Office Action Summary	Application No. 15/137,823	Applicant(s) HO ET AL.	
	Examiner HANH PHAN	Art Unit 2636	AIA (First Inventor to File) Status Yes

-- 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 2 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 *04/25/2016*.

☐ 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) *1-20* 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5a) Of the above claim(s) _____ is/are withdrawn from consideration.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) _____ is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☒ Claim(s) *1-20* 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 or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ 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) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Election/Restrictions

I. Claims 1-19, drawn to an arrayed waveguide grating (AWG) chip, classified in 398/79.

II. Claim 20, drawn to a method of forming an arrayed waveguide grating (AWG), classified in 385/24.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because Invention I discloses an arrayed waveguide grating (AWG) chip, Invention II discloses a method of forming an arrayed waveguide grating (AWG).

The examiner has required restriction between combination and subcombination inventions. Where applicant elects a subcombination, and claims thereto are subsequently found allowable, any claim(s) depending from or otherwise requiring all

the limitations of the allowable subcombination will be examined for patentability in accordance with 37 CFR 1.104. See MPEP § 821.04(a). Applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

3. Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected invention**.

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is

the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other invention.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh Phan whose telephone number is (571)272-3035.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye, can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

/HANH PHAN/

Primary Examiner, Art Unit 2636

AOI_NDCal 4-24cv09041_ 00001786

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15137823	HO ET AL.
	Examiner	Art Unit
	HANH PHAN	2636

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/30/2017								
	1	÷								
	2	÷								
	3	÷								
	4	÷								
	5	÷								
	6	÷								
	7	÷								
	8	÷								
	9	÷								
	10	÷								
	11	÷								
	12	÷								
	13	÷								
	14	÷								
	15	÷								
	16	÷								
	17	÷								
	18	÷								
	19	÷								
	20	÷								

To: kinsella@ao-inc.com,docketing@gtpp.com,kcarroll@gtpp.com
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 27543

Jun 07, 2017 04:16:41 AM

Dear PAIR Customer:

APPLIED OPTOELECTRONICS, INC.
13115 JESS PIRTLE BLVD.
SUGAR LAND, TX 77478
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 27543 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15137823	CTRS	06/07/2017	PAT260-018US

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: Ho, I-Lung
Serial No.: 15/137,823
Filed: April 25, 2016
Examiner: PHAN, Hanh
Group Art Unit: 2636 Conf. No.: 2275
Docket: PAT260-018US
Title: TECHNIQUES FOR DIRECT OPTICAL COUPLING OF PHOTODETECTORS TO OPTICAL DEMULTIPLEXER OUTPUTS AND AN OPTICAL TRANSCEIVER USING THE SAME

RESPONSE TO RESTRICTION/ELECTION REQUIREMENT

This is in response to the Official Action in this case mailed June 7, 2017. Applicant is filing this Amendment within the two-month shortened statutory period or before August 7, 2017. Hence, Applicant believes no extension of time fee is required. However, Applicant conditionally petitions for an extension of time to provide for the possibility that the need for such a petition has been inadvertently overlooked. As provided below, please charge Deposit Account No. 50-1705 for any required fee, or for any deficiency in the enclosed fee.

AOI_NDCal 4-24cv09041_ 00001789

Electronic Acknowledgement Receipt

EFS ID:	30000571
Application Number:	15137823
International Application Number:	
Confirmation Number:	2275
Title of Invention:	TECHNIQUES FOR DIRECT OPTICAL COUPLING OF PHOTODETECTORS TO OPTICAL DEMULTIPLEXER OUTPUTS AND AN OPTICAL TRANSCEIVER USING THE SAME
First Named Inventor/Applicant Name:	I-Lung HO
Customer Number:	27543
Filer:	Kenneth M. Thompson
Filer Authorized By:	
Attorney Docket Number:	PAT260-018US
Receipt Date:	07-AUG-2017
Filing Date:	25-APR-2016
Time Stamp:	13:16:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response_asfiled_080717.pdf	33238 b65e6de35bd983f60f893b410488c9d91380b450	yes	6

AOI_NDCal 4-24cv09041_ 00001790

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	6	6
	Claims	2	5
	Response to Election / Restriction Filed	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	33238	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

AOI_NDCal 4-24cv09041_ 00001791

REMARKS

In the Official Action of June 7, 2017, the Examiner required restriction to one of the following groups of claims:

I. Claims 1-19, drawn to an arrayed waveguide grating (AWG) chip, classified in 385/79.

II. Claim 20, drawn to a method of forming an arrayed waveguide grating (AWG), classified in 385/24.

Applicant elects, without traverse, to prosecute the claims of Group 1, i.e. claims 1-19. To expedite prosecution, claim 20 has been withdrawn. Applicant reserves the right to file claim 20 in a divisional application.

If the Examiner desires personal contact for further disposition of this case, the Examiner is invited to call the undersigned Attorney at 603.668.6560.

In the event there are any fee deficiencies or additional fees are payable, please charge them to our deposit account No. 50-2121.

Respectfully submitted,

Date: August 7, 2017

By: /Kenneth M. Thompson/
Kenneth M. Thompson
Reg. No. 72,001

AOI_NDCal 4-24cv09041_ 00001792

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the subject application.

1. (Original) An arrayed waveguide grating (AWG) chip comprising:

a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths;

a planar lightwave circuit (PLC) coupled to the first end configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;

a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and

a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip.

2. (Original) The AWG chip of claim 1, wherein the output interface region is configured to pass the reflected light received via the plurality of output waveguides out of the AWG chip along a second light path that is substantially orthogonal to the first light path.

3. (Original) The AWG chip of claim 1, wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end, and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.

4. (Original) The AWG chip of claim 3, wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the output interface region.

AOI_NDCal 4-24cv09041_ 00001793

5. (Original) The AWG chip of claim 3, wherein each of the output waveguides comprise a core material, and wherein a cladding material is disposed on the core material, the core material defining at least a portion of the plurality of sidewalls of the AWG chip.

6. (Original) The AWG chip of claim 5, wherein the core material of each of the plurality of output waveguides has a first index of refraction, and a medium external to and adjacent the tapered region has a second index of refraction, the first index of refraction being greater than the second index of refraction.

7. (Original) The AWG chip of claim 5, wherein the core material of each of the plurality of output waveguides provide a portion of the angled surface, and wherein the angled surface is configured to reflect incident light based on at least an interior angle of the angled surface.

