

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Lung-En Kuo
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	NAUP1630USA1

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code	Issue Date	Name	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	6043138		2000-03-28	Ibok; Effiong E.	all
	2	6492216		2002-12-10	Yeo; Yee-Chia	all
	3	6921963		2005-07-26	Krivokapic; Zoran	all
	4	7087477		2006-08-08	Fried; David M.	all
	5	7091551		2006-08-15	Anderson; Brent A.	all
	6	7247887		2007-07-24	King; Tsu-Jae	all
	7	7250658		2007-07-31	Doris; Bruce B.	all
	8	7309626		2007-12-18	leong; Mei-Kei	all

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
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Application Number	
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First Named Inventor	Lung-En Kuo
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Attorney Docket Number	NAUP1630USA1

	9	7352034		2008-04-01	Booth, Jr.; Roger Allen	all
	10	7470570		2008-12-30	Beintner; Jochen	all
	11	7531437		2009-05-12	Brask; Justin K.	all
	12	7569857		2009-08-04	Simon, legal representative; David	all

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code	Publication Date	Name	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20140035066	A1	2014-02-06	Tsai	
	2	20040195624		2004-10-07	Liu, Chee-Wee;	all
	3	20050051825		2005-03-10	Fujiwara, Makoto;	all
	4	20060099830		2006-05-11	Walther; Steven R.;	all
	5	20060286729		2006-12-21	Kavalieros; Jack;	all

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
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First Named Inventor	Lung-En Kuo
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Attorney Docket Number	NAUP1630USA1

6	20070108528		2007-05-17	Anderson; Brent A.;	all
7	20070158756		2007-07-12	Dreeskornfeld; Lars;	all
8	20080157208		2008-07-03	Fischer; Kevin J.;	all
9	20090124097		2009-05-14	Cheng; Kangguo;	all
10	20090242964		2009-10-01	Akil; Nader;	all
11	20090269916		2009-10-29	KANG; Inkuk;	all
12	20100048027		2010-02-25	Cheng; Kangguo;	all
13	20100072553		2010-03-25	XU; Jeff J.;	all
14	20100144121		2010-06-10	Chang; Cheng-Hung;	all
15	20100167506		2010-07-01	LIN; Simon Su-Horng;	all
FOREIGN PATENT DOCUMENTS					

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	Attorney Docket Number	NAUP1630USA1

Examiner Initial*	Cite No	Foreign Document Number	Country Code	Kind Code	Publication Date	Name	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1						

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.
	1	

EXAMINER SIGNATURE

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

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

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
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Attorney Docket Number	NAUP1630USA1

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

None

SIGNATURE

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

Signature	/Scott Margo/	Date (YYYY-MM-DD)	2014-08-27
Name/Print	Scott Margo	Registration Number	56277

COMBINE DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) AND ASSIGNMENT

Title of Invention:

NON-PLANAR TRANSISTOR AND METHOD OF FORMING FIN STRUCTURE

As the below named inventor, I hereby declare that:
This declaration is directed to:

- The attached application, or
- United States application number _____ filed on _____, or
- PCT international application number _____ filed on _____

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 five (5) years, or both.

In consideration of the payment by **UNITED MICROELECTRONICS CORP.** having a postal address of _____

No.3, Li-Hsin Road 2, Science-Based Industrial Park, Hsin-Chu City 300, Taiwan, R.O.C.

(referred to as "ASSIGNEE" below) to I of the sum of One Dollar (\$ 1.00), the receipt of which is hereby acknowledged, and for other good and valuable consideration.

I hereby sell, assign and transfer to ASSIGNEE and the successors and assignees of the ASSIGNEE the entire right, title and interest in and to any and all improvements which are disclosed in the invention as above-identified application and, in and to, all Letters Patent to be obtained for said invention by the above application or any continuations, continuation-in-part, divisions, renewals, substitutes, or extensions thereof, and as to Letters Patent any reissue or re-examination thereof.

I hereby covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this assignment;

I further covenant that ASSIGNEE will, upon its request, be provided promptly with all pertinent facts and documents relating to said invention and said Letters Patent and legal equivalents as may be known and accessible to I and will testify as to the same in any interference, litigation proceeding related thereto and will promptly execute and deliver to ASSIGNEE or its legal

representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue and enforce said application, said invention and said Letters Patent and said equivalents thereof which may be necessary or desirable to carry out the proposes thereof.
IN WITNESS WHEREOF, I have hereunto set hand and seal this MAR 26 2013 (Date of signing)

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use this form for each additional inventor.

