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I hereby appoint practitioners associated with Customer Number: **22429**

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as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 C.F.R. §3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 C.F.R. §3.73(c) to the address associated with Customer Number: **22429**

Legal Name and Address of Assignee:
Name: Dyi-Chung Hu
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Signature of Assignee of Record: The individual whose signature and title are supplied below is authorized to act on behalf of the assignee:	
Signature: 	Date: August 22, 2014
Name: Dyi-Chung HU	Telephone: 886 937-136728
Title: Dr.	

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	SPACER CONNECTOR			
First Named Inventor/Applicant Name:	Dyi-Chung HU			
Filer:	Benjamin J. Hauptman/Ayesha Wilson			
Attorney Docket Number:	4647-138U			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	70	70
Utility Search Fee	2111	1	300	300
Utility Examination Fee	2311	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				730

Electronic Acknowledgement Receipt

EFS ID:	26152629
Application Number:	15190695
International Application Number:	
Confirmation Number:	1921
Title of Invention:	SPACER CONNECTOR
First Named Inventor/Applicant Name:	Dyi-Chung HU
Customer Number:	22429
Filer:	Benjamin J. Hauptman/Ayesha Wilson
Filer Authorized By:	Benjamin J. Hauptman
Attorney Docket Number:	4647-138U
Receipt Date:	23-JUN-2016
Filing Date:	
Time Stamp:	14:55:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 730
RAM confirmation Number	062416INTEFSW14580100
Deposit Account	8007
Authorized User	Benjamin Hauptman

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	F-1_ApplicationTransmittal.pdf	29591	no	1
			5308e64821dd62565f24aaa56149c3b90cce2fa6		
Warnings:					
Information:					
2		F-2_Application.pdf	782552	yes	24
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	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	6	
	Claims		7	8	
	Abstract		9	9	
	Drawings-only black and white line drawings		10	23	
	Oath or Declaration filed		24	24	
Warnings:					
Information:					
3	Application Data Sheet	F-3_ADS.pdf	1822696	no	8
			46263ba4c23619dfa41683b9f031139963823190		
Warnings:					
Information:					
4		F-4_Preliminary_Amendment.pdf	22883	yes	3
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	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Preliminary Amendment		1	1	

	Specification	2	2
	Applicant Arguments/Remarks Made in an Amendment	3	3

Warnings:

Information:

5	Power of Attorney	F-5_Dyi-Chung_Hu-Power_of_Attorney.pdf	1172703	no	1
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Warnings:

Information:

6	Fee Worksheet (SB06)	fee-info.pdf	35052	no	2
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Warnings:

Information:

Total Files Size (in bytes):			3865477
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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

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ATTORNEY DOCKET NUMBER: 4647-138U

Commissioner:

Transmitted herewith for filing is the Utility patent application of:

INVENTOR(S):	Dyi-Chung HU
FOR:	SPACER CONNECTOR

Enclosed are:

- ☒ 9 pages of Specification, Claims and Abstract
- ☒ 14 sheet(s) of formal drawings
- ☒ Application Data Sheet
- ☒ Declaration
- ☒ Power of Attorney
- ☒ Preliminary Amendment

The filing fee is calculated as shown below:

	NO. FILED		NO. EXTRA	RATE	AMOUNT
Total Claims	8	MINUS 20	0	x \$80 =	\$ 0.00
Independent Claims	3	MINUS 3	0	x \$420 =	\$ 0.00
If multiple dependent claims are presented, add \$ 780.00					\$ 0.00
Basic Fee					\$ 280.00
Search Fee					\$ 600.00
Examination Fee					\$ 720.00
☒ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by ½.					
Total of above calculations					\$ 730.00
☐ Late Declaration Fee (\$140.00)					\$ 0.00
TOTAL FEE					\$ 730.00

- ☒ Credit card authorization to cover the filing fees filed via EFS.
- ☒ The Commissioner is hereby authorized to charge any additional fees associated with this communication, including patent application filing fees and processing fees under 37 C.F.R. § 1.16 and 1.17, or credit any overpayment to **Deposit Account Number 07-1337**.

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Customer No.
22429

PATENT TRADEMARK OFFICE

Respectfully submitted,

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BJH/ayw

Spacer Connector

[0001] BACKGROUND

[0002] Technical Field

[0003] The present invention relates to a fabricating process for making a spacer connector, especially using a conductive carrier in an initial step of the fabrication process.

[0004] Description of Related Art

[0005] One of the traditional processes for fabricating metal circuitry, a seed layer is often applied before electric plating. In a later process, the seed layer needs to be stripped. However, the stripping of the seed layer reduces the size of the circuits. Although such a circuit reduction is tiny, it is critical when it comes to nanotechnology. A fabricating process without reducing the dimension of a circuitry is one of the popular topics to study for a long time in the semiconductor industry.

[0006] BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Figs.1A~7A show a fabricating process for a first embodiment according the present invention.

[0008] Fig.7B shows a first embodiment according to the present invention.

[0009] Fig.8 shows an application for the first spacer connector according to the present invention.

[0010] Figs. 9A~10A show some steps in a fabricating process for a second embodiment according the present invention.

[0011] Fig.10B shows a second embodiment according to the present invention.

[0012] Fig.11 shows an application for the second spacer connector according to the present invention.

[0013] Figs. 12A~13A show some steps in a fabricating process for a third embodiment according the present invention.

[0014] Fig.13B shows a third embodiment according to the present invention.

[0015] Fig.14 shows an application for the third spacer connector according to the present invention.

[0016] DETAILED DESCRIPTION OF THE INVENTION

[0017] A fabricating process for making a spacer connector without using seed layer is disclosed.

[0018] Figs.1A~7A show a fabricating process for a first embodiment according the present invention.

[0019] Fig.1A shows that a core substrate 11 is prepared. The core substrate 11 is made of a material of glass or silicon.

[0020] Fig.1B shows a plurality of openings 12 is made through the core substrate 11.

[0021] Fig.2 shows a temporary conductive carrier 13 is prepared. A dielectric adhesive 14 is applied on a top surface of the conductive carrier 13. The core substrate 11 with through holes 12 is pasted onto the dielectric adhesive 14.

[0022] Fig.3A shows that the core substrate 11 is configured on a top surface of the dielectric adhesive 14.

[0023] Fig.3B shows that the dielectric adhesive 14 on a bottom of each through holes 12 is etched, and a top surface of the conductive carrier 13 is exposed.

[0024] Fig.4A shows copper plating is performed using the conductive carrier 13 as one of the electrode. Copper pillar 15 is formed starting from the exposed conductive carrier in each through holes 12. A metal head 151 is configured on a top of the copper pillar 15.

[0025] Fig.4B shows the metal heads 151 are removed.

[0026] Fig.5A shows that top metal pad 152 is formed.

[0027] Fig.5B shows that a passivation 16 is formed on a top of the core substrate 11. The passivation 16 also covers peripheral area of each top metal pad 152 and a central portion of the top metal pad 152 is exposed for electrical connection.

[0028] Fig.6A shows thinning process is performed from a bottom the temporary conductive carrier 13.

[0029] Fig.6B show etching process is performed to the conductive carrier 13 to form a plurality of bottom metal pads 152B. Each of the bottom metal pads 152B is configured on a bottom of a corresponding metal pillar 15.

[0030] Fig.7A shows a bottom passivation 16B is formed on a bottom surface of the dielectric adhesive 14. The bottom passivation 16B also covers peripheral area of each bottom metal pad 152B and a central portion of the bottom metal pad 152B is exposed for electrical connection.

[0031] **Fig.7B shows a first embodiment according to the present invention.**

[0032] Fig.7B shows a first embodiment of the spacer connector 10 is produced after a singulation process performed on a product of Fig.7A.

[0033] **Fig.8 shows an application for the first spacer connector according to the present invention.**

[0034] Fig.8 shows two spacer connectors 10 are configured in between package substrate 1 and package substrate 2. Fig.8 shows chip1 is configured on a top center of package substrate 1. Chip 2 is configured on a top center of package substrate 2. Package substrate 1 is stacked on a top of package substrate 2.

[0035] The package substrate 1 has a plurality of bottom metal pillars 101B, each metal pillar 101B is electrically coupled to a corresponding top metal pad 152 of the spacer connector 10. The package substrate 2 has a plurality of top metal pillars 201, each metal pillar 201 is electrically coupled to a corresponding bottom metal pad 152B of the spacer connector 10.

[0036] **Figs.1A~5B, 9A~10A show a fabricating process for a second embodiment according to the present invention.**

[0037] Figs.1A~5B have been described in previous paragraphs and are omitted for simplification.

[0038] Fig.9A is the same of the product of Fig. 5B which is a product prepared according to process Figs.1A~5A.

[0039] Fig.9B shows the conductive carrier 13 is stripped. The dielectric adhesive 14 is revealed.

[0040] Fig.10A shows the dielectric adhesive 14 is stripped. A bottom end 155 of the copper pillar 15 protruded below a bottom surface of the core substrate 11.

[0041] **Fig.10B shows a second embodiment according to the present invention.**

[0042] Fig.10B shows a second embodiment of the spacer connector 20 is produced after a singulation process is performed on the product of Fig.10A.

[0043] Fig.11 shows an application for the second spacer connector according to the present invention.

[0044] Fig.11 shows two spacer connectors 20 are configured in between substrate 1 and substrate 2. Fig.11 shows chip1 is configured on a top center of substrate 1. Chip 2 is configured on a top center of substrate 2. Substrate 1 is stacked on a top of substrate 2.

[0045] Figs.1A~5B, 12A~13A show a fabricating process for a third embodiment according to the present invention.

[0046] Figs.1A~5B have been described in previous paragraphs and are omitted for simplification.

[0047] Fig.12A is the same of the product of Fig.10A.

[0048] Fig.12B shows a plurality of bottom metal pads 152B is formed. Each bottom metal pads 152B is configured on a bottom of a corresponding copper pillar 15.

[0049] Fig.13A shows a bottom passivation 16B is formed on a bottom surface of the core substrate 11. The bottom passivation 16B also covers peripheral area of each bottom metal pad 152B and a central portion of the bottom metal pad 152B is exposed for electrical connection.

[0050] Fig.13B shows a third embodiment according to the present invention.

[0051] Fig.13B shows a second embodiment of the spacer connector 30 is produced after a singulation process is performed on the product of Fig.13A.

[0052] Fig.14 shows an application for the third spacer connector according to the present invention.

[0053] Fig.14 shows two spacer connectors 30 are configured in between substrate 1 and substrate 2. Fig.11 shows chip1 is configured on a top center of substrate 1. Chip 2 is configured on a top center of substrate 2. Substrate 1 is stacked on a top of substrate 2.

[0054] While several embodiments have been described by way of example, it will be apparent to those skilled in the art that various modifications may be configured without departs from the spirit of the present invention. Such modifications are all within the scope of the present invention, as defined by the appended claims.

What is claimed is:

1. A fabricating process for a spacer connector, comprising:
 - preparing a core substrate;
 - forming a plurality of through holes passing through the core substrate;
 - preparing a conductive carrier with dielectric adhesive layer formed on a top surface of the conductive carrier;
 - attaching the core substrate on a top surface of the dielectric adhesive;
 - etching dielectric adhesive exposed on a bottom of each through hole to expose a top surface of the conductive carrier on a bottom of a corresponding through hole; and
 - plating to form metal pillar in each through hole.
2. A fabricating process for a spacer connector as claimed in claim 1, further comprising:
 - forming a top metal pad on a top of a corresponding metal pillar;
 - forming a top passivation layer to cover a peripheral area of each top metal pad, a central area of each top metal pad is revealed for electrical contact;
 - thinning the conductive carrier from bottom;
 - forming a bottom metal pad on a bottom of a corresponding metal pillar;
 - forming a bottom passivation layer to cover a peripheral area of each bottom metal pad, a central area of each bottom metal pad is revealed for electrical contact; and
 - singulating to yield a plurality of spacer connectors.
3. A fabricating process for a spacer connector as claimed in claim 2, after forming a top passivation layer, further comprising:
 - stripping the conductive carrier;
 - stripping the dielectric adhesive so that a bottom end of each metal pillar protruded under

a bottom surface of the core substrate; and

singulating to yield a plurality of spacer connectors.

4. A fabricating process for a spacer connector as claimed in claim 3, after stripping the dielectric adhesive, further comprising

forming a bottom metal pad on a bottom of a corresponding metal pillar; and

singulating to yield a plurality of spacer connectors.

5. A spacer connector, comprising:

a core substrate;

a dielectric layer, configured on a bottom of the core substrate; and

a plurality of metal pillars, each passing through the core substrate and the dielectric layer.

6. A spacer connector as claimed in claim 5, further comprising:

a plurality of top metal pads, each top metal pad is formed on a top of a corresponding metal pillar.

7. A spacer connector as claimed in claim 5, further comprising:

a bottom metal pad, formed on a bottom of a corresponding metal pillar.

8. A spacer connector, comprising:

a core substrate;

a plurality of metal pillars, each passing through the core substrate;

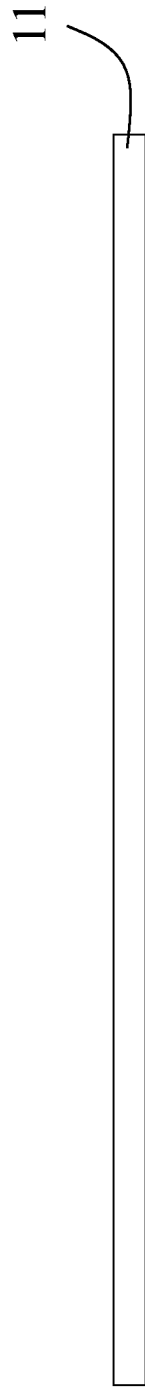
a plurality of top metal pads, each formed on a top of a corresponding metal pillar; and

a bottom end of each metal pillar protruded under a bottom surface of the core substrate.

ABSTRACT

A fabricating process for a spacer connector is disclosed. A core substrate with a plurality of through holes is prepared. A conductive carrier with a dielectric adhesive configured on a top surface is prepared. The core substrate is then pasted on a top surface of the dielectric adhesive layer. The dielectric adhesive exposed in the through hole is then etched. An electric plating process to form metal pillar in the core substrate is performed using the conductive carrier as one of the electrode.

