

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|---|---|---|
| Applicant's or agent's file reference LAMIP576WO | FOR FURTHER ACTION | see Form PCT/ISA/220 as well as, where applicable, item 5 below. |
| International application No. PCT/US2018/042635 | International filing date (<i>day/month/year</i>) 18 July 2018 (18.07.2018) | (Earliest) Priority Date (<i>day/month/year</i>) 11 August 2017 (11.08.2017) |
| Applicant LAM RESEARCH CORPORATION | | |

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 3 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. 3

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.

A. CLASSIFICATION OF SUBJECT MATTER**H01L 21/677(2006.01)i, H01L 21/67(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)
H01L 21/677; B65D 85/38; B65G 49/07; F04B ; H01L 21/322; H01L 21/673; H01L 21/68Documentation 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: transporting, wafer, vacuum, pump, portable**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-------------|---|---|
| X Y A | US 2003-0063965 A1 (JOHN GILES LANGAN et al.) 03 April 2003 See paragraphs [0027]-[0051], claim 1 and figure 2. | 1-4, 7, 9-11 5, 6, 8, 14, 16 12, 13, 15, 17 |
| X Y A | JP 09-027542 A (HITACHI LTD. et al.) 28 January 1997 See paragraphs [0009]-[0027] and figures 1-2. | 12, 13, 15, 17 5, 6, 8, 14, 16 |
| A | US 6043137 A (GORDON P. KRUEGER et al.) 28 March 2000 See column 5, line 12 - column 7, line 28 and figures 1-2. | 1-17 |
| A | US 2014-0271053 A1 (TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY, LTD.) 18 September 2014 See paragraphs [0012]-[0035] and figures 1-5. | 1-17 |
| A | WO 98-48168 A2 (SAES PURE GAS, INC.) 29 October 1998 See page 11, line 3 - page 15, line 22 and figure 1. | 1-17 |

 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

06 November 2018 (06.11.2018)

Date of mailing of the international search report

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Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2018/042635

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|---|--|
| US 2003-0063965 A1 | 03/04/2003 | TW 570890 B US 6637998 B2 | 11/01/2004 28/10/2003 |
| JP 09-027542 A | 28/01/1997 | None | |
| US 6043137 A | 28/03/2000 | CA 2203904 C CA 2485918 A1 CN 1170441 A CN 1174593 A CN 1177079 C CN 1609447 A EP 0789788 A1 EP 0789788 B1 EP 0795084 A2 EP 0795084 B1 JP 10-508078 A JP 10-510024 A JP 2007-127130 A JP 3574661 B2 JP 3943128 B2 JP 4580943 B2 KR 10-0302178 B1 KR 10-0304449 B1 TW 408794 A US 5685963 A US 5879134 A US 5911560 A US 5972183 A US 5980213 A US 5993165 A US 5997255 A US 6109880 A US 6142742 A US 6165328 A WO 96-13620 A1 WO 96-17171 A3 | 12/02/2002 06/06/1996 14/01/1998 25/02/1998 24/11/2004 27/04/2005 07/01/1998 02/05/2003 17/12/1997 17/10/2001 04/08/1998 29/09/1998 24/05/2007 06/10/2004 11/07/2007 17/11/2010 21/03/2002 29/09/2001 11/10/2000 11/11/1997 09/03/1999 15/06/1999 26/10/1999 09/11/1999 30/11/1999 07/12/1999 29/08/2000 07/11/2000 26/12/2000 09/05/1996 24/10/1996 |
| US 2014-0271053 A1 | 18/09/2014 | CN 104051310 A CN 104051310 B KR 10-1888236 B1 KR 10-2014-0113302 A KR 10-2016-0028428 A US 9748123 B2 | 17/09/2014 27/10/2017 13/08/2018 24/09/2014 11/03/2016 29/08/2017 |
| WO 98-48168 A2 | 29/10/1998 | CN 1252844 A EP 1012478 A2 JP 2001-524872 A KR 10-2001-0006278 A WO 98-48168 A3 | 10/05/2000 28/06/2000 04/12/2001 26/01/2001 24/02/2000 |