Docket No NAUP1630USA

LEGAL NAME OF INVENTOR(ASSIGNOR)

Inventor: **Lung-En Kuo**

Date: 2013/03/26

Signature: Lung-En Kuo

NPO#NAU-P1630-USA:0
CUST#UMCD-2012-0502

Page 2 of 8

F#NPO-P0002E-US1201
DSC0-102U001627

COMBINE DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) AND ASSIGNMENT

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Docket No NAUP1630USA

LEGAL NAME OF INVENTOR(ASSIGNOR)

Inventor: **Po-Wen Su**

Date: 2013/03/26

Signature: Po-Wen Su

NPO#NAU-P1630-USA:0
CUST#UMCD-2012-0502

Page 4 of 8

F#NPO-P0002E-US1201
DSC0-102U001627

COMBINE DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) AND ASSIGNMENT

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IN WITNESS WHEREOF, I have hereunto set hand and seal this MAR 26 2013 (Date of signing)

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use this form for each additional inventor.

Docket No NAUP1630USA

LEGAL NAME OF INVENTOR(ASSIGNOR)

Inventor: **Chen-Yi Weng**

Date: 2013/03/26

Signature: Chen-Yi Weng.

COMBINE DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) AND ASSIGNMENT

Title of Invention:

NON-PLANAR TRANSISTOR AND METHOD OF FORMING FIN STRUCTURE

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- United States application number _____ filed on _____, or
- PCT international application number _____ filed on _____

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representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue and enforce said application, said invention and said Letters Patent and said equivalents thereof which may be necessary or desirable to carry out the purposes thereof.

IN WITNESS WHEREOF, I have hereunto set hand and seal this APR 08 2013 (Date of signing)

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use this form for each additional inventor.

Docket No NAUP1630USA

LEGAL NAME OF INVENTOR(ASSIGNOR)

Inventor: **Hsuan-Hsu Chen**

Date: **APR 08 2013**

Signature: Hsuan-Hsu Chen

NPO#NAU-P1630-USA:0
CUST#UMCD-2012-0502

Page 8 of 8

F#NPO-P0002E-US1201
DSC0-102U001627

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.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

Practitioners associated with Customer Number:

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

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 assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

The address associated with Customer Number:

OR

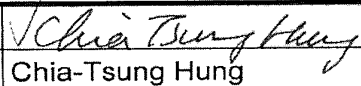
<input type="checkbox"/>	Firm or Individual Name		
	Address		
	City		
	Country		
	Telephone		Email

Assignee Name and Address:
UNITED MICROELECTRONICS CORP.
 No.3, Li-Hsin Road 2, Science-Based Industrial Park, Hsin-Chu City, Taiwan, R.O.C.

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/SB/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	SEP 26 2012
Name	Chia-Tsung Hung	Telephone	+886-3-5782258
Title	CHAIRMAN		

This collection of information is required by 37 CFR 1.31, 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.

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.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: UNITED MICROELECTRONICS CORP.

Application No./Patent No.: _____ Filed/Issue Date: _____

Titled: NON-PLANAR TRANSISTOR

UNITED MICROELECTRONICS CORP., a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

- 1. The assignee of the entire right, title, and interest.
- 2. An assignee of less than the entire right, title, and interest (check applicable box):
 - The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest **must be submitted** to account for 100% of the ownership interest.
 - There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Empty rectangular box for listing other parties with unspecified ownership percentages.

Additional Statement(s) by the owner(s) holding the balance of the interest **must be submitted** to account for the entire right, title, and interest.

- 3. The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Empty rectangular box for listing other parties in an undivided interest assignment.

Additional Statement(s) by the owner(s) holding the balance of the interest **must be submitted** to account for the entire right, title, and interest.

- 4. The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). 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 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.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Scott Margo/

08/27/2014

Signature

Date

Scott Margo

56277

Printed or Typed Name

Title or Registration Number

**COMBINE DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION
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In consideration of the payment by **UNITED MICROELECTRONICS** having a postal address of **CORP.**

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Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use this form for each additional inventor.