Fig.1A



1/14



Fig.1B

Fig.2

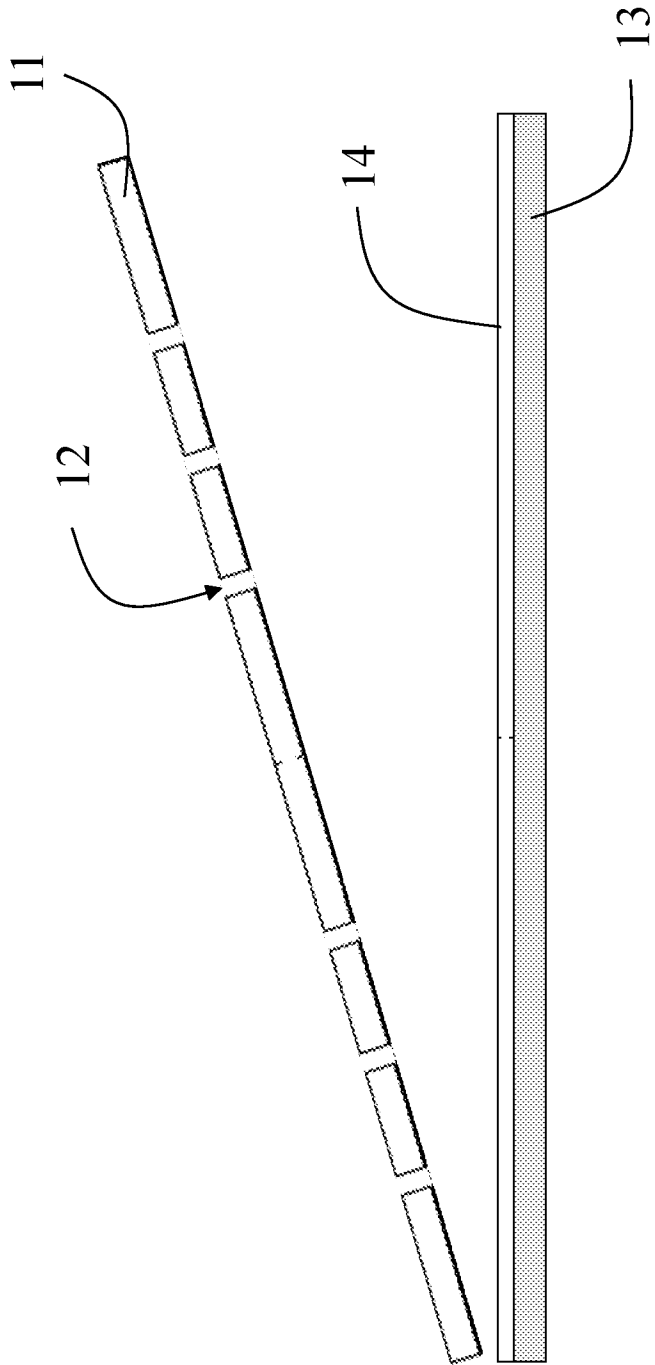


Fig.3A

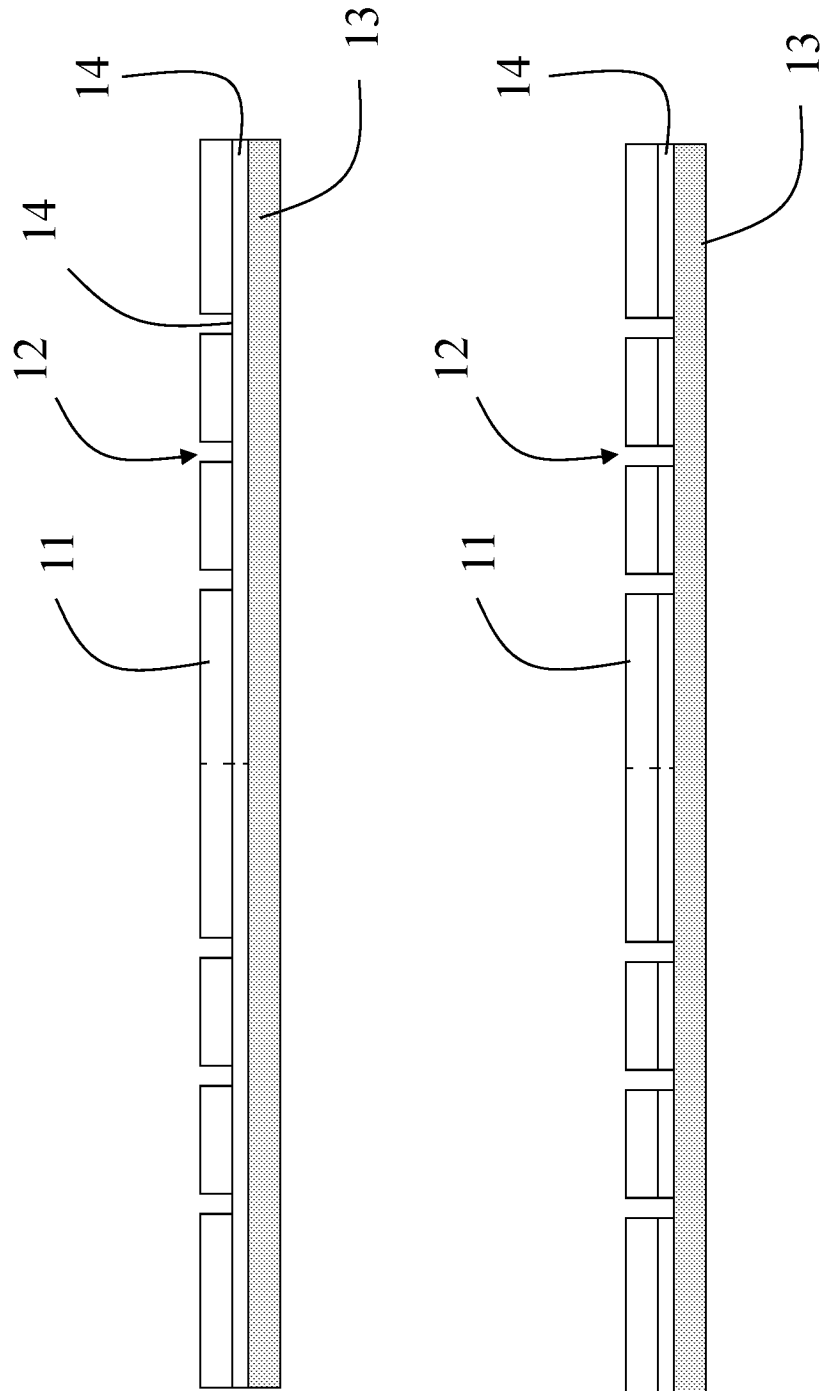


Fig.3B

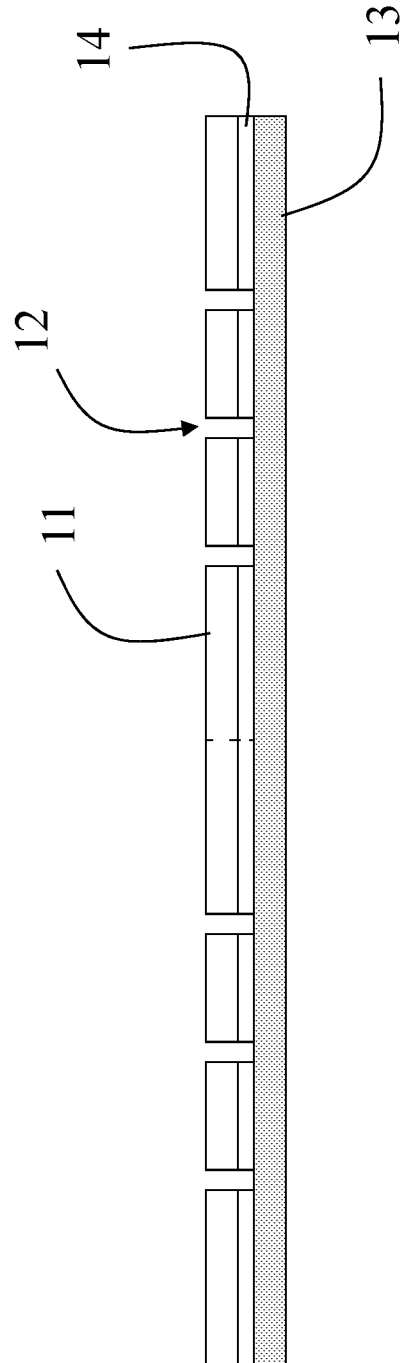


Fig.4A

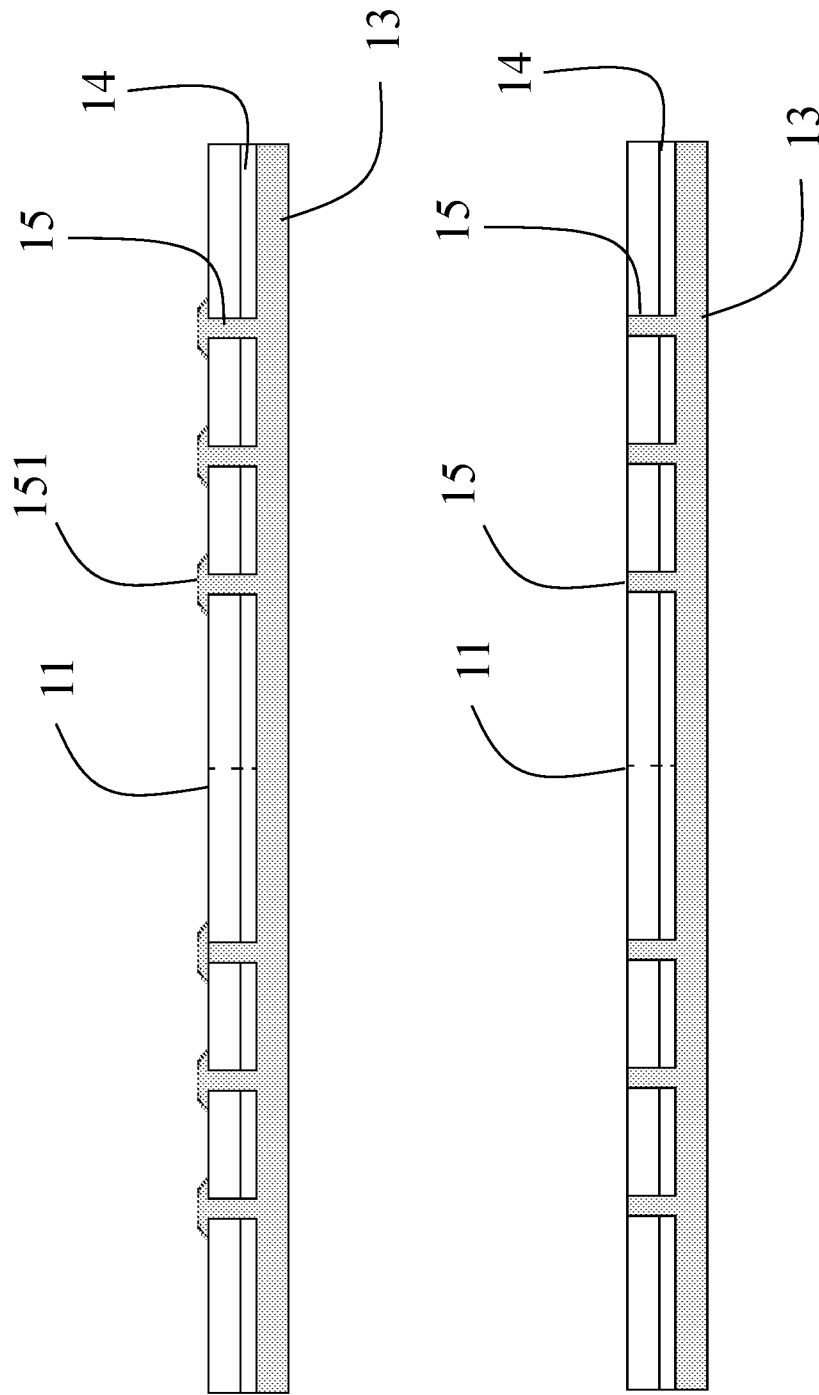


Fig.4B

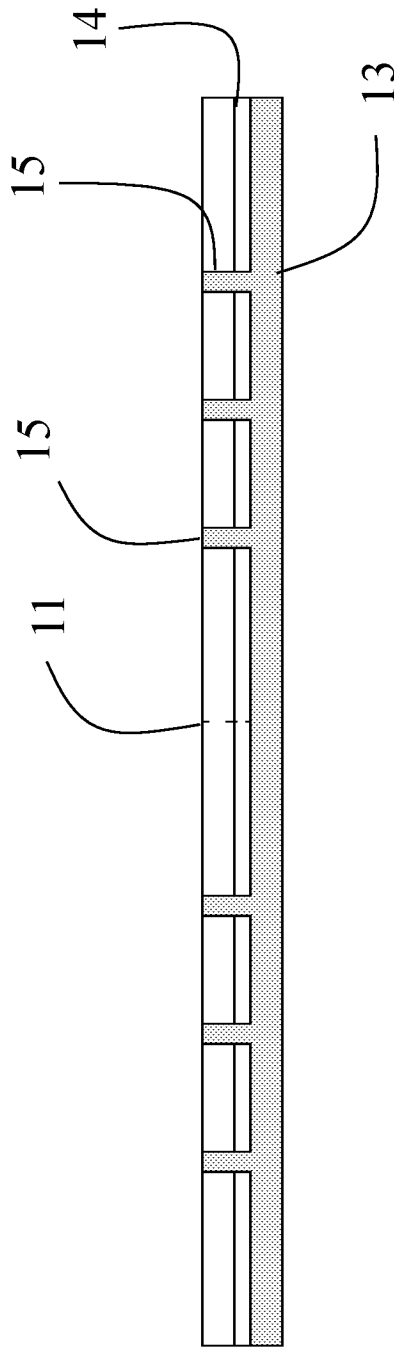


Fig.5A

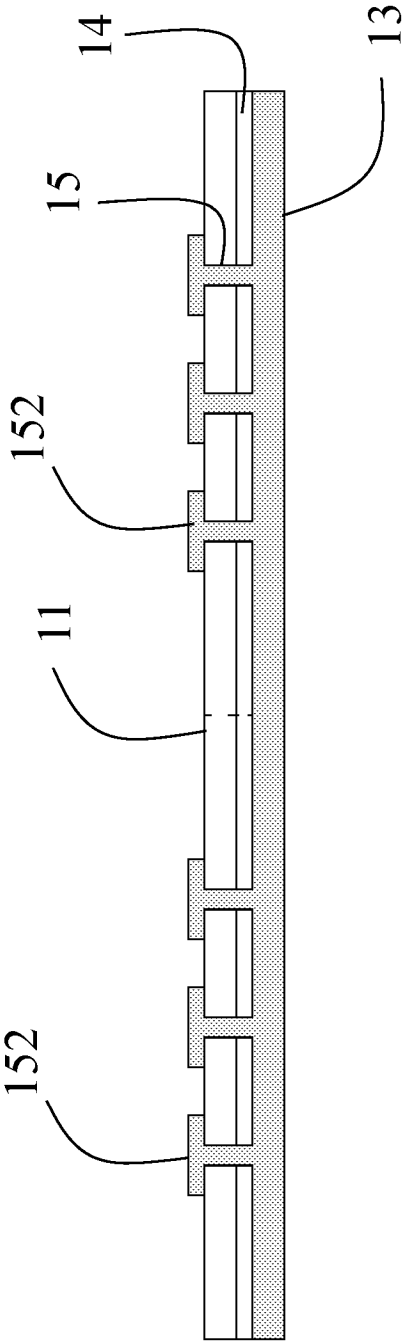


Fig.5B

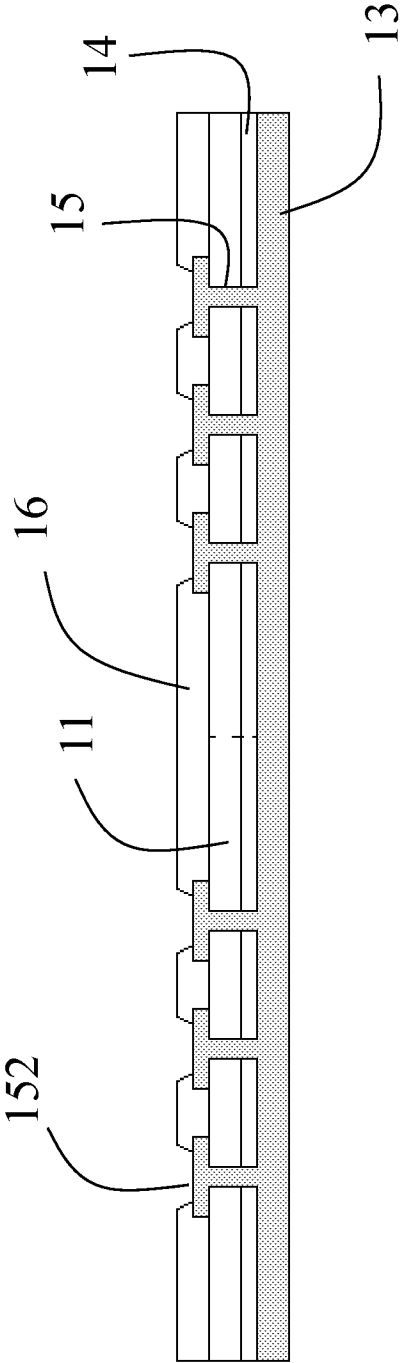


Fig.6A

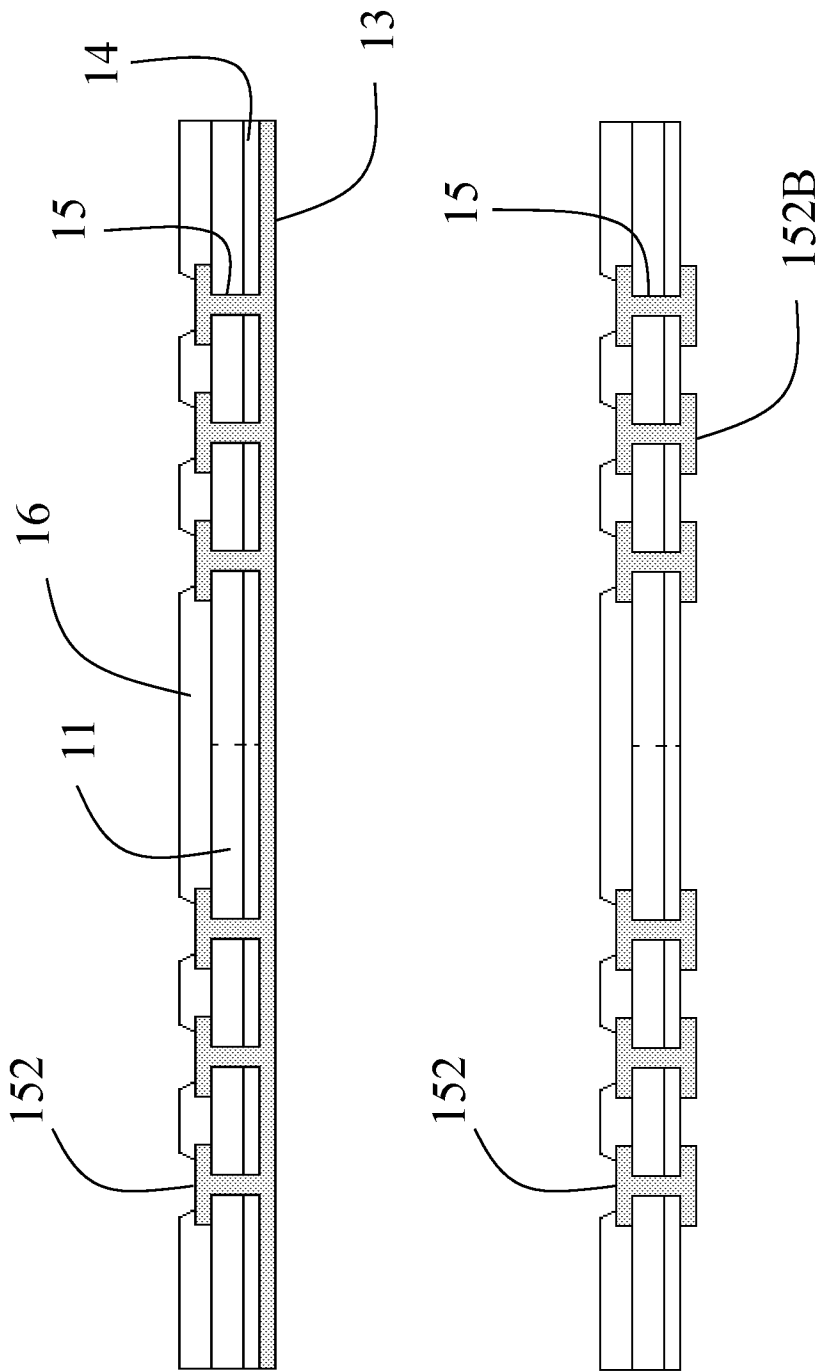


Fig.6B