8. (Original) The AWG chip of claim 5, wherein the core material comprises doped silica (SiO_2) having an index of refraction of about 1.45 to 1.50.

9. (Original) The AWG chip of claim 6, wherein the external medium comprises a material having an index of refraction of about 1.0.

10. (Original) The AWG chip of claim 1, wherein the AWG chip is configured as a 1xN demultiplexer device whereby a single optical input signal is de-multiplexed into N different channel wavelengths.

11. (Original) The AWG chip of claim 1, wherein the AWG chip is implemented in an AWG device package.

12. (Original) An optical transceiver module comprising:

a transceiver housing;

AOI_NDCal 4-24cv09041_ 00001794

a multi-channel receiver optical sub-assembly (ROSA) located in the transceiver housing and including an arrayed waveguide grating (AWG) chip, the AWG chip comprising:

a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths;

a planar lightwave circuit (PLC) coupled to the first end configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;

a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and

a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip;

an array of detector devices disposed adjacent to the output interface region of the AWG chip; and

a multi-channel transmitter optical assembly (TOSA) including at least one laser package located in the transceiver housing for transmitting optical signals at different channel wavelengths.

13. (Original) The optical transceiver module of claim 12, wherein an air gap separates the output interface region of the AWG chip and the array of detector devices.

14. (Original) The optical transceiver module of claim 12, wherein the output interface region of the AWG chip is separated from the array of detector devices by about 50 microns.

15. (Original) The optical transceiver module of claim 12, wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end, and

AOI_NDCal 4-24cv09041_ 00001795

wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.

16. (Original) The optical transceiver module of claim 15, wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the output interface region.

17. (Original) The optical transceiver module of claim 15, wherein each of the output waveguides comprise a core material, and wherein a cladding material is disposed on the core material, the core material defining at least a portion of the plurality of sidewalls of the AWG chip.

18. (Original) The optical transceiver module of claim 17, wherein the core material of each of the plurality of output waveguides provide a portion of the angled surface, and wherein the angled surface is configured to reflect incident light based on at least an interior angle of the angled surface relative to the output interface of the AWG chip.

19. (Original) The optical transceiver of claim 12, wherein the transceiver is a Small Form-factor Pluggable (SFP) transceiver module and the ROSA is configured to receive at least four different channel wavelengths at transmission rates of at least about 25 Gbps per channel.

20. (Withdrawn) A method of forming an arrayed waveguide grating (AWG) comprising:

depositing sequential layers of cladding and core material onto a substrate to form a planar lightwave circuit (PLC);

removing a portion of the substrate to expose an output interface region of the PLC; and

removing a portion of the PLC to provide a tapered region proximal to the output interface region of the PLC.

AOI_NDCal 4-24cv09041_ 00001796

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/137,823	Filing Date 04/25/2016	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	08/07/2017	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
GYZELL P. JOHNSON SMITH

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

AOI_NDCal 4-24cv09041_ 00001797

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/137,823	04/25/2016	I-Lung HO	PAT260-018US	2275

27543 7590 08/21/2017
APPLIED OPTOELECTRONICS, INC.
13115 JESS PIRTLE BLVD.
SUGAR LAND, TX 77478

EXAMINER	
PHAN, HANH	

ART UNIT	PAPER NUMBER
2636	

NOTIFICATION DATE	DELIVERY MODE
08/21/2017	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):

kinsella@ao-inc.com
docketing@gtpp.com
kcarroll@gtpp.com

Office Action Summary	Application No. 15/137,823	Applicant(s) HO ET AL.	
	Examiner HANH PHAN	Art Unit 2636	AIA (First Inventor to File) Status Yes

-- 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 *04/25/2016*.

☐ 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) *1-19* 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) *1-19* 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 or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *04/25/2016* 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) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Election/Restrictions

2. Applicant's election without traverse of Group I, Claims 1-19 in the reply filed on 08/07/2017 is acknowledged.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 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 –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

4. Claims 1-11 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Bai (US Patent No. 7,532,783).

Regarding claim 1, referring to Figures 1A, 1B, 2A and 2B, Bai teaches an arrayed waveguide grating (AWG) chip (i.e., AWG chip 110, Figs. 1A, 1B, 2A and 2B) comprising:

a first end (i.e., input port 112, Figs. 1A, 1B, 2A and 2B) for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths;

AOI_NDCal 4-24cv09041_ 00001800

a planar lightwave circuit (PLC) (i.e., grating waveguides 116, Figs. 1A, 1B, 2A and 2B) coupled to the first end configured to demultiplex each channel wavelength of the plurality of channel wavelengths;

a plurality of output waveguides (i.e., output ports 113, Figs. 1A, 1B, 2A and 2B) coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated demultiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and

a tapered region (i.e., mirror 225, and photodetector array chips 114, Figs. 1A, 1B, 2A and 2B) disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip (i.e., Figures 1A, 1B, 2A and 2B, col. 5, lines 17-67, col. 6, lines 1-67, col. 7, lines 1-61, and col. 10, lines 4-9).

Regarding claim 2, Bai further teaches wherein the output interface region (i.e., mirror 225, and photodetector array chips 114, Figs. 1A, 1B, 2A and 2B) is configured to pass the reflected light received via the plurality of output waveguides out of the AWG chip along a second light path that is substantially orthogonal to the first light path.

Regarding claim 3, Bai further teaches wherein the AWG chip (i.e., AWG chip 110, Figs. 1A, 1B, 2A and 2B) defines a plurality of sidewalls extending longitudinally from the first end to the second end, and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.

AOI_NDCal 4-24cv09041_ 00001801

Regarding claim 4, Bai further teaches wherein the angled surface (i.e., mirror 225, Fig. 2B) has an interior angle of about 41 to 45 degrees relative to the output interface region (i.e., Figs. 1A, 1B, 2A and 2B, col. 7, lines 25-61).

Regarding claim 5, Bai further teaches wherein each of the output waveguides (i.e., output port 113, Figs. 1A, 1B, 2A and 2B) comprise a core material, and wherein a cladding material is disposed on the core material, the core material defining at least a portion of the plurality of sidewalls of the AWG chip (i.e., Figures 1A, 1B, 2A and 2B, col. 5, lines 17-67, col. 6, lines 1-67, and col. 7, lines 1-61).