Docket No NAUP1630USA

LEGAL NAME OF INVENTOR(ASSIGNOR)

Inventor: **Lung-En Kuo**

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I hereby sell, assign and transfer to ASSIGNEE and the successors and assignees of the ASSIGNEE the entire right, title and interest in and to any and all improvements which are disclosed in the invention as above-identified application and, in and to, all Letters Patent to be obtained for said invention by the above application or any continuations, continuation-in-part, divisions, renewals, substitutes, or extensions thereof, and as to Letters Patent any reissue or re-examination thereof.

I hereby covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this assignment;

I further covenant that ASSIGNEE will, upon its request, be provided promptly with all pertinent facts and documents relating to said invention and said Letters Patent and legal equivalents as may be known and accessible to I and will testify as to the same in any interference, litigation proceeding related thereto and will promptly execute and deliver to ASSIGNEE or its legal

representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue and enforce said application, said invention and said Letters Patent and said equivalents thereof which may be necessary or desirable to carry out the purposes thereof.

IN WITNESS WHEREOF, I have hereunto set hand and seal this MAR 26 2013 (Date of signing)

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use this form for each additional inventor.

Docket No NAUP1630USA

LEGAL NAME OF INVENTOR(ASSIGNOR)

Inventor: **Po-Wen Su**

Date: 2013/03/26

Signature: Po-Wen Su

NPO#NAU-P1630-USA:0
CUST#UMCD-2012-0502

Page 4 of 8

F#NPO-P0002E-US1201
DSC0-102U001627

COMBINE DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) AND ASSIGNMENT

**Title of Invention:
NON-PLANAR TRANSISTOR AND METHOD OF FORMING FIN STRUCTURE**

As the below named inventor, I hereby declare that:
This declaration is directed to:

- The attached application, or
- United States application number _____ filed on _____, or
- PCT international application number _____ filed on _____

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 five (5) years, or both.

In consideration of the payment by **UNITED MICROELECTRONICS CORP.** having a postal address of _____

No.3, Li-Hsin Road 2, Science-Based Industrial Park, Hsin-Chu City 300, Taiwan, R.O.C.

(referred to as "ASSIGNEE" below) to I of the sum of One Dollar (\$ 1.00), the receipt of which is hereby acknowledged, and for other good and valuable consideration.

I hereby sell, assign and transfer to ASSIGNEE and the successors and assignees of the ASSIGNEE the entire right, title and interest in and to any and all improvements which are disclosed in the invention as above-identified application and, in and to, all Letters Patent to be obtained for said invention by the above application or any continuations, continuation-in-part, divisions, renewals, substitutes, or extensions thereof, and as to Letters Patent any reissue or re-examination thereof.

I hereby covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this assignment;

I further covenant that ASSIGNEE will, upon its request, be provided promptly with all pertinent facts and documents relating to said invention and said Letters Patent and legal equivalents as may be known and accessible to I and will testify as to the same in any interference, litigation proceeding related thereto and will promptly execute and deliver to ASSIGNEE or its legal

representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue and enforce said application, said invention and said Letters Patent and said equivalents thereof which may be necessary or desirable to carry out the proposes thereof.

IN WITNESS WHEREOF, I have hereunto set hand and seal this MAR 26 2013 (Date of signing)

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use this form for each additional inventor.

Docket No NAUP1630USA

LEGAL NAME OF INVENTOR(ASSIGNOR)

Inventor: **Chen-Yi Weng**

Date: 2013/03/26

Signature: Chen-Yi Weng.

COMBINE DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) AND ASSIGNMENT

Title of Invention:

NON-PLANAR TRANSISTOR AND METHOD OF FORMING FIN STRUCTURE

As the below named inventor, I hereby declare that:
This declaration is directed to:

- The attached application, or
- United States application number _____ filed on _____, or
- PCT international application number _____ filed on _____

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 five (5) years, or both.

In consideration of the payment by **UNITED MICROELECTRONICS** having a postal address of **CORP.**

No.3, Li-Hsin Road 2, Science-Based Industrial Park, Hsin-Chu City 300, Taiwan, R.O.C.

(referred to as "ASSIGNEE" below) to I of the sum of One Dollar (\$ 1.00), the receipt of which is hereby acknowledged, and for other good and valuable consideration.