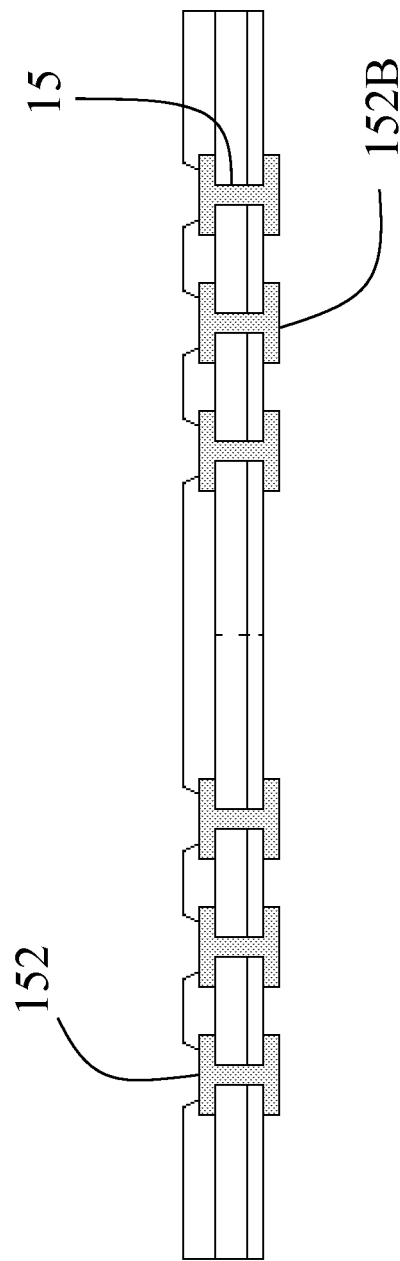


Fig.7A

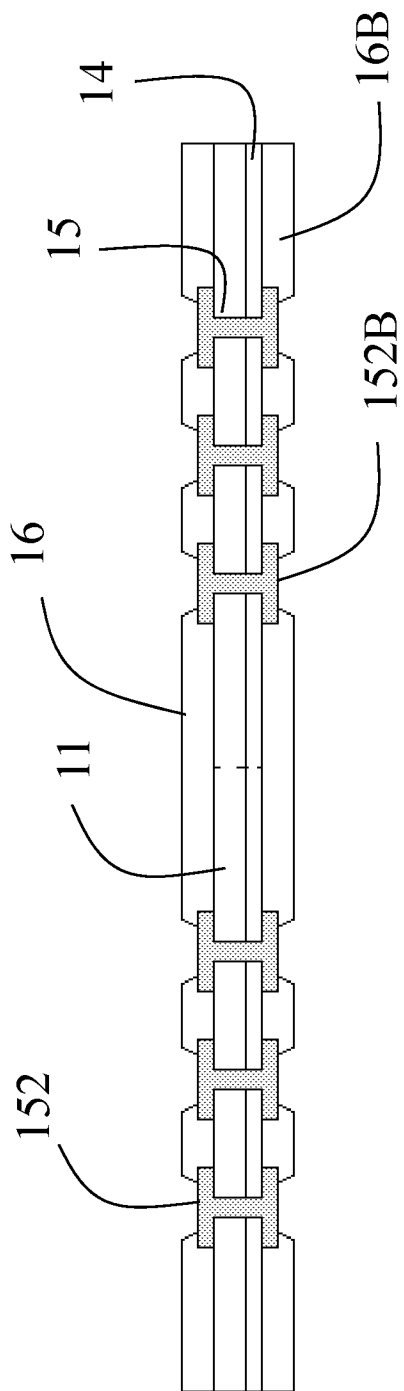
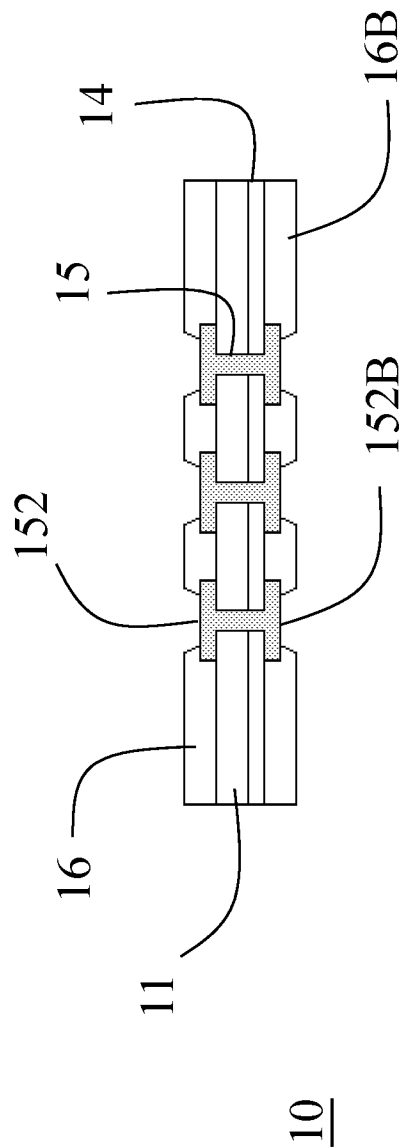


Fig.7B

Fig. 8

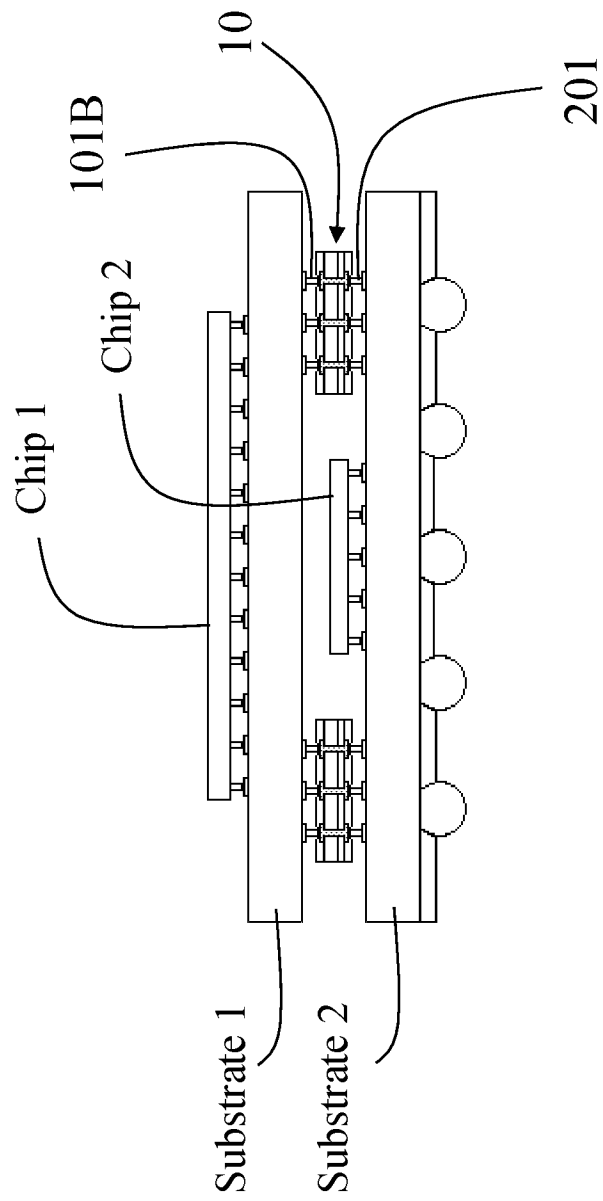


Fig.9A

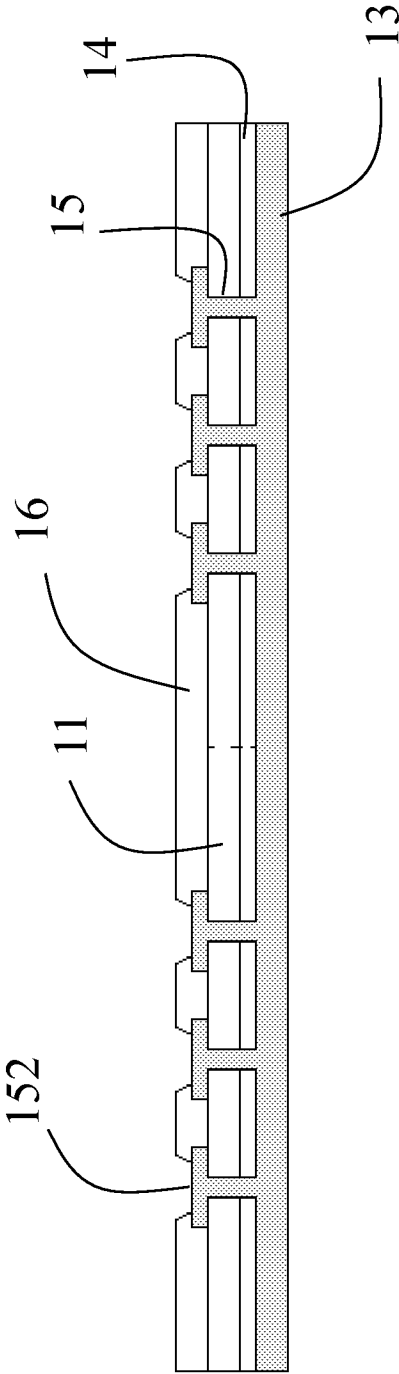


Fig.9B

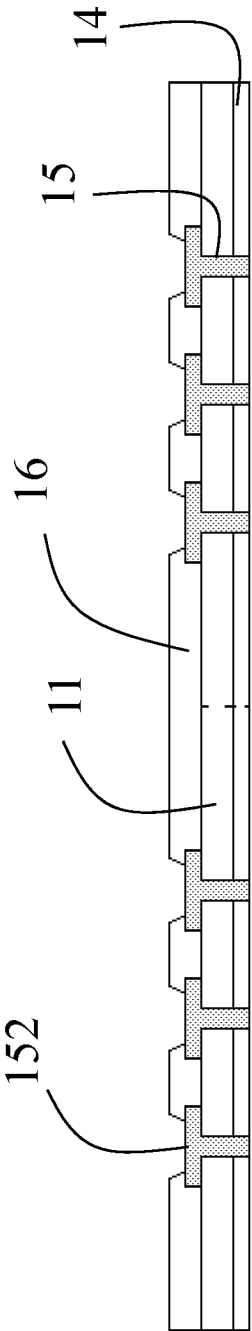
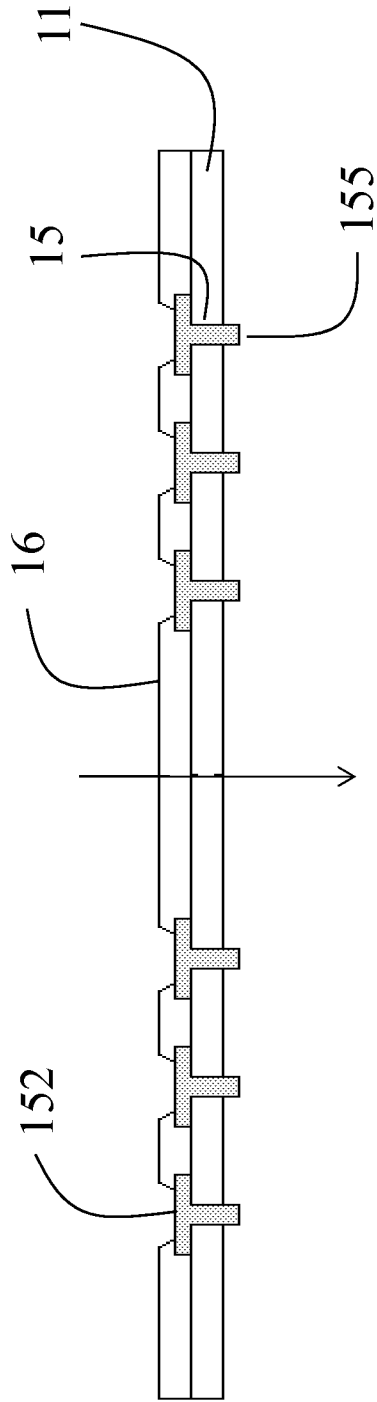


Fig.10A



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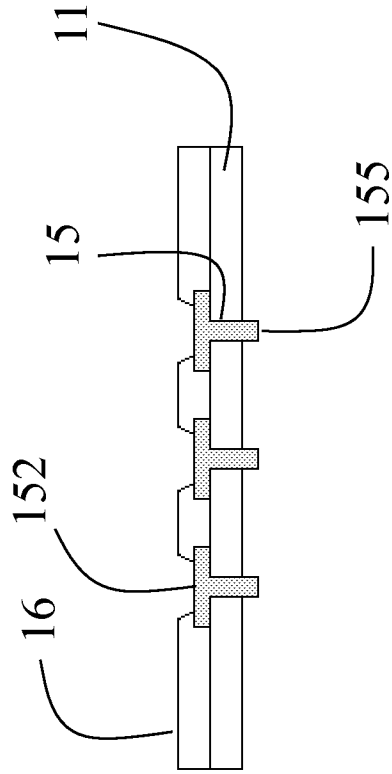