Regarding claim 6, Bai further teaches wherein the core material of each of the plurality of output waveguides (i.e., output ports 113, Figs. 1A, 1B, 2A and 2B) has a first index of refraction, and a medium external to and adjacent the tapered region has a second index of refraction, the first index of refraction being greater than the second index of refraction (i.e., Figures 1A, 1B, 2A and 2B, col. 5, lines 17-67, col. 6, lines 1-67, and col. 7, lines 1-61).

Regarding claim 7, Bai further teaches wherein the core material of each of the plurality of output waveguides provide a portion of the angled surface, and wherein the angled surface (i.e., mirror 225, Fig. 1B) is configured to reflect incident light based on at least an interior angle of the angled surface.

Regarding claim 8, Bai further teaches wherein the core material comprises doped silica (SiOi) having an index of refraction of about 1.45 to 1.50 (i.e., Figures 1A, 1B, 2A and 2B, col. 5, lines 17-67, col. 6, lines 1-67, and col. 7, lines 1-61).

Regarding claim 9, Bai further teaches wherein the external medium comprises a material having an index of refraction of about 1.0 (i.e., Figures 1A, 1B, 2A and 2B, col. 5, lines 17-67, col. 6, lines 1-67, and col. 7, lines 1-61).

Regarding claim 10, Bai further wherein the AWG chip (i.e., AWG chip 110, Figs. 1A, 1B, 2A and 2B) is configured as a 1xN demultiplexer device whereby a single optical input signal is de-multiplexed into N different channel wavelengths.

Regarding claim 11, Bai further teaches wherein the AWG chip (i.e., AWG chip 110, Figs. 1A and 3A) is implemented in an AWG device package.

Claim Rejections - 35 USC § 103

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

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 12-19 are rejected under 35 U.S.C. 103 as being unpatentable over Dallesasse (US Patent No. 7,941,053) in view of Bai (US Patent No. 7,532,783) **OR** Welch et al (US Patent No. 7,058,263).

Regarding claim 12, referring to Figures 1A, 1B, 2 and 3, Dallesasse teaches an optical transceiver module (i.e., optical transceiver module 100, Figs. 1A, 1B, 2 and 3) comprising:

a transceiver housing (i.e., transceiver housing 102, Fig. 2);

a multi-channel receiver optical sub-assembly (ROSA)(i.e., receiver subassembly 503, Fig. 3) located in the transceiver housing;

an array of detector devices (i.e., photodetectors 513, Fig. 3) disposed adjacent to the output of the optical demultiplexer (i.e., optical demultiplexer 512, Fig. 3); and

a multi-channel transmitter optical assembly (TOSA) (i.e., transmitter subassembly 502, Fig. 3) including at least one laser package located in the transceiver housing for transmitting optical signals at different channel wavelengths (i.e., Figures 1A, 1B, 2 and 3, col. 7, lines 6-67, col. 8, lines 1-67, col. 9, lines 1-67, and 10, lines 1-15).

Dallesasse differs from claim 12 in that he fails to specifically teach an arrayed waveguide grating (AWG) chip, the AWG chip comprising: a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths; a planar lightwave circuit (PLC) coupled to the first end configured to demultiplex each channel wavelength of the plurality of channel wavelengths; a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated demultiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip; an array of detector devices disposed adjacent to the output interface region of the AWG chip. However, Bai in US Patent No. 7,532,783 teaches an arrayed waveguide grating (AWG) chip (i.e.,

AWG chip 110, Figs. 1A, 1B, 2A and 2B) comprising: a first end (i.e., input port 112, Figs. 1A, 1B, 2A and 2B) for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths; a planar lightwave circuit (PLC) (i.e., grating waveguides 116, Figs. 1A, 1B, 2A and 2B) coupled to the first end configured to demultiplex each channel wavelength of the plurality of channel wavelengths; a plurality of output waveguides (i.e., output ports 113, Figs. 1A, 1B, 2A and 2B) coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated demultiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and a tapered region (i.e., mirror 225, and photodetector array chips 114, Figs. 1A, 1B, 2A and 2B) disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip (i.e., Figures 1A, 1B, 2A and 2B, col. 5, lines 17-67, col. 6, lines 1-67, col. 7, lines 1-61, and col. 10, lines 4-9). **OR**, Welch et al in US Patent No. 7,058,263 teaches an arrayed waveguide grating (AWG) chip (i.e., AWG chip 30, Figs. 28A, 28B, and 64) comprising: a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths; a planar lightwave circuit (PLC) coupled to the first end configured to demultiplex each channel wavelength of the plurality of channel wavelengths; a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated demultiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards

a second end of the AWG chip; and a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip (i.e., Figures 28A, 28B, and 64, col. 31, lines 15-54). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the arrayed waveguide grating (AWG) chip, the AWG chip comprising: a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths; a planar lightwave circuit (PLC) coupled to the first end configured to demultiplex each channel wavelength of the plurality of channel wavelengths; a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated demultiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip; an array of detector devices disposed adjacent to the output interface region of the AWG chip as taught by Bai **OR** Welch et al in the system of Dallesasse. One of ordinary skill in the art would have been motivated to do this sine allowing improving the performance of the system.

Regarding claim 13, the combination of Dallesasse and Bai **OR** Welch et al teaches wherein an air gap separates the output interface region of the AWG chip and the array of detector devices (i.e., Fig. 2B of Bai, OR Figs. 28A and 28B of Welch et al).

Regarding claim 14, the combination of Dallesasse and Bai **OR** Welch et al teaches wherein the output interface region of the AWG chip is separated from the array of detector devices by about 50 microns (i.e., Fig. 2B of Bai, OR Figs. 28A and 28B of Welch et al).

Regarding claim 15, the combination of Dallesasse and Bai **OR** Welch et al teaches wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end, and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls (i.e., Fig. 2B of Bai, OR Figs. 28A and 28B of Welch et al).

Regarding claim 16, the combination of Dallesasse and Bai **OR** Welch et al teaches wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the output interface region (i.e., Fig. 2B of Bai, OR Figs. 28A and 28B of Welch et al).

Regarding claim 17, the combination of Dallesasse and Bai **OR** Welch et al teaches wherein each of the output waveguides comprise a core material, and wherein a cladding material is disposed on the core material, the core material defining at least a portion of the plurality of sidewalls of the AWG chip (i.e., Fig. 2B of Bai, OR Figs. 28A and 28B of Welch et al).