I hereby sell, assign and transfer to ASSIGNEE and the successors and assignees of the ASSIGNEE the entire right, title and interest in and to any and all improvements which are disclosed in the invention as above-identified application and, in and to, all Letters Patent to be obtained for said invention by the above application or any continuations, continuation-in-part, divisions, renewals, substitutes, or extensions thereof, and as to Letters Patent any reissue or re-examination thereof.

I hereby covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this assignment;

I further covenant that ASSIGNEE will, upon its request, be provided promptly with all pertinent facts and documents relating to said invention and said Letters Patent and legal equivalents as may be known and accessible to I and will testify as to the same in any interference, litigation proceeding related thereto and will promptly execute and deliver to ASSIGNEE or its legal

representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue and enforce said application, said invention and said Letters Patent and said equivalents thereof which may be necessary or desirable to carry out the purposes thereof.
IN WITNESS WHEREOF, I have hereunto set hand and seal this APR 08 2013 (Date of signing)

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use this form for each additional inventor.

Docket No NAUP1630USA

LEGAL NAME OF INVENTOR(ASSIGNOR)

Inventor: **Hsuan-Hsu Chen**

Date: **APR 08 2013**

Signature: Hsuan-Hsu Chen

NPO#NAU-P1630-USA:0
CUST#UMCD-2012-0502

Page 8 of 8

F#NPO-P0002E-US1201
DSC0-102U001627

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	NAUP1630USA1
		Application Number	
Title of Invention	NON-PLANAR TRANSISTOR		
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. 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.			

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.)

Inventor Information:

Inventor 1					<input type="button" value="Remove"/>
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Lung-En		Kuo		
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Tainan City	Country of Residence i	TW		
Mailing Address of Inventor:					
Address 1	No.22, Ln. 123, Dongqiao 2nd St., Yongkang Dist.				
Address 2					
City	Tainan City	State/Province			
Postal Code		Country i	TW		
Inventor 2					<input type="button" value="Remove"/>
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Po-Wen		Su		
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Kaohsiung City	Country of Residence i	TW		
Mailing Address of Inventor:					
Address 1	No.31, Ln. 12, N. 1st Rd., Yanchao Dist.				
Address 2					
City	Kaohsiung City	State/Province			
Postal Code		Country i	TW		
Inventor 3					<input type="button" value="Remove"/>
Legal Name					

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	NAUP1630USA1
		Application Number	
Title of Invention	NON-PLANAR TRANSISTOR		

Prefix	Given Name	Middle Name	Family Name	Suffix
	Chen-Yi		Weng	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				

City	New Taipei City	Country of Residence i	TW
-------------	-----------------	-------------------------------	----

Mailing Address of Inventor:

Address 1	No.8, Ln. 27, Wan'an St., Banqiao Dist.		
Address 2			
City	New Taipei City	State/Province	
Postal Code		Country i	TW

Inventor 4

Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Hsuan-Hsu		Chen	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				

City	Tainan City	Country of Residence i	TW
-------------	-------------	-------------------------------	----

Mailing Address of Inventor:

Address 1	No.2, Ln. 276, Yuzhong Rd., East Dist.		
Address 2			
City	Tainan City	State/Province	
Postal Code		Country i	TW

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.

Add

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	27765
Email Address	scottmargo@naipo.com

Add Email

Remove Email

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	NAUP1630USA1
		Application Number	
Title of Invention	NON-PLANAR TRANSISTOR		

Application Information:

Title of the Invention	NON-PLANAR TRANSISTOR		
Attorney Docket Number	NAUP1630USA1	Small Entity Status Claimed	<input type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	7	Suggested Figure for Publication (if any)	

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:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	27765		

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	NAUP1630USA1
		Application Number	
Title of Invention	NON-PLANAR TRANSISTOR		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this 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 blank.

Prior Application Status	Pending	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Division of	13863393	2013-04-16
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			<input type="button" value="Add"/>

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(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) ⁱthe information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(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).

<input type="button" value="Remove"/>			
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.			<input type="button" value="Add"/>

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.