Fig.10B

Fig.11

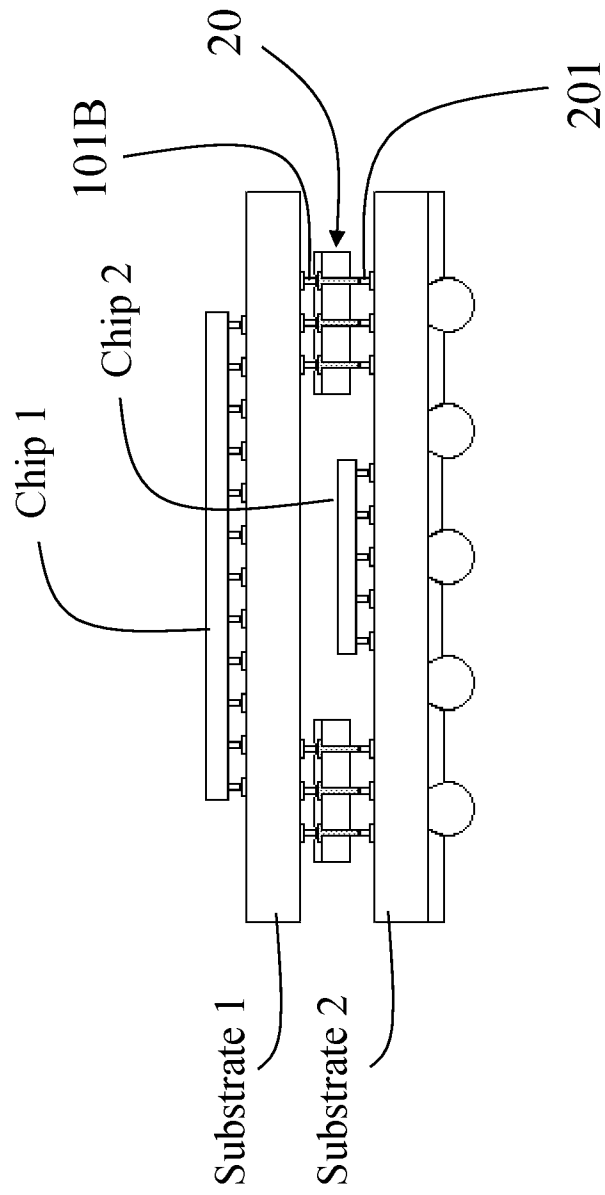


Fig.12A

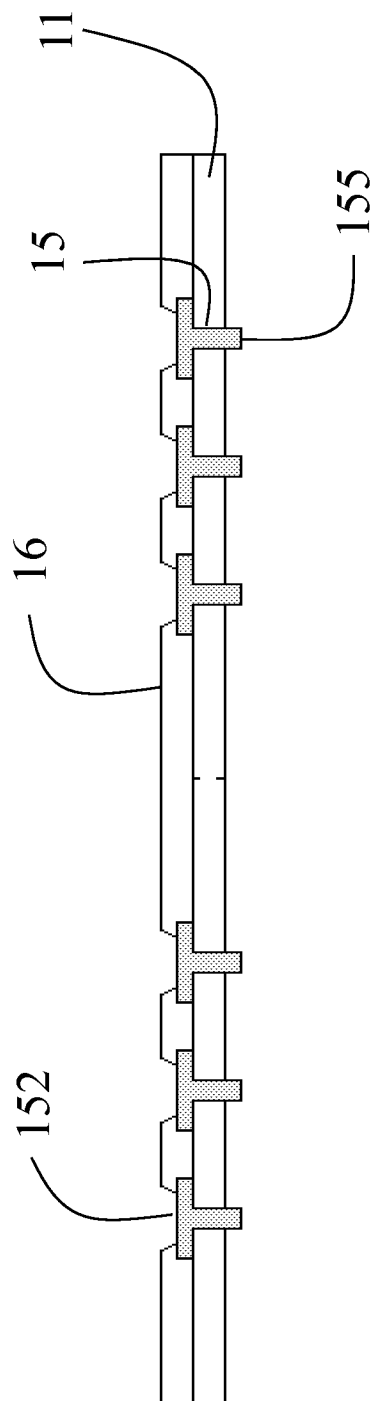


Fig.12B

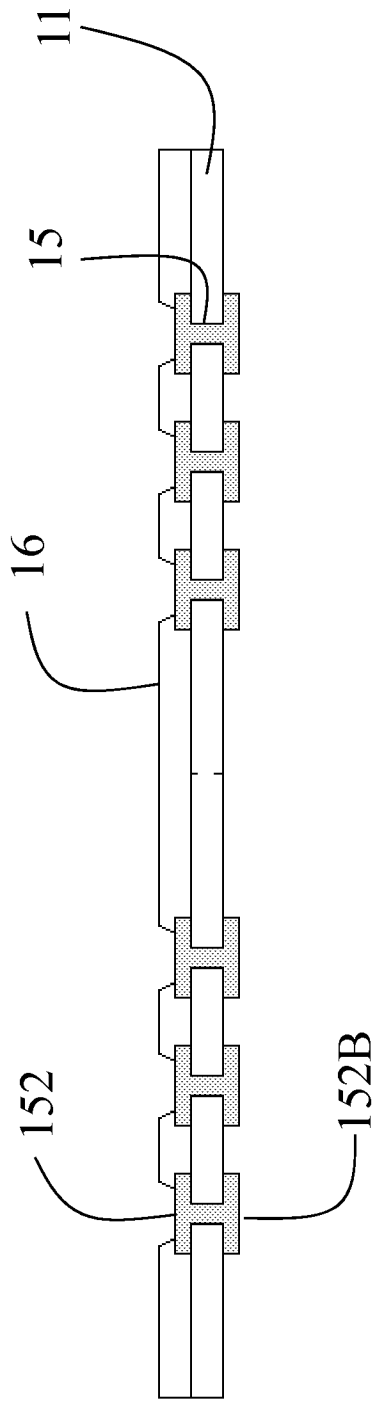
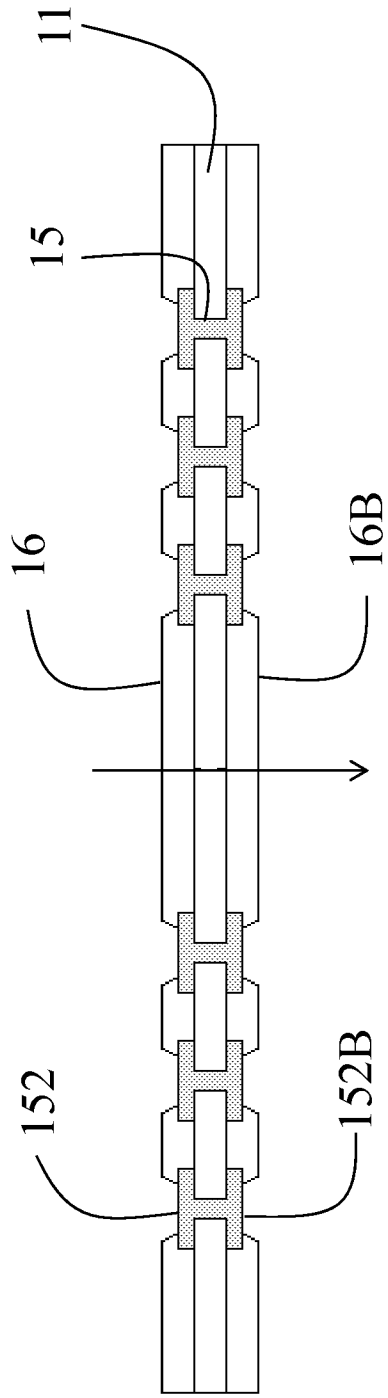


Fig.13A



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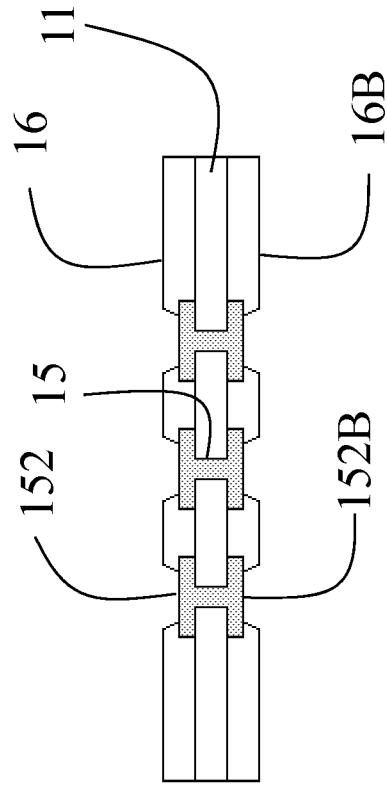
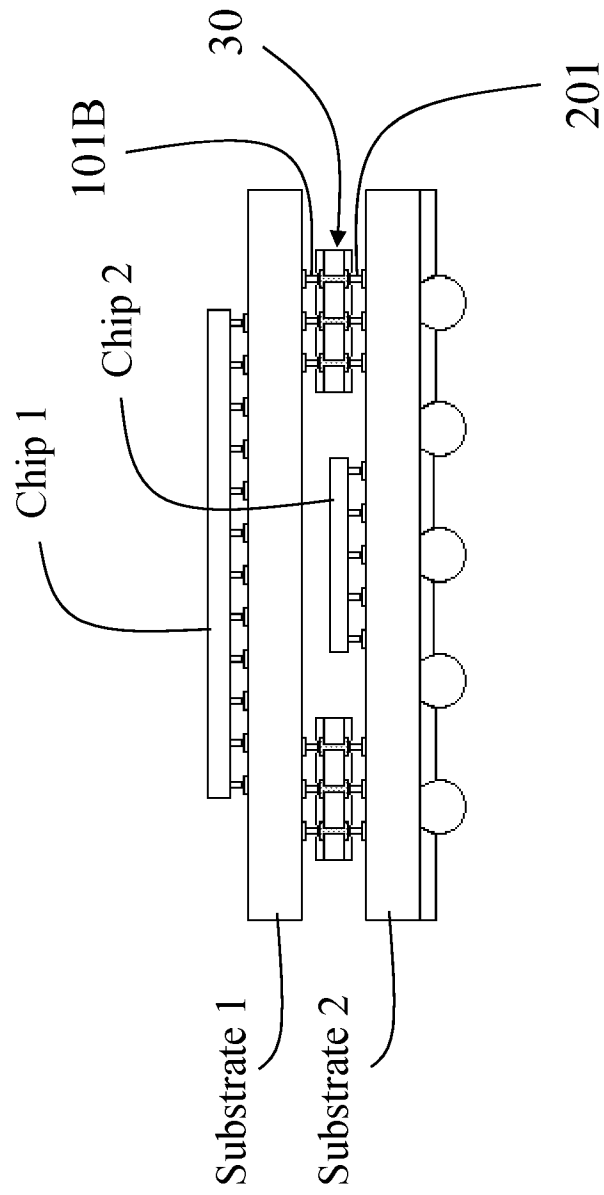


Fig.13B

Fig.14



AIA Declaration

Attorney Docket No. **4647-138PRO** Application No.

PATENT

First Named Inventor: **{Dyi-Chung HU}** Confirmation No.

Filed:

Title: **{Spacer Connector}**

DECLARATION (37 C.F.R. §1.63) FOR UTILITY OR DESIGN APPLICATION

As the below named inventor, I hereby declare that:

This declaration is directed to either the attached application, or the above identified United States application filed _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. §1001 by fine or imprisonment of not more than (5) years, or both.

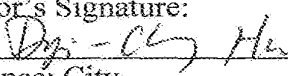
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Legal Name of Sole or First Inventor:			
(e.g., Given name (First and middle (if any) and Family Name or Surname))			
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Inventor's Signature: 			Date (Optional):
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City Hsinchu	State Taiwan	Zip 310	Country ROC

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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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4647-138U
		Application Number	
Title of Invention	SPACER CONNECTOR		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2:

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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Inventor Information:

Inventor	1				Remove
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	Dyi-Chung		HU		
Residence Information (Select One) US Residency • Non US Residency Active US Military Service					
City	Hsinchu		Country of Residence ⁱ	TW	
Mailing Address of Inventor:					
Address 1		No.354, Xuefu E. Rd., Zhudong Township			
Address 2					
City	Hsinchu		State/Province		
Postal Code	310	Country ⁱ	TW		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
☐ An Address is being provided for the correspondence Information of this application.			
Customer Number	22429		
Email Address	bjhgroupp@ipfirm.com	Add Email	Remove Email

Application Information:

Title of the Invention	SPACER CONNECTOR		
Attorney Docket Number	4647-138U	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	14	Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4647-138U
		Application Number	
Title of Invention	SPACER CONNECTOR		

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	22429		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	<div></div>	<div>Remove</div>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional <div></div>	62184034	2015-06-24
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			<div>Add</div>

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4647-138U
		Application Number	
Title of Invention	SPACER CONNECTOR		

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4647-138U
		Application Number	
Title of Invention	SPACER CONNECTOR		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☒ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☒ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4647-138U
		Application Number	
Title of Invention	SPACER CONNECTOR		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant	1	Remove		
<p>If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.</p> <p style="text-align: right;">Clear</p>				
☒ Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor		
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest		
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:				
<div style="border: 1px solid black; height: 20px; width: 100%;"></div>				
Name of the Deceased or Legally Incapacitated Inventor: <div style="border: 1px solid black; width: 450px; height: 25px;"></div>				
If the Applicant is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
<div style="border: 1px solid black; height: 20px; width: 50px;"></div>	<div style="border: 1px solid black; height: 20px; width: 150px;"></div>	<div style="border: 1px solid black; height: 20px; width: 100px;"></div>	<div style="border: 1px solid black; height: 20px; width: 150px;"></div>	<div style="border: 1px solid black; height: 20px; width: 50px;"></div>
Mailing Address Information For Applicant:				
Address 1		<div style="border: 1px solid black; height: 25px; width: 660px;"></div>		
Address 2		<div style="border: 1px solid black; height: 25px; width: 660px;"></div>		
City		State/Province		<div style="border: 1px solid black; height: 25px; width: 100px;"></div>
Country	<div style="border: 1px solid black; height: 25px; width: 350px;"></div>	Postal Code		<div style="border: 1px solid black; height: 25px; width: 100px;"></div>
Phone Number	<div style="border: 1px solid black; height: 25px; width: 250px;"></div>	Fax Number		<div style="border: 1px solid black; height: 25px; width: 100px;"></div>
Email Address		<div style="border: 1px solid black; height: 25px; width: 660px;"></div>		
Additional Applicant Data may be generated within this form by selecting the Add button.				Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4647-138U
		Application Number	
Title of Invention	SPACER CONNECTOR		

Assignee	1			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
<input type="button" value="Remove"/>				
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1		<input type="text"/>		
Address 2		<input type="text"/>		
City	<input type="text"/>	State/Province	<input type="text"/>	
Country ⁱ	<input type="text"/>	Postal Code	<input type="text"/>	
Phone Number	<input type="text"/>	Fax Number	<input type="text"/>	
Email Address	<input type="text"/>			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Benjamin J. Hauptman/		Date (YYYY-MM-DD)	2016-06-23
First Name	Benjamin	Last Name	Hauptman	Registration Number
				29310
Additional Signature may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	4647-138U
		Application Number	
Title of Invention	SPACER CONNECTOR		

This collection of information is required by 37 CFR 1.76. 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 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet 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 records.
- 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.

Docket No.: 4647-138U

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	
	:	
Dyi-Chung HU	:	Confirmation No. (Not Yet Assigned)
	:	
U.S. Patent Application No. (Not Yet Assigned)	:	
	:	
Filed: June 23, 2016	:	
	:	
For: SPACER CONNECTOR		

PRELIMINARY AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

Preliminary to examination of the above-referenced application, please amend the application as follows:

AMENDMENTS TO THE SPECIFICATION

On page 1 after the title, please insert the following:

-- RELATED APPLICATIONS

The present application claims the benefit of U.S. Provisional Application No. 62/184,034, filed June 24, 2015, the disclosure of which is hereby incorporated by reference herein in its entirety. --

REMARKS

The specification of the referenced application has been amended to incorporate be reference the corresponding U.S. Provisional application. No new matter has been introduced through the foregoing amendments. Entry is in order.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,
HAUPTMAN HAM, LLP

/Benjamin J. Hauptman/

Benjamin J. Hauptman
Registration No. 29,310

2318 Mill Road, Suite 1400
Alexandria, Virginia 22314
(703) 684-1111
Facsimile: (703) 518-5499
Date: June 23, 2016
BJH/ayw

SCORE Placeholder Sheet for IFW Content

Application Number: 15190695

Document Date: 06/23/2016

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- Drawings – Other than Black and White Line Drawings

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

To access the documents in the SCORE database, refer to instructions below.

At the time of document entry (noted above):

- Examiners may access SCORE content via the eDAN interface.
- Other USPTO employees can bookmark the current SCORE URL (<http://Score.uspto.gov/ScoreAccessWeb/>).
- External customers may access SCORE content via the Public and Private PAIR interfaces.



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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/190,695	06/23/2016	2812	730	4647-138U	8	3

CONFIRMATION NO. 1921

FILING RECEIPT



0000000084189673

22429
HAUPTMAN HAM, LLP
2318 Mill Road
Suite 1400
ALEXANDRIA, VA 22314

Date Mailed: 07/08/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Dyi-Chung HU, Hsinchu, TAIWAN;

Applicant(s)

Dyi-Chung HU, Hsinchu, TAIWAN;

Power of Attorney: The patent practitioners associated with Customer Number 22429

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/184,034 06/24/2015

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 07/06/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/190,695**

Projected Publication Date: 12/29/2016

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

SPACER CONNECTOR

Preliminary Class

438

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/190,695				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	300		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	8	minus 20 = *	x 40 =	0.00	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *	x 210 =	0.00						
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).			0.00						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00						
			TOTAL	730		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	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 found in the appropriate box in column 1.										



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/190,695	06/23/2016	Dyi-Chung HU	4647-138U

CONFIRMATION NO. 1921

PUBLICATION NOTICE



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22429
HAUPTMAN HAM, LLP
2318 Mill Road
Suite 1400
ALEXANDRIA, VA 22314

Title:SPACER CONNECTOR

Publication No.US-2016-0379922-A1

Publication Date:12/29/2016

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/190,695	06/23/2016	Dyi-Chung HU	4647-138U	1921

22429 7590 03/02/2017
HAUPTMAN HAM, LLP
2318 Mill Road
Suite 1400
ALEXANDRIA, VA 22314

EXAMINER
CHEN, XIAOLIANG

ART UNIT	PAPER NUMBER
2847	

NOTIFICATION DATE	DELIVERY MODE
03/02/2017	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):

docketing@ipfirm.com
pair_lhbb@firsttofile.com
EAnastasio@IPFirm.com

Office Action Summary	Application No. 15/190,695	Applicant(s) HU, DYI-CHUNG	
	Examiner XIAOLIANG CHEN	Art Unit 2847	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 06-23-16.
☐ 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) 1-8 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) 1-8 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) | 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date ____. | 4) ☐ Other: ____. |

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
Group I, Claims 5-7 and 8, A spacer connector, Class 174/262;
Group II, Claims 1-4, A process for making spacer connector, Class 29/832.
2. Inventions Group II and Group I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)).

In the instant case, not only the process as claimed can be used to make another and materially different product;

For example, the limitations of a plurality of metal pillars, each passing through the core substrate and the dielectric layer, in the product claim 5 of Group I, which are not required by the method claims 1 of Group II, and the limitations of a plurality of top metal pads, each formed on a top of a corresponding metal pillar; and a bottom end of each metal pillar protruded under a bottom surface of the core substrate, in the product claim 8 of Group I, which are not required by the method claims 1 of Group II,

but also, the product as claimed can be made by another and materially different process;

For example, the limitations of preparing a conductive carrier with dielectric adhesive layer formed on a top surface of the conductive carrier; attaching the core substrate on a top surface of the dielectric adhesive; etching dielectric adhesive

exposed on a bottom of each through hole to expose a top surface of the conductive carrier on a bottom of a corresponding through hole; in the method claim 1 of Group II which are not required by product claims 5 and 8 of Group I.

Because these inventions of Group I and Group II are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction were not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

3. In the Group I of this application contains claims directed to the following patentably distinct subgroups as follows:

- a. Subgroup I depicted Claims 5-7,
- b. Subgroup II depicted Claim 8;

The Subgroups are independent or distinct because claims recite the distinct characteristics of such Subgroups. In addition, these Subgroups are not obvious variants of each other based on the current record.

The Subgroup I and Subgroup II are related as subcombinations; the subcombination is distinct if it is not obvious variants, and if it is shown that at least one distinct characteristic of subcombinations are separately usable. In the instant case, the subcombination of Subgroup I has separate usable utility such as the limitations of a dielectric layer, configured on a bottom of the core substrate, in claim 5, which do not required by claim 8 of the subcombination of Subgroup II; and the subcombination of Subgroup II has separate usable utility such as the limitations of a plurality of top metal

pads, each formed on a top of a corresponding metal pillar; and a bottom end of each metal pillar protruded under a bottom surface of the core substrate, in claim 8, which do not required by claim 5 of the subcombination of Subgroup I.

4. There is an examination and search burden for these patentably distinct Subgroups due to their distinct characteristics. The Subgroups require a different field of search (e.g., searching different classes/subclasses or electronic resources, or employing different search queries); and/or the prior art applicable to one Subgroup would not likely be applicable to another Subgroup; and/or the Subgroups are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

5. Applicant is required under 35 U.S.C. 121 to elect a single disclosed Subgroup for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a Subgroups to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected Subgroups**, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

The election of the Subgroups may be made with or without traverse. To preserve 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 election of Subgroups

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.

Should applicant traverse on the ground that the Subgroups are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the Subgroups 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 Subgroups unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other Subgroups.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to XIAOLIANG CHEN whose telephone number is (571)272-9079. The examiner can normally be reached on 8:00-5:00 (EST), Monday-Friday.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Art Unit: 2847

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Xiaoliang Chen/
Primary Examiner, Art Unit 2847

<p><i>Index of Claims</i></p> 	Application/Control No. 15190695	Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG
	Examiner XIAOLIANG CHEN	Art Unit 2847

✓	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	01/28/2017								
	1	÷								
	2	÷								
	3	÷								
	4	÷								
	5	÷								
	6	÷								
	7	÷								
	8	÷								

Docket No.: 4647-138U

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:
	:
Dyi-Chung HU	: Confirmation No: 1921
	:
Application No. 15/190,695	: Group Art Unit: 2847
	:
Filed: June 23, 2016	: Examiner: CHEN, XIAOLIANG
	:

For: SPACER CONNECTOR

**PRELIMINARY AMENDMENT AND
RESPONSE TO RESTRICTION REQUIREMENT**

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria VA 22313-1450

Dear Commissioner:

In response to the Official Action mailed March 2, 2017, please enter the following
Amendment and Response to Restriction Requirement.