Regarding claim 18, the combination of Dallesasse and Bai **OR** Welch et al teaches wherein the core material of each of the plurality of output waveguides provide a portion of the angled surface, and wherein the angled surface is configured to reflect

incident light based on at least an interior angle of the angled surface relative to the output interface of the AWG chip (i.e., Fig. 2B of Bai, OR Figs. 28A and 28B of Welch et al).

Regarding claim 19, the combination of Dallesasse and Bai **OR** Welch et al teaches wherein the transceiver is a Small Form-factor Pluggable (SFP) transceiver module and the ROSA is configured to receive at least four different channel wavelengths at transmission rates of at least about 25 Gbps per channel (i.e., Figs. 2 and 3 of Dallesasse).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Nagarajan (Pub. No.: US 2015/0249501) discloses optical module.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh Phan whose telephone number is (571)272-3035.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye, can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

AOI_NDCal 4-24cv09041_ 00001808

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

/HANH PHAN/

Primary Examiner, Art Unit 2636

AOI_NDCal 4-24cv09041_ 00001809

Notice of References Cited	Application/Control No. 15/137,823	Applicant(s)/Patent Under Reexamination HO ET AL.	
	Examiner HANH PHAN	Art Unit 2636	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-7,532,783 B2	05-2009	Bai; Yu Sheng	G02B6/12019	385/14
*	B	US-7,058,263 B2	06-2006	Welch; David F.	B82Y20/00	385/24
*	C	US-7,941,053 B2	05-2011	Dallesasse; John	H04B10/40	398/135
*	D	US-2015/0249501 A1	09-2015	NAGARAJAN; Radhakrishnan L.	H04B10/40	398/79
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	("2009/0154928").URPN.	USPAT	OR	ON	2017/08/15 22:52
L2	5	("2009/0022495").URPN.	USPAT	OR	ON	2017/08/15 22:55
L3	1	("2008/0089688").URPN.	USPAT	OR	ON	2017/08/15 23:00
L4	2	("8285144").URPN.	USPAT	OR	ON	2017/08/15 23:16
L5	20	("20020081062" | "20020150329" | "20030002102" | "20040018019" | "20050019031" | "20050031259" | "20050141077" | "20050271093" | "20060115270" | "20070116468" | "20070183778" | "5295011" | "5680490" | "6023542" | "6163393" | "6545782" | "6996302" | "7035505" | "7088885" | "7869711").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/08/15 23:16
L6	5	("6735364").URPN.	USPAT	OR	ON	2017/08/15 23:33
L7	3	("6222963" | "6456763" | "6563986").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/08/15 23:34
L8	82	398/135-139.ccls. and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/15 23:52
L9	1	("2013/0287407").URPN.	USPAT	OR	ON	2017/08/15 23:56
L10	327	398/135-139.ccls. and TOSA and ROSA	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 00:06
L11	1	("2015/0078758").URPN.	USPAT	OR	ON	2017/08/16 00:20
L12	0	("9287986").URPN.	USPAT	OR	ON	2017/08/16 00:20
L13	13	("20050220397" | "20090080881" | "20130223484" | "20140161394" | "20140161455" | "20140161457" | "20140161459" | "20140241726" | "20140341580" | "20150055960" | "20150078758" | "8472805" |	US-PGPUB; USPAT; USOCR	OR	ON	2017/08/16 00:20

		"9083468").PN.				
L14	13	("20050220397" | "20090080881" | "20130223484" | "20140161394" | "20140161455" | "20140161457" | "20140161459" | "20140241726" | "20140341580" | "20150055960" | "20150078758" | "8472805" | "9083468").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/08/16 00:21
L15	0	("2012/0294623").URPN.	USPAT	OR	ON	2017/08/16 00:30
L16	0	("2012/0294623").URPN.	USPAT	OR	ON	2017/08/16 00:30
L17	26	("20020033984" | "20030067652" | "20040071473" | "20040096225" | "20050084269" | "20050135816" | "20070196111" | "20080063396" | "20080089693" | "20080095541" | "20100021166" | "20130177309" | "6532320" | "6559996" | "7123786" | "7164692" | "7215892" | "7224907" | "7580637" | "7801445" | "7860400" | "8107820" | "8107821" | "8223768" | "8340123" | "8412051").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/08/16 00:35
L18	65	("2008/0095541").URPN.	USPAT	OR	ON	2017/08/16 00:42
L19	24	("2005/0084269").URPN.	USPAT	OR	ON	2017/08/16 00:48
L20	14	("7941053").URPN.	USPAT	OR	ON	2017/08/16 00:49
L21	14	("7941053").URPN.	USPAT	OR	ON	2017/08/16 00:57
L22	29	("20010004289" | "20020063926" | "20020089719" | "20020126346" | "20030020981" | "20040068593" | "20040078494" | "20040156572" | "20040175177" | "20040225951" | "20050019036" | "20050047726" | "20050084269" | "20050105907" | "20060189220" | "20070047963" | "20070050658" | "20070154217" | "20080089693" | "4193664" | "6449069" | "6501781" | "7106968" | "7203426" | "7286572" | "7346082" | "7373087" | "7380993" | "7577171").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/08/16 00:57
L23	8	398/135-139.ccls. and TOSA and ROSA and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 01:07
L24	37	398/$.ccls. and TOSA and ROSA and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 01:07
L25	0	385/24.ccls. and TOSA and ROSA and AWG	US-PGPUB; USPAT;	OR	ON	2017/08/16 01:08

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
L26	0	385/37.ccls. and TOSA and ROSA and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 01:08
L27	10	385/$.ccls. and TOSA and ROSA and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 01:08
L28	542	385/$.ccls. and photodetector and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 01:09
L29	75	("2004/0033004").URPN.	USPAT	OR	ON	2017/08/16 01:44
L30	0	H04J14/02.cpc. and TOSA and RSOA and photodetector and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 02:10
L31	10	H04J14/02.cpc. and TOSA and ROSA and photodetector and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 02:10
L32	29	H04J14/$.cpc. and TOSA and ROSA and photodetector and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 02:11
L33	0	H04B/40.cpc. and TOSA and ROSA and photodetector and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 02:11
L34	23	H04B10/40.cpc. and TOSA and ROSA and photodetector and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2017/08/16 02:11