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	NAUP1630USA1
		Application Number	
Title of Invention	NON-PLANAR TRANSISTOR		

Authorization to Permit Access:

<input checked="" type="checkbox"/> Authorization to Permit Access to the Instant Application by the Participating Offices
<p>If 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 World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.</p> <p>In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.</p> <p>In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.</p>

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		<input type="button" value="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>		
		<input type="button" value="Clear"/>
<input checked="" type="radio"/> Assignee	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Joint Inventor
<input type="radio"/> Person to whom the inventor is obligated to assign.	<input type="radio"/> Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
Name of the Deceased or Legally Incapacitated Inventor : <input type="text"/>		
If the Applicant is an Organization check here. <input checked="" type="checkbox"/>		
Organization Name	UNITED MICROELECTRONICS CORP.	

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	NAUP1630USA1
		Application Number	
Title of Invention	NON-PLANAR TRANSISTOR		

Mailing Address Information:			
Address 1	No.3, Li-Hsin Road 2,		
Address 2	Science-Based Industrial Park		
City	Hsin-Chu City	State/Province	
Country ⁱ	TW	Postal Code	
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			<input type="button" value="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.				
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.				<input type="checkbox"/>
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country ⁱ		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.				<input type="button" value="Add"/>

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	NAUP1630USA1
		Application Number	
Title of Invention	NON-PLANAR TRANSISTOR		

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications					
Signature	/Scott Margo/			Date (YYYY-MM-DD)	2014-08-27
First Name	Scott	Last Name	Margo	Registration Number	56277
Additional Signature may be generated within this form by selecting the Add button.					<input type="button" value="Add"/>

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.