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. **(Currently Amended)** A fabricating process for a spacer connector, the spacer connector comprising:

a core substrate;

a plurality of metal pillars, each passing through the core substrate; and

a plurality of top metal pads, each on a top end of a corresponding metal pillar among the plurality of metal pillars;

wherein a bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from a bottom surface of the core substrate,

the method comprising:

preparing ~~[[a]]~~ the core substrate;

forming a plurality of through holes passing through the core substrate;

preparing a conductive carrier with a dielectric adhesive layer ~~formed~~ on a top surface of the conductive carrier;

attaching the core substrate on ~~[[a]]~~ the top surface of the conductive carrier via the dielectric adhesive;

etching the dielectric adhesive exposed on a bottom of each through hole among the plurality of through holes to expose ~~[[a]]~~ the top surface of the conductive carrier on ~~[[a]]~~ the bottom of ~~a corresponding said each~~ through hole; and

plating to form the plurality of metal pillars, each filled in ~~[[each]]~~ a corresponding through hole among the plurality of through holes.

2. **(Currently Amended)** The~~[[A]]~~ fabricating process for a ~~spacer connector~~ as claimed in claim 1, further comprising:

forming the plurality of top metal pads, each on the ~~a top metal pad on a top end~~ of a corresponding metal pillar among the plurality of metal pillars;

forming a top passivation layer to cover a peripheral area of each top metal pad among the plurality of top metal pads, wherein a central area of said each top metal pad is revealed for electrical contact;

~~thinning the conductive carrier from bottom;~~

~~forming a bottom metal pad on a bottom of a corresponding metal pillar;~~

~~forming a bottom passivation layer to cover a peripheral area of each bottom metal pad, a central area of each bottom metal pad is revealed for electrical contact; and~~

~~singulating to yield a plurality of spacer connectors.~~

3. **(Currently Amended)** The[[A]] fabricating process ~~for a spacer connector~~ as claimed in claim 2, after said forming [[a]] the top passivation layer, further comprising:

stripping the conductive carrier;

stripping the dielectric adhesive so that [[a]] the bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from the ~~protruded under a~~ bottom surface of the core substrate; and

singulating to yield a plurality of spacer connectors.

4. **(Currently Amended)** The[[A]] fabricating process ~~for a spacer connector~~ as claimed in claim ~~[[3]]~~ 2, after said forming the top passivation layer ~~stripping the dielectric adhesive,~~ further comprising

thinning the conductive carrier from bottom;

patterning the thinned conductive carrier into a plurality of bottom metal pads, each on a bottom of a corresponding metal pillar among the plurality of metal pillars;

forming a bottom passivation layer to cover a peripheral area of each bottom metal pad among the plurality of bottom metal pads, wherein a central area of said each bottom metal pad is revealed for electrical contact; and

~~forming a bottom metal pad on a bottom of a corresponding metal pillar; and~~

singulating to yield a plurality of spacer connectors.

5. **(Currently Amended)** The[[A]] spacer connector as claimed in claim 8,

further comprising:

~~a core substrate;~~

a dielectric layer, ~~configured on a~~ on the bottom surface of the core substrate, ~~[[; and]]~~

wherein the [[a]] plurality of metal pillars, each passing pass through the core substrate and the dielectric layer.

6. **(Currently Amended)** The[[A]] spacer connector as claimed in claim 5, wherein further comprising:

the dielectric layer is a dielectric adhesive into which the core substrate is pasted.

a plurality of top metal pads, each top metal pad is formed on a top of a corresponding metal pillar.

7. **(Currently Amended)** The[[A]] spacer connector as claimed in claim 5, further comprising:

a plurality of bottom metal pads, each on the formed on a bottom end of a corresponding metal pillar among the plurality of metal pillars.

8. **(Currently Amended)** A spacer connector, comprising:
a core substrate;
a plurality of metal pillars, each passing through the core substrate; and
a plurality of top metal pads, each ~~formed~~ on a top end of a corresponding metal pillar among the plurality of metal pillars; ~~[[and]]~~

wherein a bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from protruded under a bottom surface of the core substrate.

9. **(New)** The spacer connector as claimed in claim 8, wherein
the spacer connector is free of metal pads on the bottom ends of the plurality of metal pillars protruding downwardly from the bottom surface of the core substrate.

10. (New) The spacer connector as claimed in claim 9, wherein each metal pillar among the plurality of metal pillars and the corresponding top metal pad form a T shape.

11. (New) A structure, comprising:
a bottom package substrate;
a top package substrate stacked on top of the bottom package substrate; and
at least one spacer connector interposed between the bottom package substrate and the top package substrate to define a space between the bottom package substrate and the top package substrate, wherein

the spacer connector comprises
a core substrate;
a plurality of metal pillars, each passing through the core substrate; and
a plurality of top metal pads, each on a top end of a corresponding metal pillar among the plurality of metal pillars;

wherein a bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from a bottom surface of the core substrate,

the top package substrate has, on a bottom surface thereof, a plurality of bottom metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector,

the bottom package substrate has, on a top surface thereof, a plurality of top metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector, and

the top package substrate is electrically coupled to the bottom package substrate through the plurality of bottom metal pillars of the top package substrate, the plurality of metal pillars of the spacer connector, and the plurality of top metal pillars of the bottom package substrate.

12. (New) The structure of claim 11, further comprising:
a bottom chip arranged in the space between the bottom package substrate and the top package substrate, wherein

the bottom chip is mounted to the top surface of the bottom package substrate, and
the at least one spacer connector comprises two spacer connectors arranged on opposite sides
of the bottom chip.

13. **(New)** The structure of claim 12, wherein
a top surface of the bottom chip is spaced downwardly from the bottom surface of the top
package substrate.

14. **(New)** The structure of claim 13, further comprising:
a top chip mounted to the top surface of the top package substrate,
wherein in a direction in which the top package substrate is stacked on top of the bottom
package substrate, the top chip overlaps the bottom chip and each of the two spacer connectors.

15. **(New)** The structure of claim 11, wherein
each bottom metal pillar among the plurality of bottom metal pillars of the top package
substrate is aligned with a corresponding metal pillar among the plurality of metal pillars of the spacer
connector, and with a corresponding top metal pillar among the plurality of top metal pillars of the
bottom package substrate.

16. **(New)** The structure of claim 15, wherein
the spacer connector is free of metal pads on the bottom ends of the plurality of metal pillars
protruding downwardly from the bottom surface of the core substrate, and
each metal pillar among the plurality of metal pillars and the corresponding top metal pad of
the spacer connector form a T shape.

17. **(New)** The structure of claim 15, wherein
the bottom ends of the plurality of metal pillars protruding downwardly from the bottom
surface of the core substrate of the spacer connector are connected, in an end-to-end manner, to
corresponding top ends of the plurality of top metal pillars of the bottom package substrate, and
bottom ends of the plurality of bottom metal pillars of the top package substrate are connected

to the corresponding top ends of the plurality of metal pillars of the spacer connector via the corresponding top metal pads of the spacer connector.

18. **(New)** The structure of claim 15, wherein
the spacer connector further comprises a dielectric layer on the bottom surface of the core substrate, and
the plurality of metal pillars pass through the core substrate and the dielectric layer.

19. **(New)** The structure of claim 15, wherein
the dielectric layer is a dielectric adhesive into which the core substrate is pasted.

20. **(New)** The structure of claim 15, wherein
the spacer connector further comprises a plurality of bottom metal pads, each on the bottom end of a corresponding metal pillar among the plurality of metal pillars,
the bottom ends of the plurality of metal pillars are connected to corresponding top ends of the plurality of top metal pillars of the bottom package substrate via the corresponding bottom metal pads of the spacer connector, and
bottom ends of the plurality of bottom metal pillars of the top package substrate are connected to the corresponding top ends of the plurality of metal pillars of the spacer connector via the corresponding top metal pads of the spacer connector.

REMARKS

The original claims are amended. New claims 9-20 are added. No new matter is believed to have been introduced through the foregoing amendments.

Restriction to one of the following groups is required:

Group I. Claims 5-7 and 8, directed to a spacer connector

Group II. Claims 1-4, directed to a process

In response, Applicant elects **Group I**.

Further restriction to one of the following subgroups of Group I is required:

Subgroup I. Claims 5-7

Subgroup II. Claim 8

In response, Applicant elects **Subgroup II**.

The elected claims are **claims 8-17**. Claims 8 and 11-15 are generic.

The group election is made *with traverse*, because the Office has not demonstrated why the hypothetical process(es) mentioned in the Restriction Requirement, page 2, can be regarded as a *materially* different process.

The subgroup election is made *with traverse*, because the Office's allegation that the subgroups have separate *utility* is incorrect. The Office's analysis at the paragraph bridging pages 3-4 of the Restriction Requirement is about *features* recited (or not recited) in the claims, rather than about separate *utility* as alleged by the Office. Applicant respectfully submits that both subgroups have the same utility as spacer connectors. Thus, both subgroups should be examined.

In view of the above, withdrawal of the Restriction Requirement and consideration of all claims pending in the instant application are believed appropriate and therefore courteously solicited.

Early examination on the merits is respectfully requested.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,

HAUPTMAN HAM, LLP



Benjamin J. Hauptman
Registration No. 29,310

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(703) 518-5499 Facsimile
Date: May 1, 2017
BJH:KL/fcr

Electronic Acknowledgement Receipt

EFS ID:	29079357
Application Number:	15190695
International Application Number:	
Confirmation Number:	1921
Title of Invention:	SPACER CONNECTOR
First Named Inventor/Applicant Name:	Dyi-Chung HU
Customer Number:	22429
Filer:	Benjamin J. Hauptman/Faith Russell
Filer Authorized By:	Benjamin J. Hauptman
Attorney Docket Number:	4647-138U
Receipt Date:	01-MAY-2017
Filing Date:	23-JUN-2016
Time Stamp:	15:26:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response.pdf	65788	yes	9
			3c430e66664797202d4187f0caedfaf1708064af		

Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Preliminary Amendment	1	1	
Claims	2	7	
Response to Election / Restriction Filed	8	9	

Warnings:

Information:

Total Files Size (in bytes):	65788
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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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/190,695	Filing Date 06/23/2016	☐ To be Mailed
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ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

(Column 1)

(Column 2)

FOR	NUMBER FILED	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

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	05/01/2017	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X \$40 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	X \$210 =	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	

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	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
ROZENIA HARMON

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.



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.
15/190,695	06/23/2016	Dyi-Chung HU	4647-138U	1921

22429 7590 05/11/2017
HAUPTMAN HAM, LLP
2318 Mill Road
Suite 1400
ALEXANDRIA, VA 22314

EXAMINER
CHEN, XIAOLIANG

ART UNIT	PAPER NUMBER
2847	

NOTIFICATION DATE	DELIVERY MODE
05/11/2017	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):

docketing@ipfirm.com
pair_lhbb@firsttofile.com
EAnastasio@IPFirm.com

Election/Restrictions

1. In the amendment of 05-01-17, applicant amended all original claims 1-8, elected subgroup II of Group I of Claim 8, the amended subgroup I of Group I of claim 5-7 changed to depended on claim 8, and added new claim s 9-20, of which applicant states belong to the same subgroup II of Group I of claim 8 (It is applicant's own idea and not true at all), which is belong to another subgroup different from claim 8 (see detailed reasons below).

Applicant elected one subgroup, omitted another subgroup by changing the dependency, and added a further new subgroup still under the restriction requirement is improper and would delay the process of the patent application.

Therefore, the amendment and election of 05-01-17 regarded as Non-Compliant Amendment with the Non- Responsive election.

2. Following is the reasons the newly added claim 11-20 and claim 8 are not belong to the same subgroups:

The newly added claims 11-20 directed to the following patentably distinct subgroup from subgroup II (following the last Restriction/Election Requirement of 03-02-17):

- a. Subgroup I depicted claims 5-7 (this Subgroup is omitted by changing the dependency to claim 8 of the subgroup II),
- b. Subgroup II depicted claims 8 (this Subgroup is added claims 5-7, 9 and 10),
- c. Subgroup III depicted newly added claims 11-20;

The Subgroups are independent or distinct because claims recite the distinct characteristics of such Subgroups. In addition, these Subgroups are not obvious variants of each other based on the current record.

The Subgroup II and Subgroup III are related as combination and subcombination; the subcombination is distinct if it is not obvious variants, and if it is shown that at least one distinct characteristic of subcombinations are separately usable. In the instant case, the subcombination of Subgroup III has separate usable utility such as the limitations of A structure, comprising: a bottom package substrate; a top package substrate stacked on top of the bottom package substrate; and at least one spacer connector interposed between the bottom package substrate and the top package substrate to define a space between the bottom package substrate and the top package substrate, the top package substrate has, on a bottom surface thereof, a plurality of bottom metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector, the bottom package substrate has, on a top surface thereof, a plurality of top metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector, and the top package substrate is electrically coupled to the bottom package substrate through the plurality of bottom metal pillars of the top package substrate, the plurality of metal pillars of the spacer connector, and the plurality of top metal pillars of the bottom package substrate, in claim 9 of the subcombination of Subgroup III, which do not required by claim 8 of the combination of Subgroup II.

3. Since the response of 05-01-17 for the requirement of restriction/election is an improper response, the amendment with the election of 05-01-17 is not entered, the applicant should response to the Restriction/Election Requirement of 03-02-17 properly with any amendment; and the response time set by the Restriction/Election Requirement of 03-02-17 is still available and the time set for response was expired on 05-02-17; applicant needs to file a petition and pay a later fee due to the Non-compliant Response and to extend the expiring date.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to XIAOLIANG CHEN whose telephone number is (571)272-9079. The examiner can normally be reached on 8:00-5:00 (EST), Monday-Friday.

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

/Xiaoliang Chen/

Application/Control Number: 15/190,695

Page 5

Art Unit: 2847

Primary Examiner, Art Unit 2847

Notice of Non-Compliant Amendment (37 CFR 1.121)	Application No.	Applicant(s)
	15/190,695	HU, DYI-CHUNG
	Examiner	Art Unit
	XIAOLIANG CHEN	2847

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

The amendment document filed on 05-01-17 is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121 or 1.4. In order for the amendment document to be compliant, correction of the following item(s) is required.

THE FOLLOWING MARKED (X) ITEM(S) CAUSE THE AMENDMENT DOCUMENT TO BE NON-COMPLIANT:

- ☐ 1. Amendments to the specification:
 - ☐ A. Amended paragraph(s) do not include markings.
 - ☐ B. New paragraph(s) should not be underlined.
 - ☐ C. Other _____.
- ☐ 2. Abstract:
 - ☐ A. Not presented on a separate sheet. 37 CFR 1.72.
 - ☐ B. Other _____.
- ☐ 3. Amendments to the drawings:
 - ☐ A. The drawings are not properly identified in the top margin as "Replacement Sheet," "New Sheet," or "Annotated Sheet" as required by 37 CFR 1.121(d).
 - ☐ B. The practice of submitting proposed drawing correction has been eliminated. Replacement drawings showing amended figures, without markings, in compliance with 37 CFR 1.84 are required.
 - ☐ C. Other _____.
- ☐ 4. Amendments to the claims:
 - ☐ A. A complete listing of all of the claims is not present.
 - ☐ B. The listing of claims does not include the text of all pending claims (including withdrawn claims)
 - ☐ C. Each claim has not been provided with the proper status identifier, and as such, the individual status of each claim cannot be identified. Note: the status of every claim must be indicated after its claim number by using one of the following status identifiers: (Original), (Currently amended), (Canceled), (Previously presented), (New), (Not entered), (Withdrawn) and (Withdrawn-currently amended).
 - ☐ D. The claims of this amendment paper have not been presented in ascending numerical order.
 - ☐ E. Other: _____.
- ☒ 5. Other (e.g., the amendment is unsigned or not signed in accordance with 37 CFR 1.4):
the amendment with election is improper response after the requirement of restriction/election

For further explanation of the amendment format required by 37 CFR 1.121, see MPEP § 714.

TIME PERIODS FOR FILING A REPLY TO THIS NOTICE:

1. Applicant is given **no new time period** if the non-compliant amendment is an after-final amendment or an amendment filed after allowance. If applicant wishes to resubmit the non-compliant after-final amendment with corrections, the **entire corrected amendment** must be resubmitted.
2. Applicant is given **two months** from the mail date of this notice to supply the correction, if the non-compliant amendment is one of the following: a preliminary amendment, a non-final amendment (including a submission for a request for continued examination (RCE) under 37 CFR 1.114), a supplemental amendment filed within a suspension period under 37 CFR 1.103(a) or (c), and an amendment filed in response to a *Quayle* action. If any of above boxes 1. to 4. are checked, the correction required is only the **corrected section** of the _____ non-compliant amendment in compliance with 37 CFR 1.121.

Extensions of time are available under 37 CFR 1.136(a) only if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action.

Failure to timely respond to this notice will result in:

Abandonment of the application if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action; or

Non-entry of the amendment if the non-compliant amendment is a preliminary amendment or supplemental amendment.

/XIAOLIANG CHEN/ Primary Examiner, Art Unit 2847	
---	--

1. Applicant amended all original claims 1-8, elected subgroup II of Group I of Claim 8, the amended subgroup I of Group I of claim 5-7 and changed to depended on claim 8, and added new claim s 9-20, of which applicant states belong to the same subgroup II of Group I of claim 8 (It is applicant's own idea and not true at all), which is belong to another subgroup different from claim 8 (see detailed reasons attached). Applicant elected one subgroup, omitted another subgroup by changing the dependency, and added a further new subgroup still under the restriction requirement is improper and would delay the process of the patent application.