			DERWENT; IBM_TDB			
L35	34	H04B10/$.cpc. and TOSA and ROSA and photodetector and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 02:11
L36	24	G02B6/$.cpc. and TOSA and ROSA and photodetector and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/16 02:12
S1	76	ho-i-lung.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/15 15:37
S2	8	miao-zhengyu.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/15 16:06
S3	1951	li-qin.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/15 16:06
S4	5	"7532783"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/15 16:07
S5	0	("7532783").URPN.	USPAT	OR	ON	2017/08/15 16:07
S6	4	("20040131302" | "5617234" | "6108472" | "7050666").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/08/15 16:07
S7	450	398/79.ccls. and AWG	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/08/15 16:08
S8	2	("2015/0229400").URPN.	USPAT	OR	ON	2017/08/15 16:33
S9	5	("2014/0029951").URPN.	USPAT	OR	ON	2017/08/15 16:53

S10	31	("20040123029" | "20060200697" | "20080104290" | "20080183959" | "20090141558" | "20090297140" | "20090300259" | "20100005212" | "20100162037" | "20100199125" | "20100274952" | "20110072200" | "20110125990" | "20110170329" | "20120151294" | "20120243299" | "20120257459" | "20120297231" | "20130060996" | "20140029951" | "20140169789" | "5592612" | "6128094" | "6400621" | "6542956" | "6993701" | "7656727" | "7990746" | "8325554" | "8687451" | "9071364").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/08/15 18:15
S11	1	("2013/0016977").URPN.	USPAT	OR	ON	2017/08/15 18:36

8/ 16/ 2017 2:13:18 AM

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15137823	HO ET AL.
	Examiner	Art Unit
	HANH PHAN	2636

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/16/2017								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	N								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15137823	HO ET AL.
	Examiner	Art Unit
	HANH PHAN	2636

CPC- SEARCHED		
Symbol	Date	Examiner
H04J14/02, H04B10/40, H04J14/0282, H04j14/0221, H04j14/0202, H04B10/506, H04B10/503, H04B10/504, G02B6/4246, G02B6/4293	08/16/2017	HP

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
398	135, 136, 137, 138, 139, 79, 82, 158. 159, 85, 87, 84, 202, 208, 213, 214	08/16/2017	HP
385	24, 37, 14, 43	08/16/2017	HP

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
EAST SEARCH SEE ATTACHED PRINTOUT IN THE FILE	08/16/2017	HP
IEEE SEARCH	08/16/2017	HP
JPO SEARCH	08/16/2017	HP
CPC SEARCH PERFORMED IN EAST	08/16/2017	HP

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 2275

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
15/137,823	04/25/2016 RULE	398	2636	PAT260-018US

APPLICANTS
Applied Optoelectronics, Inc., Sugar Land, TX;

INVENTORS
I-Lung HO, Sugar Land, TX;
Zhengyu MIAO, Sugar Land, TX;
Qin LI, Houston, TX;

** CONTINUING DATA **********

** FOREIGN APPLICATIONS **********

** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **
05/09/2016

Foreign Priority claimed	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No	☐				
35 USC 119(a-d) conditions met ☐ Yes ☑ No					
Verified and Acknowledged /HANH PHAN/ Examiner's Signature	Initials	TX	7	20	3

ADDRESS

APPLIED OPTOELECTRONICS, INC.
13115 JESS PIRTLE BLVD.
SUGAR LAND, TX 77478
UNITED STATES

TITLE

TECHNIQUES FOR DIRECT OPTICAL COUPLING OF PHOTODETECTORS TO OPTICAL DEMULTIPLEXER OUTPUTS AND AN OPTICAL TRANSCEIVER USING THE SAME

FILING FEE RECEIVED		
1600	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

BIB (Rev. 05/07).

AOI_NDCal 4-24cv09041_ 00001818

To: kinsella@ao-inc.com,docketing@gtpp.com,kcarroll@gtpp.com
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 27543

Aug 21, 2017 03:27:23 AM

Dear PAIR Customer:

APPLIED OPTOELECTRONICS, INC.
13115 JESS PIRTLE BLVD.
SUGAR LAND, TX 77478
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 27543 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15137823	CTNF	08/21/2017	PAT260-018US
	892	08/21/2017	PAT260-018US

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	15137823
Filing Date	2016-04-25
First Named Inventor	HO
Art Unit	2636
Examiner Name	PHAN, Hanh
Attorney Docket Number	PAT260-018US

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5617234		1997-04-01	KOGA ET AL	
	2	7376308	B2	2008-05-20	CHEBEN ET AL	
	3	8831433	B2	2014-09-09	HO ET AL	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15137823
	Filing Date	2016-04-25
	First Named Inventor	HO
	Art Unit	2636
	Examiner Name	PHAN, Hanh
	Attorney Docket Number	PAT260-018US

If you wish to add additional Foreign Patent Document citation information please click the Add button [Add]

NON-PATENT LITERATURE DOCUMENTS [Remove]

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	PCT Search Report and Written Opinion mailed July 6, 2017, received in corresponding PCT Application No. PCT/US17/29350, 9 pgs.	

If you wish to add additional non-patent literature document citation information please click the Add button [Add]

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15137823
	Filing Date	2016-04-25
	First Named Inventor	HO
	Art Unit	2636
	Examiner Name	PHAN, Hanh
	Attorney Docket Number	PAT260-018US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Kevin J. Carroll/	Date (YYYY-MM-DD)	2017-10-06
Name/Print	Kevin J. Carroll	Registration Number	36384

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: KEVIN J. CARROLL
GROSSMAN TUCKER PERREAULT & PFLEGER, PLLC
55 SOUTH COMMERCIAL STREET
MANCHESTER, NH 03101

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

RECEIVED
JUL 10 2017
GROSSMAN, TUCKER
PERREAULT & PFLEGER, PLLC

Applicant's or agent's file reference PAT260018PCT	Date of mailing (day/month/year) FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/US2017/029350	International filing date (day/month/year) 25 April 2017
Applicant APPLIED OPTOELECTRONICS, INC.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

How? Directly to the International Bureau of WIPO preferably through ePCT or on paper to, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ With regard to any protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
   - ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
   - ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

Shortly after the expiration of **18 months from the priority date, the international application will be published** by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Within **19 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 Telephone No. PCT OSP: 571-272-7774

Form PCT/ISA/220 (July 2014)

AOI_NDCal 4-24cv09041_ 00001824

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: KEVIN J. CARROLL
GROSSMAN TUCKER PERREAULT & PFLEGER, PLLC
55 SOUTH COMMERCIAL STREET
MANCHESTER, NH 03101

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)*	06 JUL 2017
Applicant's or agent's file reference: PAT260018PCT	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No.: PCT/US2017/029350	International filing date *(day/month/year)*: 25 April 2017
Applicant: APPLIED OPTOELECTRONICS, INC.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   How? Directly to the International Bureau of WIPO preferably through ePCT or on paper to, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

   Shortly after the expiration of **18 months from the priority date, the international application will be published** by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

   Within **19 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 Telephone No. PCT OSP: 571-272-7774

Form PCT/ISA/220 (July 2014)

AOI_NDCal 4-24cv09041_ 00001825

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference PAT260018PCT	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US2017/029350	International filing date *(day/month/year)* 25 April 2017	(Earliest) Priority Date *(day/month/year)* 25 April 2016
Applicant APPLIED OPTOELECTRONICS, 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 2 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 43.6*bis*(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. 2

   ☒ 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.

