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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/002,365	08/30/2013	Naoki Kobayashi	BUNKYO-PT030	7403
3624	7590	05/09/2014	EXAMINER	
VOLPE AND KOENIG, P.C. UNITED PLAZA 30 SOUTH 17TH STREET PHILADELPHIA, PA 19103			LIN, ERICA S Y	
			ART UNIT	PAPER NUMBER
			2853	
			NOTIFICATION DATE	DELIVERY MODE
			05/09/2014	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eoffice@volpe-koenig.com

<b>Office Action Summary</b>	<b>Application No.</b> 14/002,365	<b>Applicant(s)</b> KOBAYASHI ET AL.	
	<b>Examiner</b> ERICA LIN	<b>Art Unit</b> 2853	<b>AIA (First Inventor to File) Status</b> No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 8/30/2013.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

- 5)  Claim(s) 1-7 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 1-7 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on 8/30/2013 is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some\*\*    c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 3) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)<br>Paper No(s)/Mail Date <u>8/30/2013</u> . | 4) <input type="checkbox"/> Other: _____  |

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The present application is being examined under the pre-AIA first to invent provisions.

### **DETAILED ACTION**

#### ***Priority***

Receipt is acknowledged of certified copies of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

#### ***Information Disclosure Statement***

The information disclosure statement (IDS) submitted on August 30, 2013, with the application. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of 35 U.S.C. 112(b):

(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 2 is rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

Claim 2 recites the limitation "the other first surface electrode row". There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

***Claims 1-2 and 5-7 rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by European Patent No. EP1336489 (“Hirota”).***

Regarding claim 1, ***Hirota*** discloses a piezoelectric actuator (Fig. 9A), comprising: a ceramic substrate being long in one direction (actuator 21), the ceramic substrate comprising a vibrating plate (Fig. 9A, vibrating plate 42), a common electrode disposed on the vibrating plate (Fig. 9A, common electrode 34a), and a piezoelectric ceramic layer disposed on the common electrode (Fig. 9A, piezoelectric ceramic layer 41) and having a plurality of first through holes connected to the common electrode (Fig. 9A, through-hole 41a within piezoelectric layer 41 connects to common electrode 34a); a plurality of individual electrodes disposed in a region of the piezoelectric ceramic layer opposed to the common electrode (Fig. 9A, individual electrodes 35a are opposite of common electrodes 34a); and a plurality of first surface electrodes respectively disposed inside a plurality of the first through holes in the piezoelectric ceramic layer and on a circumference of a plurality of the first through holes (paragraph [0056], the through-holes 41a are filled with conductive material to serve as electrodes), wherein a plurality of the first through holes are arranged along the one direction at a central part of the ceramic substrate in a direction orthogonal to the one direction (Fig. 9A, through-holes 41a are arranged

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in a lateral direction along the length of actuator 21), and the first surface electrodes are long in the one direction (Fig. 9A with paragraph [0056], through-holes forming electrodes are vertical).

Regarding claim 2, *Hirota* discloses the piezoelectric actuator according to claim 1, wherein

the first surface electrodes comprises one first surface electrode row and the other first surface electrode row (Fig. 6, the first surface electrodes corresponding to paragraph [0056] also correspond to the pressure chambers 10 which alternate), and the first surface electrodes constituting the one first surface electrode row and the first surface electrodes constituting the other first surface electrode row are shiftedly arranged in the one direction (Fig. 6, the rows are slightly shifted in a lateral direction along the length of actuator 21).

Regarding claim 5, *Hirota* discloses the piezoelectric actuator according to claim 1, wherein an arrangement is made so that the single first surface electrode is overlapped with the two or more first through holes (Fig. 9A, first surface electrode of paragraph [0056] is overlaps through holes 41a and 42a).

Regarding claim 6, *Hirota* discloses the liquid discharge head, comprising: the piezoelectric actuator (Fig. 7 incorporates the actuator of Fig, 9) according to claim 1; and a passage member comprising a plurality of discharge holes (passage unit 4) and a plurality of pressurizing chambers respectively connected to a plurality of the discharge holes (pressure chambers 10), a plurality of the pressurizing chambers and a plurality of the individual electrodes being overlappedly stacked one upon another on a side of the piezoelectric actuator located closer to the vibrating plate (Fig. 6, pressure chambers 10 and electrodes 35a and 35b are overlapping).

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Regarding claim 7, *Hirota* discloses a recording device, comprising: the liquid discharge head according to claim 6 (Fig. 7); a conveyance section for conveying a recording medium to the liquid discharge head (Fig. 1, paper feed unit 111); and a control section for controlling a voltage applied to a plurality of the individual electrodes (paragraph [0033], driver IC 132).

***Claim Rejections - 35 USC § 103***

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

***Claims 3-4 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over European Patent No. EP1336489 (“Hirota”).***

Regarding claim 3, *Hirota* discloses the piezoelectric actuator according to claim 1 wherein a second electrode 38 with conductive column 55a which is connected to the piezoelectric layer from an upper edge of the actuator 21 (paragraph [0040] and being connected to the common electrode (paragraph [0040] with electrodes 35a) is disposed at least one of end parts of the ceramic substrate in the one direction (Fig. 6, electrodes 38 are positioned at outer edge) and a second surface electrode is disposed inside the second through hole in the piezoelectric ceramic layer and on a circumference of the second through hole, the second surface electrode being long in a direction orthogonal to the one direction (Fig. 9B, electrodes 38 is long in lateral direction with 55a being filled with conductive material and thus the circumference).

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*Hirota* discloses that the second through hole is formed through a cover film 52 but does not explicitly disclose wherein a second through hole penetrating through the piezoelectric ceramic layer.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have formed the through hole through the piezoelectric ceramic layer, as in Fig. 9A, rather than the cover film because at the time of the invention there had been a recognized need in the art to decrease the size of actuators to increase the droplet density. There were a finite number of identified and predictable potential solutions to decreasing size of actuators.

One of ordinary skill in the art could have pursued the known potential solutions with a reasonable expectation of success including eliminating the cover film and providing a second through hole through the piezoelectric layer since both solutions of penetrating a cover film or penetrating a piezoelectric layer provide voltage to the actuator.

Regarding claim 4, *Hirota* discloses the piezoelectric actuator according to claim 3 (Fig. 9A), wherein an arrangement is made so that the single second surface electrode is overlapped with the two or more second through holes (Fig. 6 with 9B, pressure chambers 10 and electrodes 38 and 55a are overlapping).

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***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERICA LIN whose telephone number is (571)270-7911. The examiner can normally be reached on 7:30 AM - 5:30 PM (Mon - Thurs).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on (571) 272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ERICA LIN/  
Examiner, Art Unit 2853