Therefore, the amendment and election of 05-01-17 regarded as Non-Compliant Amendment with the Non- Responsive election.

2. Since the response of 05-01-17 for the requirement of restriction/election is an improper response, the amendment with the election of 05-01-17 is not entered, the applicant should response to the Restriction/Election Requirement of 03-02-17 properly with any amendment; and the response time set by the Restriction/Election Requirement of 03-02-17 is still available and the time set for response was expired on 05-02-17; applicant needs to file a petition and pay a later fee due to the Non-compliant Response and to extend the expiring date.

Docket No.: 4647-138U

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	
	:	
Dyi-Chung HU	:	Confirmation No: 1921
	:	
Application No. 15/190,695	:	Group Art Unit: 2847
	:	
Filed: June 23, 2016	:	Examiner: CHEN, XIAOLIANG
	:	

For: SPACER CONNECTOR

PRELIMINARY AMENDMENT AND
RESPONSE TO RESTRICTION REQUIREMENT

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria VA 22313-1450

Dear Commissioner:

In response to the Official Action mailed March 2, 2017, please enter the following
Amendment and Response to Restriction Requirement.

Doc Code: PA..

Document Description: Power of Attorney

PTO/AIA/82A (07-13)

Approved for use through 01/31/2018. OMB 0651-0035

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.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	15/190,695
Filing Date	2016-06-23
First Named Inventor	Dyi-Chung HU
Title	SPACER CONNECTOR
Art Unit	2847
Examiner Name	CHEN, XIAOLIANG
Attorney Docket Number	70850-US-PA

SIGNATURE of Applicant or Patent Practitioner

Signature	/Belinda Lee/	Date (Optional)	2017-06-16
Name	Belinda Lee	Registration Number	46863
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 1.11 and 1.14. This collection is estimated to take 3 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.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number

Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)



I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

OR

31561



I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:



The address associated with the above-mentioned Customer Number

OR



The address associated with Customer Number:

OR

Firm or
Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Dyi-Chung HU



Inventor or Joint Inventor (title not required below)



Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)



Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)



Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Date (Optional)

Name

Dyi-Chung HU

Title

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.



Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 1.11 and 1.14. This collection is estimated to take 3 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.

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 records.
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.

Electronic Acknowledgement Receipt

EFS ID:	29516651
Application Number:	15190695
International Application Number:	
Confirmation Number:	1921
Title of Invention:	SPACER CONNECTOR
First Named Inventor/Applicant Name:	Dyi-Chung HU
Customer Number:	22429
Filer:	Belinda Lee
Filer Authorized By:	
Attorney Docket Number:	4647-138U
Receipt Date:	16-JUN-2017
Filing Date:	23-JUN-2016
Time Stamp:	04:01:36
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	Power of Attorney	70850-US_POA.pdf	1066111	no	3
			b2dd16305f9400044e3295c80701c65853c7c2d9		

Warnings:

Information:	
Total Files Size (in bytes):	1066111
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>	



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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/190,695	06/23/2016	Dyi-Chung HU	4647-138U

22429
HAUPTMAN HAM, LLP
2318 Mill Road
Suite 1400
ALEXANDRIA, VA 22314

CONFIRMATION NO. 1921
POWER OF ATTORNEY NOTICE



Date Mailed: 06/20/2017

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/16/2017.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mtklemichael/



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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/190,695	06/23/2016	Dyi-Chung HU	70850-US-PA

31561
JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

CONFIRMATION NO. 1921
POA ACCEPTANCE LETTER



Date Mailed: 06/20/2017

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/16/2017.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mtklemichael/

AMENDMENT

To the Claims:

Please amend the claims as following.

1. (withdrawn) A fabricating process for a spacer connector, the spacer connector comprising:

a core substrate;

a plurality of metal pillars, each passing through the core substrate; and

a plurality of top metal pads, each on a top end of a corresponding metal pillar among the plurality metal pillars;

wherein a bottom end of each metal pillar among the plurality metal pillars protruded downwardly from a bottom surface of the core substrate,

the method comprising:

preparing the core substrate;

forming a plurality of through holes passing through the core substrate;

preparing a conductive carrier with a dielectric adhesive layer on a top surface of the conductive carrier;

attaching the core substrate on the top surface of the conductive carrier via the dielectric adhesive;

etching the dielectric adhesive exposed on a bottom of each through hole among the plurality of through holes to expose the top surface of the conductive carrier on the bottom of said each through hole; and

plating to form the plurality of metal pillars, each filled in a corresponding through hole among the plurality of through holes.

2. (withdrawn) The fabricating process as claimed in claim 1, further comprising:

forming the plurality of top metal pads, each on the top end of a corresponding metal pillar among the plurality of metal pillars;

forming a top passivation layer to cover a peripheral area of each top metal pad among the plurality of top metal pads, wherein a central area of said each top metal pad is revealed for electrical contact.

3. (withdrawn) The fabricating process as claimed in claim 2, after said forming the top passivation layer, further comprising:

stripping the conductive carrier;

stripping the dielectric adhesive so that the bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from the bottom surface of the core substrate; and

singulating to yield a plurality of spacer connectors.

4. (withdrawn) The fabricating process as claimed in claim 2, after said forming the top passivation layer, further comprising:

thinning the conductive carrier from bottom;

patterning the thinned conductive carrier into a plurality of bottom metal pads, each on a bottom of a corresponding metal pillar among the plurality of metal pillars;

forming a bottom passivation layer to cover a peripheral area of each bottom metal pad among the plurality of bottom metal pads, wherein a central area of said each bottom metal pad is revealed for electrical contact; and

singulating to yield a plurality of spacer connectors.

5. (withdrawn) The spacer connector as claimed in claim 8, further comprising:

a dielectric layer on the bottom surface of the core substrate,

wherein the plurality of metal pillars pass through the core substrate and the dielectric layer.

6. (withdrawn) The spacer connector as claimed in claim 5, wherein the dielectric layer is a dielectric adhesive into which the core substrate is pasted.

7. (withdrawn) The spacer connector as claimed in claim 5, further comprising:

a plurality of bottom metal pads, each on the bottom end of a corresponding metal pillar among the plurality of metal pillars.

8. (withdrawn) A spacer connector, comprising:

a core substrate;

a plurality of metal pillars, each passing through the core substrate; and

a plurality of top metal pads, each on a top end of a corresponding metal pillar among the plurality of metal pillars;

wherein a bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from a bottom surface of the core substrate.

9. (withdrawn) The spacer connector as claimed in claim 8, wherein the spacer connector is free of metal pads on the bottom ends of the plurality of metal pillars protruding downwardly from the bottom surface of the core substrate.

10. (withdrawn) The spacer connector as claimed in claim 9, wherein each metal pillar among the plurality of metal pillars and the corresponding top

metal pad form a T shape.

11. (previously presented) A structure, comprising:

a bottom package substrate;

a top package substrate stacked on top of the bottom package substrate; and

at least one spacer connector interposed between the bottom package substrate and the top package substrate to define a space between the bottom package substrate and the top package substrate, wherein

the spacer connector comprises

a core substrate;

a plurality of metal pillars, each passing through the core substrate; and

a plurality of top metal pads, each on a top end of a corresponding metal pillar among the plurality of metal pillars;

wherein a bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from a bottom surface of the core substrate,

the top package substrate has, on a bottom surface thereof, a plurality of bottom metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector,

the bottom package substrate has, on a top surface thereof, a plurality of top metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector, and

the top package substrate is electrically coupled to the bottom package substrate through the plurality of bottom metal pillars of the top package substrate, the plurality of metal pillars of the spacer connector, and the plurality of top metal pillars of the bottom

package substrate.

12. (previously presented) The structure of claim 11, further comprising:
a bottom chip arranged in the space between the bottom package substrate and the top package substrate, wherein
the bottom chip is mounted to the top surface of the bottom package substrate, and
the at least one spacer connector comprises two spacer connectors arranged on opposite sides of the bottom chip.

13. (previously presented) The structure of claim 12, wherein
a top surface of the bottom chip is spaced downwardly from the bottom surface of the top package substrate.

14. (previously presented) The structure of claim 13, further comprising:
a top chip mounted to the top surface of the top package substrate,
wherein in a direction in which the top package substrate is stacked on top of the bottom package substrate, the top chip overlaps the bottom chip and each of the two spacer connectors.

15. (previously presented) The structure of claim 11, wherein
each bottom metal pillar among the plurality of bottom metal pillars of the top package substrate is aligned with a corresponding metal pillar among the plurality of metal pillars of the spacer connector, and with a corresponding top metal pillar among the plurality of top metal pillars of the bottom package substrate.

16. (previously presented) The structure of claim 15, wherein
the spacer connector is free of metal pads on the bottom ends of the plurality of metal pillars protruding downwardly from the bottom surface of the core substrate, and

each metal pillar among the plurality of metal pillars and the corresponding top metal pad of the spacer connector form a T shape.

17. (previously presented) The structure of claim 15, wherein the bottom ends of the plurality of metal pillars protruding downwardly from the bottom surface of the core substrate of the spacer connector are connected, in an end-to-end manner, to corresponding top ends of the plurality of top metal pillars of the bottom package substrate, and

bottom ends of the plurality of bottom metal pillars of the top package substrate are connected to the corresponding top ends of the plurality of metal pillars of the spacer connector via the corresponding top metal pads of the spacer connector.

18. (previously presented) The structure of claim 15, wherein the spacer connector further comprises a dielectric layer on the bottom surface of the core substrate, and

the plurality of metal pillars pass through the core substrate and the dielectric layer.

19. (previously presented) The structure of claim 15, wherein the dielectric layer is a dielectric adhesive in which the core substrate is pasted.

20. (previously presented) The structure of claim 15, wherein the spacer connector further comprises a plurality of bottom metal pads, each on the bottom end of a corresponding metal pillar among the plurality of metal pillars,

the bottom ends of the plurality of metal pillars are connected to corresponding top ends of the plurality of top metal pillars of the bottom package substrate via the corresponding bottom metal pads of the spacer connector, and

bottom ends of the plurality of bottom metal pillars of the top package substrate are

connected to the corresponding top ends of the plurality of metal pillars of the spacer connector via the corresponding top metal pads of the spacer connector.

REMARKS

In response to the Restriction Requirement dated May 11, 2017, a complete listing of all of the claims is presented herewith. The application contains claims 1-20 which are directed to three distinct Subgroups and are subject to restriction and/or election by the Office. Applicant preliminarily elects Subgroup III drawn to claims 11-20 for prosecution on the merits.

Since this reply to the requirement includes (i) an election of a species or invention to be examined, and (ii) identification of the claims encompassing the elected invention, this reply is responsive and complete.

Respectfully submitted,

Date :

2017/7/10

Vinson Lin
Vinson Lin

Registration No. 74,125

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Electronic Acknowledgement Receipt

EFS ID:	29725733
Application Number:	15190695
International Application Number:	
Confirmation Number:	1921
Title of Invention:	SPACER CONNECTOR
First Named Inventor/Applicant Name:	Dyi-Chung HU
Customer Number:	31561
Filer:	Belinda Lee/Tammy Liu
Filer Authorized By:	Belinda Lee
Attorney Docket Number:	70850-US-PA
Receipt Date:	10-JUL-2017
Filing Date:	23-JUN-2016
Time Stamp:	06:40:23
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		70850_Response_RR.pdf	331895	yes	9
			e3c0ffecd04f1e7becff7c0673e2c6908570a bb2		

Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Response to Election / Restriction Filed	1	1	
Claims	2	8	
Applicant Arguments/Remarks Made in an Amendment	9	9	

Warnings:

Information:

Total Files Size (in bytes):	331895
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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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/190,695	Filing Date 06/23/2016	☐ To be Mailed
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 ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	NUMBER FILED	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), (l), 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	(Column 1)	(Column 2)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)	
	07/10/2017	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X \$40 = 0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	X \$210 = 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)	(Column 2)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)	
		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	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.

 SLIE
 HELENA PAYTON

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.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/190,695	06/23/2016	Dyi-Chung HU	70850-US-PA	1921

31561 7590 07/21/2017
JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER

CHEN, XIAOLIANG

ART UNIT	PAPER NUMBER
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2847

NOTIFICATION DATE	DELIVERY MODE
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07/21/2017

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):

USA@JCIPGROUP.COM
Belinda@JCIPGROUP.COM

Office Action Summary	Application No. 15/190,695	Applicant(s) HU, DYI-CHUNG	
	Examiner XIAOLIANG CHEN	Art Unit 2847	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 07-10-17.
☐ 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) 1-10 is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 11 and 15-20 is/are rejected.
- 8) ☒ Claim(s) 12-14 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 06-23-16 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) | 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date ____. | 4) ☐ Other: ____. |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Subgroup III, Claims 11-20, in the reply filed on 07-10-17 is acknowledged.

Amendment

2. Acknowledgement is made of Amendment filed 07-10-17.
3. Claims 1-10 are withdrawn.

Drawings

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the important feature of the spacer connector is free of metal pads (claim 16) with the top package substrate has, on a bottom surface thereof, a plurality of bottom metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector (claim 1), must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure

number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

5. Claim 19 is objected to because of the following informalities:

Claim 19 is depended on claim 15 and stated "the dielectric layer", since therein no limitation of "a dielectric layer" anyway in claim 15 and before, and the only claim with limitation "a dielectric layer" is claim 18; therefore, for examining purpose only read claim 19 as depended on claim 18.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. 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 –

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

7. Claims 11, 15 and 17-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Arai et al. (US20080155820).

Re Claim 11, Arai show and disclose

A structure, comprising:

a bottom package substrate (10, fig. 11);

a top package substrate (30, fig. 11) stacked on top of the bottom package substrate; and

at least one spacer connector (20, fig. 11) interposed between the bottom package substrate and the top package substrate to define a space between the bottom package substrate and the top package substrate (fig. 11), wherein the spacer connector comprises a core substrate (12, fig. 11); a plurality of metal pillars (14 with 16 at the bottom, fig. 11), each passing through the core substrate (fig. 11); and a plurality of top metal pads (top pad 16, fig. 11), each on a top end of a corresponding metal pillar among the plurality of metal pillars (fig. 11); wherein a bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from a bottom surface of the core substrate (fig. 11),

the top package substrate (30, fig. 4) has, on a bottom surface thereof, a plurality of bottom metal pillars (34 with 36 at the bottom, fig. 4) each coupled (through 30a, fig. 4) to a corresponding metal pillar among the plurality of metal pillars of the spacer connector,

the bottom package substrate (10, fig. 11) has, on a top surface thereof, a plurality of top metal pillars (14 with 16 on the top, fig. 11) each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector, and

the top package substrate is electrically coupled to the bottom package substrate through the plurality of bottom metal pillars of the top package substrate, the plurality of metal pillars of the spacer connector, and the plurality of top metal pillars of the bottom package substrate (fig. 11).

Re Claim 15, Arai show and disclose

The structure of claim 11, wherein each bottom metal pillar among the plurality of bottom metal pillars of the top package substrate is aligned with a corresponding metal pillar among the plurality of metal pillars of the spacer connector, and with a corresponding top metal pillar among the plurality of top metal pillars of the bottom package substrate (fig. 11).

Re Claim 17, Arai show and disclose

The structure of claim 15, wherein the bottom ends of the plurality of metal pillars protruding downwardly from the bottom surface of the core substrate of the spacer connector are connected (fig. 11), in an end-to-end manner (fig. 11), to

corresponding top ends of the plurality of top metal pillars of the bottom package substrate (fig. 11), and bottom ends of the plurality of bottom metal pillars of the top package substrate are connected to the corresponding top ends of the plurality of metal pillars of the spacer connector via the corresponding top metal pads of the spacer connector (fig. 11).

Re Claim 18, Arai show and disclose

The structure of claim 15, wherein the spacer connector further comprises a dielectric layer (18, fig. 11) on the bottom surface of the core substrate, and the plurality of metal pillars pass through the core substrate and the dielectric layer (fig. 11).

Re Claim 19, Arai show and disclose

The structure of claim 18, wherein the dielectric layer is a dielectric adhesive (dielectric layer 18 adhered to core 12, fig. 11) into which the core substrate is pasted.

Re Claim 20, Arai show and disclose

The structure of claim 15, wherein the spacer connector further comprises a plurality of bottom metal pads (terminal 20a, fig. 11), each on the bottom end of a corresponding metal pillar among the plurality of metal pillars (fig. 11), the bottom ends of the plurality of metal pillars are connected to corresponding top ends of the plurality of top metal pillars of the bottom package substrate via the corresponding bottom metal pads of the spacer connector (fig. 11), and bottom ends of the plurality of bottom metal pillars of the top package substrate are

connected to the corresponding top ends of the plurality of metal pillars of the spacer connector via the corresponding top metal pads of the spacer (fig. 11).

Claim Rejections - 35 USC § 103

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

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

9. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al.

Re Claim 16, Arai show and disclose

The structure of claim 15, wherein the spacer connector is free of metal pads on the bottom ends of the plurality of metal pillars (14 with 16 on bottom, fig. 11) protruding downwardly from the bottom surface of the core substrate,

Arai disclosed claimed invention except for each metal pillar among the plurality of metal pillars and the corresponding top metal pad of the spacer connector form a T shape, since Arai disclosed the top pad on the pillar (fig. 4 and 11) of an upside-down L shape (one end of the pad placed on the pillar), therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made could arrange middle of the pad on the pillar (then it will be T shapes) in the electronic device of Arai, in order to be able to have variety design choice of the way of a pad placed on a pillar in the electronic

device, since a pillar (metal via) connecting in middle of a pad is well-known and most common in the art, since it has been held that rearranging parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70; and since the particular claimed configuration is just one of numerous configurations a person of ordinary skill in the art would find obvious, and it has been held that the configuration of the shape in claimed invention was a matter of choice. In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Allowable Subject Matter

10. Claims 12-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claim 12 and all claims dependent thereof are allowable because the prior art of record neither anticipates nor renders obvious the limitations of the claim in combination as claimed, including:

further comprising: a bottom chip arranged in the space between the bottom package substrate and the top package substrate, wherein the bottom chip is mounted to the top surface of the bottom package substrate, and the at least one spacer connector comprises two spacer connectors arranged on opposite sides of the bottom chip.