Form PCT/ISA/210 (first sheet) (January 2015)

AOI_NDCal 4-24cv09041_ 00001826

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/029350

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G02B 6/12; H04J 14/02 (2017.01)
CPC - G02B 6/12016; G02B 6/12009; G02B 6/4214 (2017.02)

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
USPC - 385/14; 385/31; 398/79 (keyword delimited)

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.
X --- Y	US 7,532,783 B2 (BAI) 12 May 2009 (12.05.2009) entire document	1-11, 20 --- 12-19
Y	US 8,831,433 B2 (HO et al) 09 September 2014 (09.09.2014) entire document	12-19
Y	US 7,376,308 B2 (CHEBEN et al) 20 May 2008 (20.05.2008) entire document	13
A	US 5,617,234 A (KOGA et al) 01 April 1997 (01.04.1997) entire document	1-20

☐ 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	Date of mailing of the international search report
15 June 2017	06 JUL 2017
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)

AOI_NDCal 4-24cv09041_ 00001827

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: KEVIN J. CARROLL
GROSSMAN TUCKER PERREAULT & PFLEGER, PLLC
55 SOUTH COMMERCIAL STREET
MANCHESTER, NH 03101

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	06 JUL 2017
Applicant's or agent's file reference PAT260018PCT	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2017/029350	25 April 2017	25 April 2016

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - G02B 6/12; H04J 14/02 (2017.01)
CPC - G02B 6/12016; G02B 6/12009; G02B 6/4214 (2017.02)

Applicant APPLIED OPTOELECTRONICS, INC.

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

- [x] 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
- [x] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and 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 66.1*bis*(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/US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	15 June 2017	Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (January 2015)

AOI_NDCal 4-24cv09041_ 00001828

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2017/029350

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 43*bis*.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 13*ter*.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 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.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:

AOI_NDCal 4-24cv09041_ 00001829

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2017/029350

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

1. Statement

Novelty (N)	Claims	12-19	YES
	Claims	1-11, 20	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-11 and 20 lack novelty under PCT Article 33(2) as being anticipated by Bai.

Regarding Claim 1, Bai discloses an arrayed waveguide grating (AWG) chip (Hybrid receiver 100 also includes an optical demultiplexer in the silicon bench ... the optical demultiplexer includes an arrayed waveguide grating (AWG) 110 ... Col.5, Ln.37 - 55; Fig.1A) comprising: a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths (In an embodiment, the input port 112 is optically coupled to an optical fiber 119 for receiving a DWDM optical signal ... Col.5, Ln.56 - Col.6, Ln.6); a planar lightwave circuit (PLC) coupled to the first end configured to demultiplex each channel wavelength of the plurality of channel wavelengths (In a specific embodiment, the optical demultiplexer includes an arrayed waveguide grating (AWG) 110 made in a silica-on-silicon planar lightwave circuit (PLC) in the silicon bench. Col.5, Ln.37 - 55; Fig.1A); a plurality of output waveguides coupled to the PLC (... the AWG 110 includes ... multiple output ports 113 ... Col.5, Ln.56 - Col.6, Ln.6; Fig.1A), each of the output waveguides configured to receive light corresponding to an associated demultiplexed channel wavelength launched from the PLC (In a specific embodiment, each of the output ports outputs a demultiplexed optical signal. In some embodiments, each output port of the AWG has a center wavelength and pass band associated with light transmission. Col.5, Ln.56 - Col.6, Ln.6; Fig.1A) and provide the light along a first light path that extends towards a second end of the AWG chip (... at an end point of an output waveguide with a 45 degrees surface terminating the waveguide ... Col.7, Ln.48 -61; Fig.2B); and a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip (For example, a gap is formed in the silica layer at an end point of an output waveguide with a 45 degrees surface terminating the waveguide to allow total internal reflection. Col.7, Ln.48 -61; Fig.2B).

Regarding Claim 2, Bai discloses the AWG chip of claim 1, wherein the output interface region is configured to pass the reflected light received via the plurality of output waveguides out of the AWG chip along a second light path that is substantially orthogonal to the first light path (In an embodiment, light coming out of each output waveguide is reflected to the surface of the PLC and collected by a corresponding photodetector, e.g., 214. Col.7, Ln.26 - 47; ... with a 45 degrees surface terminating the waveguide ... Col.7, Ln.48 -61; It is well known to all that such 45 degree structure will result in orthogonal reflected light path).

Regarding Claim 3, Bai discloses the AWG chip of claim 1, wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end (the upper and lower side of waveguide 121 in Fig.1B), and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls (... at an end point of an output waveguide with a 45 degrees surface terminating the waveguide ... Col.7, Ln.48 -61; Fig.2B).

Regarding Claim 4, Bai discloses the AWG chip of claim 3, wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the output interface region (... with a 45 degrees surface terminating the waveguide ... Col.7, Ln.48 -61; Fig2B).

Regarding Claim 5, Bai discloses the AWG chip of claim 3, wherein each of the output waveguides comprise a core material, and wherein a cladding material is disposed on the core material (As shown, a waveguide includes doped silica region 121 enclosed in an undoped silica layer 122 on a silicon substrate 124. Col.6, Ln.7 - 24; Fig.1B), the core material defining at least a portion of the plurality of sidewalls of the AWG chip (waveguide 121 in Fig.1B).

Regarding Claim 6, Bai discloses the AWG chip of claim 5, wherein the core material of each of the plurality of output waveguides has a first index of refraction, and a medium external to and adjacent the tapered region has a second index of refraction, the first index of refraction being greater than the second index of refraction (In a specific embodiment, the doped silica region 121 has a higher index of refraction than the undoped silica region. Col.6, Ln.7 - 24).

