.01) i, H01M4/62 (2006.01) i, H01M10/0567 (2010.01) i**

Applicant  
**PANASONIC INTELLECTUAL PROPERTY MANAGEMENT CO., LTD.**

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/JP	Date of completion of this opinion	Authorized officer
Facsimile No.		Telephone No.

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2017/044301

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established 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)).
2.  This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3.  With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
  - a.  forming part of the international application as filed:
    - in the form of an Annex C/ST.25 text file.
    - on paper or in the form of an image file.
  - b.  furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
  - c.  furnished subsequent to the international filing date for the purposes of international search only:
    - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
    - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4.  In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No. PCT/JP2017/044301
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<b>Box No. V</b>	<b>Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</b>
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1. Statement			
Novelty (N)	Claims	1-5	YES
	Claims	_____	NO
Inventive step (IS)	Claims	1-5	YES
	Claims	_____	NO
Industrial applicability (IA)	Claims	1-5	YES
	Claims	_____	NO

2. Citations and explanations:	
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Document 1: WO 2012/111813 A1 (TOSHIBA CORPORATION) 23 August 2012 & US 2013/0330613 A1 & EP 2677572 A1 & CN 103314471 A

Document 2: JP 2007-173150 A (GS YUASA CORPORATION) 05 July 2007 (Family: none)

Document 3: JP 2010-50079 A (SANYO ELECTRIC CO., LTD.) 04 March 2010 & US 2009/0239146 A1

Document 4: JP 10-162860 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) 19 June 1998 (Family: none)

The invention as in claims 1-5 is not disclosed in any of the documents cited in the ISR, and is novel and involves an inventive step. In particular, none of the documents discloses a nonaqueous electrolyte secondary battery comprising a positive electrode having a positive electrode mixture layer including a first positive electrode active material and a second positive electrode active material, a negative electrode having a negative electrode mixture layer including a lithium titanium composite oxide as a negative electrode active material,

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2017/044301

**Box No. V** Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

and a nonaqueous electrolyte including a lithium salt having an oxalato complex as an anion, wherein the first positive electrode active material is a Co-containing lithium transition metal oxide and has a volume per mass of  $8 \text{ mm}^3/\text{g}$  or more with respect to pores having a pore diameter of 100 nm or less, the second positive electrode active material has a volume per mass of  $5 \text{ mm}^3/\text{g}$  or less with respect to pores having a pore diameter of 100 nm or less, the volume per mass of the pores having a pore diameter of 100 nm or less in the first positive electrode material is set to 4 times or more the volume per mass of the pores having a pore diameter of 100 nm or less in the second positive electrode active material, and the amount of the first positive electrode active material is set to 30% by mass or less of the total amount of the first positive electrode active material and the second positive electrode active material. Meanwhile, because of such a configuration, the present invention exerts an advantageous effect that Co eluted from the first positive electrode active material with charge and discharge cycles migrates to the negative electrode, and a coating film is formed on the surface of a lithium titanium composite oxide by the reaction of said migrated Co and a decomposition product derived from the lithium salt having an oxalato complex as an anion in the nonaqueous electrolyte, thereby suppressing gas generation associated with charge and discharge cycles.