The aforementioned limitations in combination with all remaining limitations of the respective claims are believed to render said claim 12 and all claims dependent thereof patentable over art of record.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US-20020179331 US-20040017672 US-20040173891 US-20040178508 US-20040184219 US-20040227258 US-20050184381 US-20050194672 US-20060055017 US-20060091538 US-20060180938 US-20070057685 US-20070075717 US-20090108425 US-20090145636 US-20100025081 US-20110080713 US-20120119370 US-20120147578 US-20120326334 US-20130001798 US-20130027895 US-20130037964 US-20130147026 US-20140001639 US-20140085850 US-20140117557 US-20140157593 US-20150102485 US-20150115466 US-20150115467 US-20150214207 US-20150255412 US-20160027764 US-20160027712 US-20030160325 US-20070090534 US-20080157326 US-20120193812 US-20120211885 US-20130111123 US-20130320568 US-20140167263 US-20140252561 US-20150061101 US-20150061095 US-20070215380 US-20140092569 US-6366467 US-9202742 US-9376541

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to XIAOLIANG CHEN whose telephone number is (571)272-9079. The examiner can normally be reached on 8:00-5:00 (EST), Monday-Friday.

Art Unit: 2847

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Thompson can be reached on 571-272-2342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

Xiaoliang Chen
Primary Examiner
Art Unit 2847

/XIAOLIANG CHEN/
Primary Examiner, Art Unit 2847

Notice of References Cited	Application/Control No. 15/190,695		Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG	
	Examiner XIAOLIANG CHEN		Art Unit 2847	Page 1 of 4

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

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	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.

Notice of References Cited	Application/Control No. 15/190,695		Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG	
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FOREIGN PATENT DOCUMENTS

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U.S. PATENT DOCUMENTS

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Notice of References Cited	Application/Control No. 15/190,695		Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG	
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<p><i>Index of Claims</i></p> 	Application/Control No. 15190695	Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG
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✓	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	01/28/2017	07/17/2017						
	1	÷	N						
	2	÷	N						
	3	÷	N						
	4	÷	N						
	5	÷	N						
	6	÷	N						
	7	÷	N						
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	9		N						
	10		N						
	11		✓						
	12		O						
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	14		O						
	15		✓						
	16		✓						
	17		✓						
	18		✓						
	19		✓						
	20		✓						

Search Notes 	Application/Control No. 15190695	Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG
	Examiner XIAOLIANG CHEN	Art Unit 2847

CPC- SEARCHED		
Symbol	Date	Examiner
H05K1/02,03,09,11,14,16,18	07-17-17	XC
H05K3/00,30,32,36,40	07-17-17	XC
H01L21/02,48,50,56,60	07-17-17	XC
H01L23/00,02,12,14,28,31,48,52	07-17-17	XC

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
174	262,251,252,255,258,260,261,265	07-17-17	XC
257	675,676,686,741,758,774,777,778,787	07-17-17	XC
361	306.3,752,760,773,783	07-17-17	XC
29	830,841	07-17-17	XC

* 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, Inventor Search	07-17-17	XC

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

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AMENDMENT

To the Claims:

Please amend the claims as following.

1. (withdrawn) A fabricating process for a spacer connector, the spacer connector comprising:

a core substrate;

a plurality of metal pillars, each passing through the core substrate; and

a plurality of top metal pads, each on a top end of a corresponding metal pillar among the plurality metal pillars;

wherein a bottom end of each metal pillar among the plurality metal pillars protruded downwardly from a bottom surface of the core substrate,

the method comprising:

preparing the core substrate;

forming a plurality of through holes passing through the core substrate;

preparing a conductive carrier with a dielectric adhesive layer on a top surface of the conductive carrier;

attaching the core substrate on the top surface of the conductive carrier via the dielectric adhesive;

etching the dielectric adhesive exposed on a bottom of each through hole among the plurality of through holes to expose the top surface of the conductive carrier on the bottom of said each through hole; and

plating to form the plurality of metal pillars, each filled in a corresponding through hole among the plurality of through holes.

2. (withdrawn) The fabricating process as claimed in claim 1, further comprising:

forming the plurality of top metal pads, each on the top end of a corresponding metal pillar among the plurality of metal pillars;

forming a top passivation layer to cover a peripheral area of each top metal pad among the plurality of top metal pads, wherein a central area of said each top metal pad is revealed for electrical contact.

3. (withdrawn) The fabricating process as claimed in claim 2, after said forming the top passivation layer, further comprising:

stripping the conductive carrier;

stripping the dielectric adhesive so that the bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from the bottom surface of the core substrate; and

singulating to yield a plurality of spacer connectors.

4. (withdrawn) The fabricating process as claimed in claim 2, after said forming the top passivation layer, further comprising:

thinning the conductive carrier from bottom;

patterning the thinned conductive carrier into a plurality of bottom metal pads, each on a bottom of a corresponding metal pillar among the plurality of metal pillars;

forming a bottom passivation layer to cover a peripheral area of each bottom metal pad among the plurality of bottom metal pads, wherein a central area of said each bottom metal pad is revealed for electrical contact; and

singulating to yield a plurality of spacer connectors.

5. (withdrawn) The spacer connector as claimed in claim 8, further comprising:

a dielectric layer on the bottom surface of the core substrate,

wherein the plurality of metal pillars pass through the core substrate and the dielectric layer.

6. (withdrawn) The spacer connector as claimed in claim 5, wherein the dielectric layer is a dielectric adhesive into which the core substrate is pasted.

7. (withdrawn) The spacer connector as claimed in claim 5, further comprising:

a plurality of bottom metal pads, each on the bottom end of a corresponding metal pillar among the plurality of metal pillars.

8. (withdrawn) A spacer connector, comprising:

a core substrate;

a plurality of metal pillars, each passing through the core substrate; and

a plurality of top metal pads, each on a top end of a corresponding metal pillar among the plurality of metal pillars;

wherein a bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from a bottom surface of the core substrate.

9. (withdrawn) The spacer connector as claimed in claim 8, wherein the spacer connector is free of metal pads on the bottom ends of the plurality of metal pillars protruding downwardly from the bottom surface of the core substrate.

10. (withdrawn) The spacer connector as claimed in claim 9, wherein each metal pillar among the plurality of metal pillars and the corresponding top

metal pad form a T shape.

11. (currently amended) A structure, comprising:

a bottom package substrate;

a top package substrate stacked on top of the bottom package substrate; [[and]]

at least one spacer connector interposed between the bottom package substrate and the top package substrate to define a space between the bottom package substrate and the top package substrate, wherein

the spacer connector comprises

a core substrate;

a plurality of metal pillars, each passing through the core substrate; and

a plurality of top metal pads, each on a top end of a corresponding metal pillar among the plurality of metal pillars;

wherein a bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from a bottom surface of the core substrate,

the top package substrate has, on a bottom surface thereof, a plurality of bottom metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector,

the bottom package substrate has, on a top surface thereof, a plurality of top metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector, and

the top package substrate is electrically coupled to the bottom package substrate through the plurality of bottom metal pillars of the top package substrate, the plurality of metal pillars of the spacer connector, and the plurality of top metal pillars of the bottom

package substrate; and

a bottom chip arranged in the space between the bottom package substrate and the top package substrate, wherein

the bottom chip is mounted to the top surface of the bottom package substrate, and
the at least one spacer connector comprises two spacer connectors arranged on
opposite sides of the bottom chip.

12. (canceled)

13. (currently amended) The structure of claim ~~[[12]]~~11, wherein
a top surface of the bottom chip is spaced downwardly from the bottom surface of the top package substrate.

14. (previously presented) The structure of claim 13, further comprising:
a top chip mounted to the top surface of the top package substrate,
wherein in a direction in which the top package substrate is stacked on top of the bottom package substrate, the top chip overlaps the bottom chip and each of the two spacer connectors.

15. (previously presented) The structure of claim 11, wherein
each bottom metal pillar among the plurality of bottom metal pillars of the top package substrate is aligned with a corresponding metal pillar among the plurality of metal pillars of the spacer connector, and with a corresponding top metal pillar among the plurality of top metal pillars of the bottom package substrate.

16. (previously presented) The structure of claim 15, wherein
the spacer connector is free of metal pads on the bottom ends of the plurality of metal pillars protruding downwardly from the bottom surface of the core substrate, and

each metal pillar among the plurality of metal pillars and the corresponding top metal pad of the spacer connector form a T shape.

17. (previously presented) The structure of claim 15, wherein

the bottom ends of the plurality of metal pillars protruding downwardly from the bottom surface of the core substrate of the spacer connector are connected, in an end-to-end manner, to corresponding top ends of the plurality of top metal pillars of the bottom package substrate, and

bottom ends of the plurality of bottom metal pillars of the top package substrate are connected to the corresponding top ends of the plurality of metal pillars of the spacer connector via the corresponding top metal pads of the spacer connector.

18. (previously presented) The structure of claim 15, wherein

the spacer connector further comprises a dielectric layer on the bottom surface of the core substrate, and

the plurality of metal pillars pass through the core substrate and the dielectric layer.

19. (currently amended) The structure of claim ~~[[15]]~~18, wherein

the dielectric layer is a dielectric adhesive in which the core substrate is pasted.

20. (previously presented) The structure of claim 15, wherein

the spacer connector further comprises a plurality of bottom metal pads, each on the bottom end of a corresponding metal pillar among the plurality of metal pillars,

the bottom ends of the plurality of metal pillars are connected to corresponding top ends of the plurality of top metal pillars of the bottom package substrate via the corresponding bottom metal pads of the spacer connector, and

bottom ends of the plurality of bottom metal pillars of the top package substrate are

connected to the corresponding top ends of the plurality of metal pillars of the spacer connector via the corresponding top metal pads of the spacer connector.

REMARKS

The Office Action electronically delivered on July 21, 2017 has been received and carefully noted. The amendments made herein and the following remarks are submitted as a full and complete response to the Office Action.

In the Office Action, the drawings are objected to under 37 CFR 1.83(a); claim 19 is objected to because of an informality; claims 11, 15 and 17-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Arai et al. (US 2008/0155820; hereinafter “Arai”); claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arai; and claims 12-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant sincerely expresses gratitude to the Office for the thorough examination and for acknowledging claims 12-14 as allowable. After careful study and consideration of the Office Action and the cited reference, the allowable subject matter recited in claim 12 has been incorporated into independent claim 11. Claim 12 has been canceled and claim 13 has been modified, accordingly. In addition, Applicant has amended claim 19 to be dependent on claim 18 as suggested by the Office on page 3 of the detailed action. Withdrawal of the rejections, in light of the foregoing amendments and present remarks, is respectfully solicited.

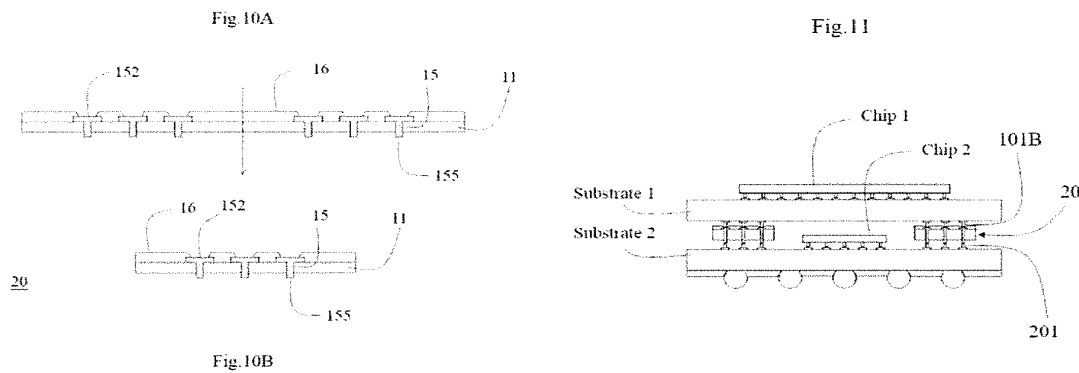
Discussion of Drawing Objection

The drawings are objected to under 37 CFR 1.83(a).

The Office on page 2 of the detailed action stated that “*the important feature of the*

spacer connector is free of metal pads (claim 16) with the top package substrate has, on a bottom surface thereof, a plurality of bottom metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector (claim 1), must be shown or the feature(s) canceled from the claim(s)”.

In responsive, Applicant respectfully submits that the aforementioned features are already shown in the drawings of FIG. 10A, FIG. 10B and FIG. 11 of the application, and thus no modification of the drawings or the claim(s) is required.



Specifically, referring to FIG. 10A, FIG. 10B and FIG. 11 of the application shown above, it is clear that the spacer connector (20) is free of metal pads on the bottom ends (155) of the plurality of metal pillars (15)(claim 16) with the top package substrate (1) has, on a bottom surface thereof, a plurality of bottom metal pillars (101B) each coupled to a corresponding metal pillar (15) among the plurality of metal pillars (15) of the spacer connector (20)(claim 1).

According to the above, it is submitted that all the important feature of claims 1 and 16 that are assumed by the Office as not being shown in the drawings are already illustrated in the drawings of FIG. 10A, FIG. 10B and FIG. 11 of the application. Thus, withdrawal of the drawing objection is earnestly solicited.

Discussion of Claim Objection

Claim 19 is objected to because of an informality.

In response thereto, Applicant has modified the claim dependency of claim 19 from claim 15 to claim 18 according to the suggestion provided by the Office on page 4 of the detailed action, and hereby submits that the amended claim 9 is currently in a proper condition for allowance. Thus, withdrawal of the claim objection on the claim 19 is earnestly requested.

Discussion of Claim Rejections Under 35 U.S.C. Section 102(b) and 103(a)

Claims 11, 15 and 17-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Arai.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arai.

In response thereto, Applicant has amended independent claim 11 to include the **allowable subject matter** of claim 12 to patently define the claimed invention over the cited reference, and hereby respectfully traverses the said rejections on the grounds set forth below.

Specifically, Applicant respectfully submits that the independent claim 11, as currently amended, is allowable for at least the reason that Arai fails to explicitly disclose, teach or suggest the allowable limitation “*a bottom chip arranged in the space between the bottom package substrate and the top package substrate, wherein the bottom chip is mounted to the top surface of the bottom package substrate, and the at least one spacer connector comprises two spacer connectors arranged on opposite sides of the bottom*

chip” as recited in the amended independent claim 11 of the application. (Emphasis added)

Therefore, it is submitted that the amended independent claim 11 stands novel, non-obvious and patentable over the prior art of record, and withdrawal of the 102(b) rejection thereon is most earnestly requested.

Because the independent claim 11 is allowable over the prior art of record, claims 13-20 directly or indirectly depending on the independent claim 1 are also allowable as a matter of law, for at least the reason that these claims contain all features/elements of independent claim 11. *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988).

CONCLUSION

For at least the foregoing reasons, it is submitted that all the pending claims 11 and 13-20 of the present application patently define over the prior art of record and are in proper condition for allowance. An action to such effect is earnestly solicited. If the Office believes that a telephone conference would expedite the examination of the above-identified patent application, the Office is invited to call the undersigned.

Date: 2017/10/11

Respectfully Submitted,

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Electronic Acknowledgement Receipt

EFS ID:	30698239
Application Number:	15190695
International Application Number:	
Confirmation Number:	1921
Title of Invention:	SPACER CONNECTOR
First Named Inventor/Applicant Name:	Dyi-Chung HU
Customer Number:	31561
Filer:	Belinda Lee/Yilin Yen
Filer Authorized By:	Belinda Lee
Attorney Docket Number:	70850-US-PA
Receipt Date:	19-OCT-2017
Filing Date:	23-JUN-2016
Time Stamp:	04:02:28
Application Type:	Utility under 35 USC 111(a)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		70850_Response_OA.pdf	512484	yes	13
			1fa107fcdd36b366dcccdf8e5297b949e1cb2c91		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	8
	Applicant Arguments/Remarks Made in an Amendment	9	13

Warnings:

Information:

Total Files Size (in bytes):	512484
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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.

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 15/190,695	Filing Date 06/23/2016	☐ To be Mailed
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ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO**APPLICATION AS FILED – PART I**

(Column 1)

(Column 2)

FOR	NUMBER FILED	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), (l), 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

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	10/19/2017	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 19	Minus	** 20	= 0	X \$40 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X \$210 =	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	

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	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
CHERYL CLARK

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.



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

NOTICE OF ALLOWANCE AND FEE(S) DUE

31561 7590 11/07/2017
JCIPRNET
P.O. Box 600 Taipei Guting
Taipei City, 10099
TAIWAN

EXAMINER

CHEN, XIAOLIANG

ART UNIT

PAPER NUMBER

2847

DATE MAILED: 11/07/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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15/190,695

06/23/2016

Dyi-Chung HU

70850-US-PA

1921

TITLE OF INVENTION: SPACER CONNECTOR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	02/07/2018

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

31561 7590 11/07/2017
JCIPRNET
P.O. Box 600 Taipei Guting
Taipei City, 10099
TAIWAN

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/190,695	06/23/2016	Dyi-Chung HU	70850-US-PA	1921

TITLE OF INVENTION: SPACER CONNECTOR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	02/07/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
CHEN, XIAOLIANG	2847	174-262000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363). ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached. ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.	2. For printing on the patent front page, list (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____ (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____ 3 _____
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted: ☐ Issue Fee ☐ Publication Fee (No small entity discount permitted) ☐ Advance Order - # of Copies _____	4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above) ☐ A check is enclosed. ☐ Payment by credit card. Form PTO-2038 is attached. ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).
---	---

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____



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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/190,695	06/23/2016	Dyi-Chung HU	70850-US-PA	1921
31561	7590	11/07/2017	EXAMINER	
JCIPRNET			CHEN, XIAOLIANG	
P.O. Box 600 Taipei Guting			ART UNIT	PAPER NUMBER
Taipei City, 10099			2847	
TAIWAN				

DATE MAILED: 11/07/2017

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. 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.