Regarding Claim 7, Bai discloses the AWG chip of claim 5, wherein the core material of each of the plurality of output waveguides provide a portion of the angled surface (For example, a gap is formed in the silica layer at an end point of an output waveguide with a 45 degrees surface terminating the waveguide ... Col.7, Ln.48 -61; Fig.2B), and wherein the angled surface is configured to reflect incident light based on at least an interior angle of the angled surface (... with a 45 degrees surface terminating the waveguide to allow total internal reflection. Col.7, Ln.48 -61; Fig.2B).

Regarding Claim 8, Bai discloses the AWG chip of claim 5, wherein the core material comprises doped silica (SiO2) having an index of refraction of about 1.45 to 1.50 (In a specific example, the doped silica region 121 has a index of refraction of about 1.47, ... Col.6, Ln.7 - 24).

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Regarding Claim 9, Bai discloses the AWG chip of claim 6, wherein the external medium comprises a material having an index of refraction of about 1.0 (... in silica-air interface ... Col.7, Ln.48 -61; It is well known that the refrective index of air is about 1.0).

Regarding Claim 10, Bai discloses the AWG chip of claim 1, wherein the AWG chip is configured as a lxN demultiplexer device whereby a single optical input signal is de-multiplexed into N different channel wavelengths (These waveguides have varying lengths for performing wavelength division multiplexing and demultiplexing functions. In a specific embodiment, each of the output ports outputs a demultiplexed optical signal. Col.5, Ln.56 - Col.6, Ln.6).

Regarding Claim 11, Bai discloses the AWG chip of claim 1, wherein the AWG chip is implemented in an AWG device package (Fig. 1A is a simplified top view diagram of a hybrid integrated DWDM receiver according to an embodiment of the present invention. Col.5, Ln.37 - 55; Fig.1A).

Regarding Claim 20, Bai discloses a method of forming an arrayed waveguide grating (AWG) (Fig. 4 is a simplified flowchart of a method for making an integrated DWDM receiver according to an embodiment of the invention. Col.8, Ln.24 - 30) comprising: depositing sequential layers of cladding and core material onto a substrate to form a planar lightwave circuit (PLC) (... forming a first un-doped silica sub-layer on the silicon layer; forming a doped silica sub-layer on the first un-doped silica sub-layer; Col.8, Ln.49 - 52); removing a portion of the substrate to expose an output interface region of the PLC (The recess includes a first surface that terminates a corresponding one of the output waveguides. Col.8, Ln.58 - Col.9, Ln.9); and removing a portion of the PLC to provide a tapered region proximal to the output interface region of the PLC (... is formed by first forming a recess region in the first region of the silica layer. Col.8, Ln.58 - Col.9, Ln.9).

Claims 12 and 14-19 lack an inventive step under PCT Article 33(3) as being obvious over Bai in view of Ho et al. (hereinafter Ho).

Regarding Claim 12, Bai discloses a multi-channel receiver optical sub-assembly (ROSA) including an AWG chip (Hybrid receiver 100 also includes an optical demultiplexer in the silicon bench ... the optical demultiplexer includes an arrayed waveguide grating (AWG) 110 ... Col.5, Ln.37 - 55; Fig.1A) comprising: a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths (In an embodiment, the input port 112 is optically coupled to an optical fiber 119 for receiving a DWDM optical signal ... Col.5, Ln.56 - Col.6, Ln.6); a planar lightwave circuit (PLC) coupled to the first end configured to demultiplex each channel wavelength of the plurality of channel wavelengths (In a specific embodiment, the optical demultiplexer includes an arrayed waveguide grating (AWG) 110 made in a silica-on-silicon planar lightwave circuit (PLC) in the silicon bench. Col.5, Ln.37 - 55; Fig.1A); a plurality of output waveguides coupled to the PLC (... the AWG 110 includes ... multiple output ports 113 ... Col.5, Ln.56 - Col.6, Ln.6; Fig.1A), each of the output waveguides configured to receive light corresponding to an associated demultiplexed channel wavelength launched from the PLC (In a specific embodiment, each of the output ports outputs a demultiplexed optical signal. In some embodiments, each output port of the AWG has a center wavelength and pass band associated with light transmission. Col.5, Ln.56 - Col.6, Ln.6; Fig.1A) and provide the light along a first light path that extends towards a second end of the AWG chip (... at an end point of an output waveguide with a 45 degrees surface terminating the waveguide ... Col.7, Ln.48 -61; Fig.2B); and a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip (For example, a gap is formed in the silica layer at an end point of an output waveguide with a 45 degrees surface terminating the waveguide to allow total internal reflection. Col.7, Ln.48 -61; Fig.2B); an array of detector devices disposed adjacent to the output interface region of the AWG chip (... and directed up toward a photodetector, which is mounted above the reflecting surface as described below. Col.8, Ln.58 - Col.9, Ln.9);
Bai fails to explicitly disclose a transceiver housing; a multi-channel receiver optical sub-assembly (ROSA) located in the transceiver housing and arrayed waveguide grating (AWG) chip, and a multi-channel transmitter optical assembly (TOSA) including at least one laser package located in the transceiver housing for transmitting optical signals at different channel wavelengths.
Ho teaches an optical transceiver module (The transceiver module 202 ... Col.5, Ln.32 - 48; Fig.2) comprising: a transceiver housing (... includes a transceiver housing 210 ... Col.5, Ln.32 - 48; Fig.2); a multi-channel receiver optical sub-assembly (ROSA) located in the transceiver housing and arrayed waveguide grating (AWG) chip (... a multi-channel ROSA 230, ... Col.5, Ln.32 - 48; Fig.2), ... and a multi-channel transmitter optical assembly (TOSA) (... containing the temperature controlled multi-channel TOSA 220, ... Col.5, Ln.32 - 48; Fig.2) including at least one laser package located in the transceiver housing (One embodiment of the multi-channel TOSA 120 includes an array of lasers 122, such as laser diodes, ... Col.4, Ln.18 - 30; Fig.1) for transmitting optical signals at different channel wavelengths (... the lasers 122 may be tunable lasers that generate the optical signals at the respective channel wavelengths. Col.4, Ln.31 - 49).
It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bai with the teaching of Ho for the purpose of forming demultiplexer including AWG (see Bai; Col.5, Ln.37 - 55).