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 disclosure of these records is required by the Freedom of Information Act.
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 inspection 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.

Notice of Allowability	Application No. 15/190,695	Applicant(s) HU, DYI-CHUNG	
	Examiner XIAOLIANG CHEN	Art Unit 2847	AIA (First Inventor to File) Status Yes

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

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 10-19-17.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. ☐ 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.
3. ☒ The allowed claim(s) is/are 11 and 13-20. As a result of the allowed claim(s), 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.
4. ☐ 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)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. ☐ Notice of References Cited (PTO-892) | 5. ☒ Examiner's Amendment/Comment |
| 2. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 6. ☒ Examiner's Statement of Reasons for Allowance |
| 3. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. ☐ Other _____. |
| 4. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

/XIAOLIANG CHEN/
Primary Examiner, Art Unit 2847

DETAILED ACTION

Amendment

1. Acknowledgement is made of Amendment filed 10-19-17.
2. Claims 11, 13 and 19 are amended.
3. Claim 12 is canceled.
4. Claims 1-10 are withdrawn.

Election/Restrictions

5. This application is in condition for allowance except for the presence of claims 1-10 directed to non-elected withdrawn. Accordingly, claims 1-10 been cancelled.

EXAMINER'S AMENDMENT

6. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The reason for the examiner's amendment is to cancel the non-elected without traverse claims 1-10 (see above) for allowing the case.

For Claims 1-10:

1-10. (**Canceled**)

Allowable Subject Matter

7. Claims 11 and 13-20 are allowed.
8. The following is a statement of reasons for the indication of allowable subject matter:

Claims 11 and 13-20 are allowable because the prior art of record neither anticipates nor renders obvious the limitations of the base claim 11 in combination as claimed, including:

wherein the spacer connector comprises a core substrate; a plurality of metal pillars, each passing through the core substrate; and a plurality of top metal pads, each on a top end of a corresponding metal pillar among the plurality of metal pillars; wherein a bottom end of each metal pillar among the plurality of metal pillars protrudes downwardly from a bottom surface of the core substrate, the top package substrate has, on a bottom surface thereof, a plurality of bottom metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector, the bottom package substrate has, on a top surface thereof, a plurality of top metal pillars each coupled to a corresponding metal pillar among the plurality of metal pillars of the spacer connector, and the top package substrate is electrically coupled to the bottom package substrate through the plurality of bottom metal pillars of the top package substrate, the

plurality of metal pillars of the spacer connector, and the plurality of top metal pillars of the bottom package substrate; and a bottom chip arranged in the space between the bottom package substrate and the top package substrate, wherein the bottom chip is mounted to the top surface of the bottom package substrate, and the at least one spacer connector comprises two spacer connectors arranged on opposite sides of the bottom chip.

After carefully review the specification and the claims in the application and art search, considering what is claimed as a whole that the aforementioned limitations are believed to render said claim 11 and all claims dependent thereof patentable over art of record.

9. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to XIAOLIANG CHEN whose telephone number is (571)272-9079. The examiner can normally be reached on 8:00-5:00 (EST), Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Thompson can be reached on 571-272-2342. The fax phone

Art Unit: 2847

number for the organization where this application or proceeding is assigned is 571-273-8300.

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

Xiaoliang Chen
Primary Examiner
Art Unit 2847

/XIAOLIANG CHEN/
Primary Examiner, Art Unit 2847

Search Notes 	Application/Control No. 15190695	Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG
	Examiner XIAOLIANG CHEN	Art Unit 2847

CPC- SEARCHED		
Symbol	Date	Examiner
H05K1/02,03,09,11,14,16,18	07-17-17	XC
H05K3/00,30,32,36,40	07-17-17	XC
H01L21/02,48,50,56,60	07-17-17	XC
H01L23/00,02,12,14,28,31,48,52	07-17-17	XC
Updated above Search	10-27-17	XC

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
174	262,251,252,255,258,260,261,265	07-17-17	XC
257	675,676,686,741,758,774,777,778,787	07-17-17	XC
361	306.3,752,760,773,783	07-17-17	XC
29	830,841	07-17-17	XC
Updated above Search		10-27-17	XC

* 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, Inventor Search	07-17-17	XC
East, Interference Search	10-27-17	XC

INTERFERENCE SEARCH

--	--

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
174	262,251,252,255,258,260,261,265	10-27-17	xc
257	675,676,686,741,758,774,777,778,787	10-27-17	xc
361	306.3,752,760,773,783	10-27-17	xc
29	830,841	10-27-17	xc

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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. 1921

SERIAL NUMBER 15/190,695	FILING or 371(c) DATE 06/23/2016 RULE	CLASS 174	GROUP ART UNIT 2847	ATTORNEY DOCKET NO. 70850-US-PA	
APPLICANTS INVENTORS Dyi-Chung HU, Hsinchu, TAIWAN; ** CONTINUING DATA ***** This appln claims benefit of 62/184,034 06/24/2015 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY ** 07/06/2016					
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and Acknowledged <u>/XIAOLIANG CHEN/</u> Examiner's Signature	☐ Met after Allowance <u> </u> Initials	STATE OR COUNTRY TAIWAN	SHEETS DRAWINGS 14	TOTAL CLAIMS 8	INDEPENDENT CLAIMS 3
ADDRESS JCIPRNET P.O. Box 600 Taipei Guting Taipei City, 10099 TAIWAN			9 /XC/ 10-27-17	1 /XC/ 10-27-17	
TITLE SPACER CONNECTOR					
FILING FEE RECEIVED 730	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		

<i>Index of Claims</i> 	Application/Control No. 15190695	Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG
	Examiner XIAOLIANG CHEN	Art Unit 2847

✓	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	01/28/2017	07/17/2017	10/27/2017															
	1	÷	N	-															
	2	÷	N	-															
	3	÷	N	-															
	4	÷	N	-															
	5	÷	N	-															
	6	÷	N	-															
	7	÷	N	-															
	8	÷	N	-															
	9		N	-															
	10		N	-															
1	11		✓	=															
	12		O	-															
2	13		O	=															
3	14		O	=															
4	15		✓	=															
5	16		✓	=															
6	17		✓	=															
7	18		✓	=															
8	19		✓	=															
9	20		✓	=															

Issue Classification 	Application/Control No. 15190695	Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG	
	Examiner XIAOLIANG CHEN	Art Unit 2847	

CPC						
Symbol					Type	Version
H01L		23	/	49838	F	2013-01-01
H01L		23	/	49827	I	2013-01-01
H01L		21	/	486	I	2013-01-01
H01L		21	/	4846	I	2013-01-01
H01L		25	/	105	A	2013-01-01
H01L		2224	/	16227	A	2013-01-01
H01L		2225	/	1023	A	2013-01-01
H01L		2225	/	107	A	2013-01-01
H01L		2924	/	15313	A	2013-01-01
H01L		2924	/	15331	A	2013-01-01
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			/			
			/			

CPC Combination Sets					
Symbol		Type	Set	Ranking	Version

NONE		Total Claims Allowed:	
(Assistant Examiner)		9	
(Date)			
/XIAOLIANG CHEN/ Primary Examiner.Art Unit 2847	10-27-17	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	14

Issue Classification 	Application/Control No. 15190695	Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG
	Examiner XIAOLIANG CHEN	Art Unit 2847

US ORIGINAL CLASSIFICATION						INTERNATIONAL CLASSIFICATION										
CLASS		SUBCLASS				CLAIMED					NON-CLAIMED					
174		262				H	0	5	K	1 / 11 (2006.01.01)						
CROSS REFERENCE(S)																
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)															
174	251	252	255	258	260											
174	265															
257	675	676	686	741	758											
257	774	777	778	787												
361	306.3	752	763	783												
29	830	841														

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	9	
/XIAOLIANG CHEN/ Primary Examiner.Art Unit 2847	10-27-17	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	14

Issue Classification 	Application/Control No. 15190695	Applicant(s)/Patent Under Reexamination HU, DYI-CHUNG
	Examiner XIAOLIANG CHEN	Art Unit 2847

☐ Claims renumbered in the same order as presented by applicant															
☐ CPA															
☐ T.D.															
☐ R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1	6	17												
	2	7	18												
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	12														
2	13														
3	14														
4	15														
5	16														

NONE	Total Claims Allowed:	
(Assistant Examiner)	9	
(Date)		
/XIAOLIANG CHEN/ Primary Examiner.Art Unit 2847	10-27-17	O.G. Print Claim(s) 1
(Primary Examiner)	(Date)	O.G. Print Figure 14

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
15190695	23-Jun-2016	Dyi-Chung HU	70850-US-PA	1921

TITLE OF INVENTION :

SPACER CONNECTOR

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Small	Utility under 35 USC 111(a)	2847	262000	XIAOLIANG CHEN
Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
\$480	\$0	\$480	07-Feb-2018	\$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
31561 JCIPRNET P.O. Box 600 Taipei Guting Taipei City 10099 TAIWAN 8775045885,EXT 1 Belinda@JCIPGROUP.COM	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☐ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status**Change in Entity Status**

Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.

Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
☐ If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

☒ Applicant asserting small entity status. See 37 CFR 1.27.

Note: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status.

Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

Document Description: Issue Fee Payment (PTO-85B)

3.The Following Fee(s) Are Submitted:

☒ Issue Fee

☐ I authorize USPTO to apply my previously paid issue fee to the current fees due

☐ Publication Fee

☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____

☐ Advance Order - # of copies _____

☒ If in **addition** to the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number 502620.
The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

1. JCIPRNET

2.

3.

5.Assignee Name(s) and Residence Data To Be Printed

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

Name	City	State	Country	Category

6.Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/Belinda Lee/	Date	11-20-2017
Name	Belinda Lee	Registration Number	46863

Electronic Patent Application Fee Transmittal

Application Number:	15190695			
Filing Date:	23-Jun-2016			
Title of Invention:	SPACER CONNECTOR			
First Named Inventor/Applicant Name:	Dyi-Chung HU			
Filer:	Belinda Lee			
Attorney Docket Number:	70850-US-PA			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPL ISSUE FEE	2501	1	480	480
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				480

Electronic Acknowledgement Receipt

EFS ID:	30992741
Application Number:	15190695
International Application Number:	
Confirmation Number:	1921
Title of Invention:	SPACER CONNECTOR
First Named Inventor/Applicant Name:	Dyi-Chung HU
Customer Number:	31561
Filer:	Belinda Lee
Filer Authorized By:	
Attorney Docket Number:	70850-US-PA
Receipt Date:	27-NOV-2017
Filing Date:	23-JUN-2016
Time Stamp:	03:16:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 480
RAM confirmation Number	112717INTEFSW00002746502620
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Web85b.pdf	45415	no	2
			91243e3e919a8280717e6004b170ee3ff40e0185		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	31854	no	2
			cfed042f6429e46ec9f7747f0c1e7f95e9ab0174		
Warnings:					
Information:					
Total Files Size (in bytes):			77269		
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>					



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/190,695	01/02/2018	9859202	70850-US-PA	1921

31561 7590 12/13/2017
JCIPRNET
P.O. Box 600 Taipei Guting
Taipei City, 10099
TAIWAN

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Dyi-Chung HU, Hsinchu, TAIWAN;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

Assignment ID: PATI982546

SUBMISSION TYPE:	NEW ASSIGNMENT	
NATURE OF CONVEYANCE:	ASSIGNMENT	
CONVEYING PARTY DATA		
	Name	Execution Date
	Dr. Dyi-Chung Hu	03/14/2025
RECEIVING PARTY DATA		
Company Name:	Topwire LLC	
Street Address:	2908 Rosedale Ave	
City:	Dallas	
State/Country:	TEXAS	
Postal Code:	75205-1533	
PROPERTY NUMBERS Total: 2		
Property Type	Number	
Patent Number:	9737215	
Patent Number:	9859202	
CORRESPONDENCE DATA		
Fax Number:	8882315775	
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>		
Phone:	2148658000	
Email:	rkatz@katzfirm.com	
Correspondent Name:	Robert D Katz	
Address Line 1:	8350 N. Central Expressway	
Address Line 2:	Suite 1900	
Address Line 4:	Dallas, TEXAS 75206	
ATTORNEY DOCKET NUMBER:	Topwire 2025	
NAME OF SUBMITTER:	Robert Katz	
SIGNATURE:	/Robert Katz/	
DATE SIGNED:	04/27/2025	
	This document serves as an Oath/Declaration (37 CFR 1.63).	
Total Attachments: 3		
source=Topwire - Executed Assignment#page1.tiff		
source=Topwire - Executed Assignment#page2.tiff		
source=Topwire - Executed Assignment#page3.tiff		

PATENT ASSIGNMENT AGREEMENT

THIS PATENT ASSIGNMENT AGREEMENT (the "Agreement"), is made and entered into this 14th day of March, 2025 (the "Effective Date"), by and between Dyi-Chung Hu ("Seller") and Topwire LLC ("Buyer"), (each a "Party" and collectively the "Parties")

WHEREAS, Assignor is the owner of all rights, title and interest in and to the invention (the "Invention") described as follows (the "Patents"): U.S. Patent Numbers 9,737,215 and 9,859,202 and including without limitation, all extensions, continuations, provisional, derivatives and related applications thereof to the extent any exist;

WHEREAS, Assignor and Assignee have agreed by a Patent Purchase Agreement (the "Purchase Agreement") dated March 14, 2025, by and between Assignor and Assignee, the terms of which are incorporated herein by reference, that Assignor shall sell, transfer, assign and set over unto Assignee and Assignee shall accept all rights, title and interest in and to the Patent as specified in this Agreement;

NOW, THEREFORE, in consideration of the mutual covenants and agreements of the Parties and pursuant to the Purchase Agreement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, it is hereby agreed as follows:

1. Assignor hereby sells, transfers, assigns and sets over to Assignee all rights, title and interest (for all countries) in and to the Patent, and all the rights and privileges under any letters patent that may be granted under any continuations, divisions, reissues, reexaminations, renewals and extensions therefor and thereon and all continuations, divisions) reissues, reexaminations, renewals and extensions thereof; and all applications for industrial property protection, including without limitation, all applications for patents, utility models, copyright, and designs which may hereafter be filed for said Invention and Patent in any country or countries, together with the right to file such applications and the right to claim for the same the priority rights derived from the Patent under the patent laws of the United States, the International Convention for the Protection of Industrial Property, or any other international agreement or the domestic laws of the country in which any such application is filed, as may be applicable; and all applications for industrial property protection, including, without limitation, all applications for patents, utility models, copyrights and designs which may hereafter be filed for said Invention or Patent in any country or countries, together with the right to file such applications; and all forms of industrial property protection, including, without limitation, patents, utility models, inventors' certificates, copyrights and designs which may be granted for said Patent in any country or countries and all extensions, renewals and reissues thereof; including all moral rights and all rights relating to the past, present and future including the benefit of any attorney client privilege or attorney work product privilege, all income, royalties, damages, rights to enforce, rights to sue, and any and all payments now or hereafter due or payable with respect thereto, and the right to bring any claim, sue, counterclaim, and recover for the past, present and future infringement, the right to sue for and recover all profits and damages by reason of past infringement by any party or parties for Assignee's and Assignee's successors' and assigns' own use and benefit. All rights to royalty

income, including past, present, and future royalties, are also hereby conveyed by this instrument.

2. Assignor appoints Assignee, and Assignee's successors and assigns, as its attorney-in-fact to act in Assignor's name and to execute, deliver, and record any document or instrument of assignment or conveyance necessary to perfect, grant, and confirm the rights granted herein. Assignor hereby authorizes and requests the Commissioner of Patents and Trademarks of the United States and any official of any country or countries foreign to the United States, whose duty is to issue patents or other evidence or forms of industrial property on applications as aforesaid, to issue the same to Assignee, its successors, assigns and legal representatives, or to such nominees as it may designate.

3. Assignor agrees that, whenever reasonably requested by Assignee and at Assignee's expense, Assignor will execute all papers, take all rightful oaths, and do all acts which may be reasonably necessary for securing and maintaining patents for the Invention in any country and for vesting title thereto in Assignee, its successors, assigns and legal representatives or nominees.

4. Assignor authorizes and empowers Assignee, its successors, assigns and legal representatives or nominees, to invoke and claim for any application for patent or other form of protection for the Invention, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it, or any other international agreement or the domestic laws of the country in which any such application is filed, as may be applicable, and to invoke and claim such right of priority without further written or oral authorization from Assignor.

5. Assignor hereby consents that a copy of this Agreement shall be deemed a full legal and formal equivalent of any assignment, consent to file or like document that may be required in any country for any purpose and more particularly in proof of the right of Assignee or nominee to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it.

6. All of the rights, title and interest in and to the Patents sold, transferred, assigned and set over to Assignee hereunder include all income, royalties, damages, and payments now or hereafter due or payable with respect thereto, and all causes of action (whether in law or equity) and the right to sue, counterclaim, and recover for the past, present and future infringement of the rights assigned or to be assigned hereunder.

Agreed to:

Dyi-Chung Hu

Dyi-Chung Hu

Date: 3/14/2025

Agreed to:

Topwire LLC

By: 

Name: Robert Katz

Title: Member

Date: March 14, 2025