Regarding Claim 14, modified Bai discloses the optical transceiver module of claim 12, wherein the output interface region of the AWG chip is separated from the array of detector devices (...a gap is formed in the silica layer at an end point of an output waveguide...Col.7, Ln.48 -61; Fig.2B).
Bai fails to explicitly disclose the output interface region of the AWG chip is separated from the array of detector devices by about 50 microns.
However, determining the optimal distance between components that provides the transmission of the highest quality optical signals across the transmitted wavelengths in such an optical system is a matter of routine experimentation for one of ordinary skill in the art.
It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bai by providing the output of the AWG chip separated from the array of detector devices by about 50 microns for the purpose of optimizing the transmitted signal across the utilized wavelengths, since discovering the optimum value of a result effective variable requires only routine skill in the art.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Regarding Claim 15, modified Bai discloses the optical transceiver module of claim 12, wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end, and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls (... at an end point of an output waveguide with a 45 degrees surface terminating the waveguide ... Col.7, Ln.48 -61; Fig.2B).

Regarding Claim 16, modified Bai discloses the optical transceiver module of claim 15, wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the output interface region (... with a 45 degrees surface terminating the waveguide ... Col.7, Ln.48 -61; Fig2B).

Regarding Claim 17, modified Bai discloses the optical transceiver module of claim 15, wherein each of the output waveguides comprise a core material, and wherein a cladding material is disposed on the core material (As shown, a waveguide includes doped silica region 121 enclosed in an undoped silica layer 122 on a silicon substrate 124. Col.6, Ln.7 - 24; Fig.1B), the core material defining at least a portion of the plurality of sidewalls of the AWG chip (waveguide 121 in Fig.1B).

Regarding Claim 18, modified Bai discloses the optical transceiver module of claim 17, wherein the core material of each of the plurality of output waveguides provide a portion of the angled surface (For example, a gap is formed in the silica layer at an end point of an output waveguide with a 45 degrees surface terminating the waveguide ... Col.7, Ln.48 -61; Fig.2B), and wherein the angled surface is configured to reflect incident light based on at least an interior angle of the angled surface relative to the output interface of the AWG chip (... with a 45 degrees surface terminating the waveguide to allow total internal reflection. Col.7, Ln.48 -61; Fig.2B).

Regarding Claim 19, modified Bai discloses the optical transceiver of claim 12, and further discloses a hybrid receiver 100 includes an optical demultiplexer in the silicon bench (Hybrid receiver 100 also includes ... the optical demultiplexer includes an arrayed waveguide grating (AWG) 110 ... Col.5, Ln.37 - 55; Fig.1A).
Bai fails to explicitly disclose the transceiver is a Small Formfactor Pluggable (SFP) transceiver module and the ROSA is configured to receive at least four different channel wavelengths at transmission rates of at least about 25 Gbps per channel.
Ho teaches the transceiver is a Small Formfactor Pluggable (SFP) transceiver module (The transceiver module 202 ... may thus be designed to have a relatively small form factor with minimal space. Col.5, Ln.32 - 48. The dual fiber type direct link adapter 250 is also configured to receive pluggable optical connectors ... Col.5, Ln.49 - 61) and the ROSA is configured to receive at least four different channel wavelengths at transmission rates of at least about 25 Gbps per channel (Other data rates and modulation schemes may also be used. Col.5, Ln.1 - 13).
It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bai with the teaching of Ho for the purpose
of forming demultiplexer including AWG (see Bai; Col.5, Ln.37 - 55).

Claim 13 lacks an inventive step under PCT Article 33(3) as being obvious over Bai in view of Ho et al. (hereinafter Ho) and Cheben et al. (hereinafter Cheben).

Regarding Claim 13, modified Bai discloses the optical transceiver module of claim 12, and further discloses an array of detector devices (... and directed up toward a photodetector, which is mounted above the reflecting surface as described below. Col.8, Ln.58 - Col.9, Ln.9).
Bai fails to explicitly disclose an air gap separates the output interface region of the AWG chip and the array of detector devices.
Cheben teaches an air gap separates the output interface region of the AWG chip and the array of detector devices (The residual substrate 9 underneath the reflective element and the thinned aperture 8 are optional, the latter may be used to reduce distance between the reflection element and the second device that intercepts or emits the out-of-plane wave. Col.3, Ln.46 - 57; Fig.1a. The second device can be either an optical waveguide or an array of thereof, a photodetector or an array of thereof, ... Col.7, Ln.7 - 18).
It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bai with the teaching of Cheben for the purpose of positioning photodetector to interecept reflected light from waveguide (see Cheben; Col.3, Ln.46 - 57).

Claims 1-20 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

Electronic Acknowledgement Receipt

EFS ID:	30588295
Application Number:	15137823
International Application Number:	
Confirmation Number:	2275
Title of Invention:	TECHNIQUES FOR DIRECT OPTICAL COUPLING OF PHOTODETECTORS TO OPTICAL DEMULTIPLEXER OUTPUTS AND AN OPTICAL TRANSCEIVER USING THE SAME
First Named Inventor/Applicant Name:	I-Lung HO
Customer Number:	27543
Filer:	Kevin J. Carroll/April Davis
Filer Authorized By:	Kevin J. Carroll
Attorney Docket Number:	PAT260-018US
Receipt Date:	06-OCT-2017
Filing Date:	25-APR-2016
Time Stamp:	14:19:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	PAT260_018US_IDS.pdf	612096 e98f2383cee6b96b986b46bb5ac229e1011b2bc1	no	4

Warnings:

AOI_NDCal 4-24cv09041_ 00001833

Information:					
2	Other Reference-Patent/App/Search documents	PCT_SearchReport_WrittenOpinion.pdf	636607 65bdfc49aa45d89e1984e0a52b3f18f009ef1b0c	no	9
Warnings:					
Information:					
			Total Files Size (in bytes):	1248703	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

AOI_NDCal 4-24cv09041_ 00001834

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/137,823	04/25/2016	I-Lung HO	PAT260-018US	2275

27543 7590 10/27/2017
APPLIED OPTOELECTRONICS, INC.
13115 JESS PIRTLE BLVD.
SUGAR LAND, TX 77478

EXAMINER	
PHAN, HANH	

ART UNIT	PAPER NUMBER
2636	

NOTIFICATION DATE	DELIVERY MODE
10/27/2017	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):

kinsella@ao-inc.com
docketing@gtpp.com
kcarroll@gtpp.com