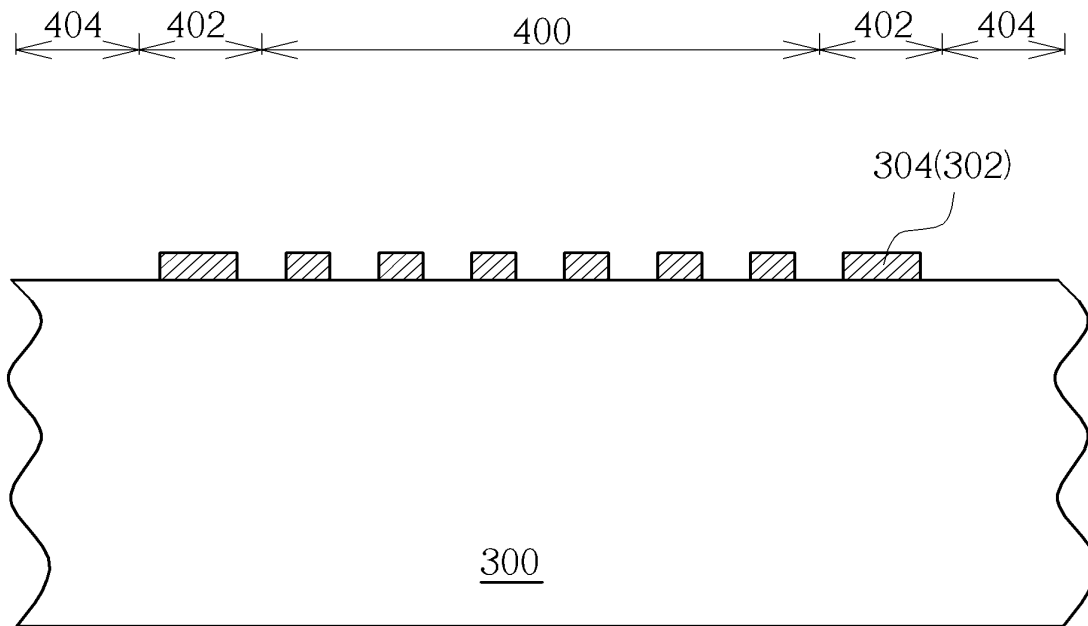


FIG. 1

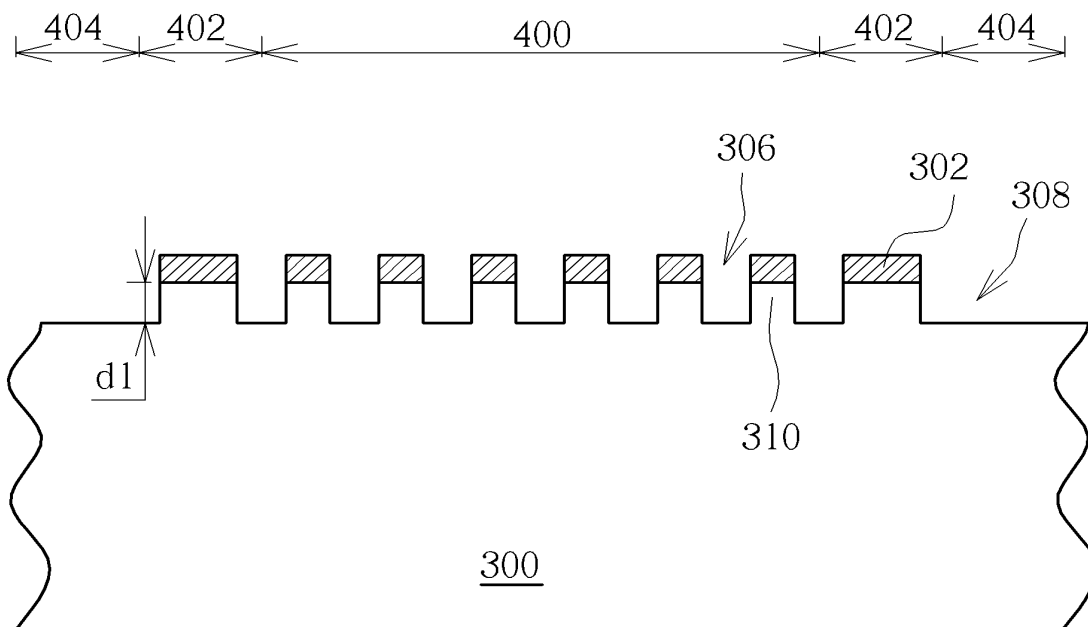


FIG. 2

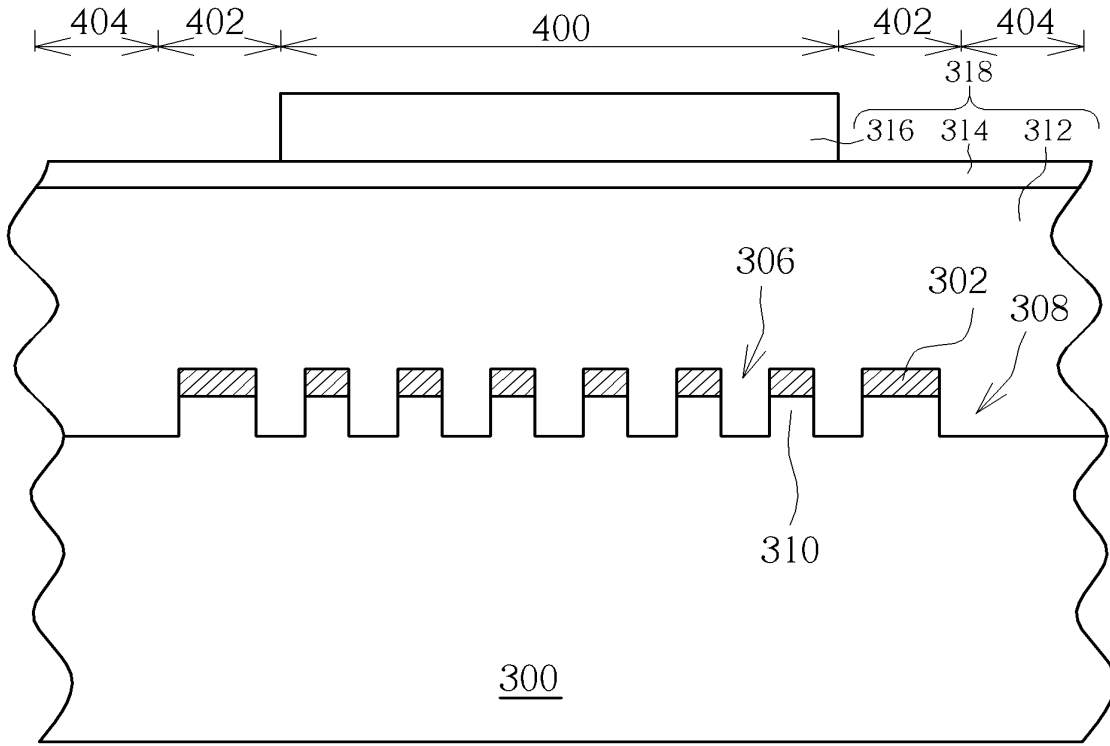


FIG. 3

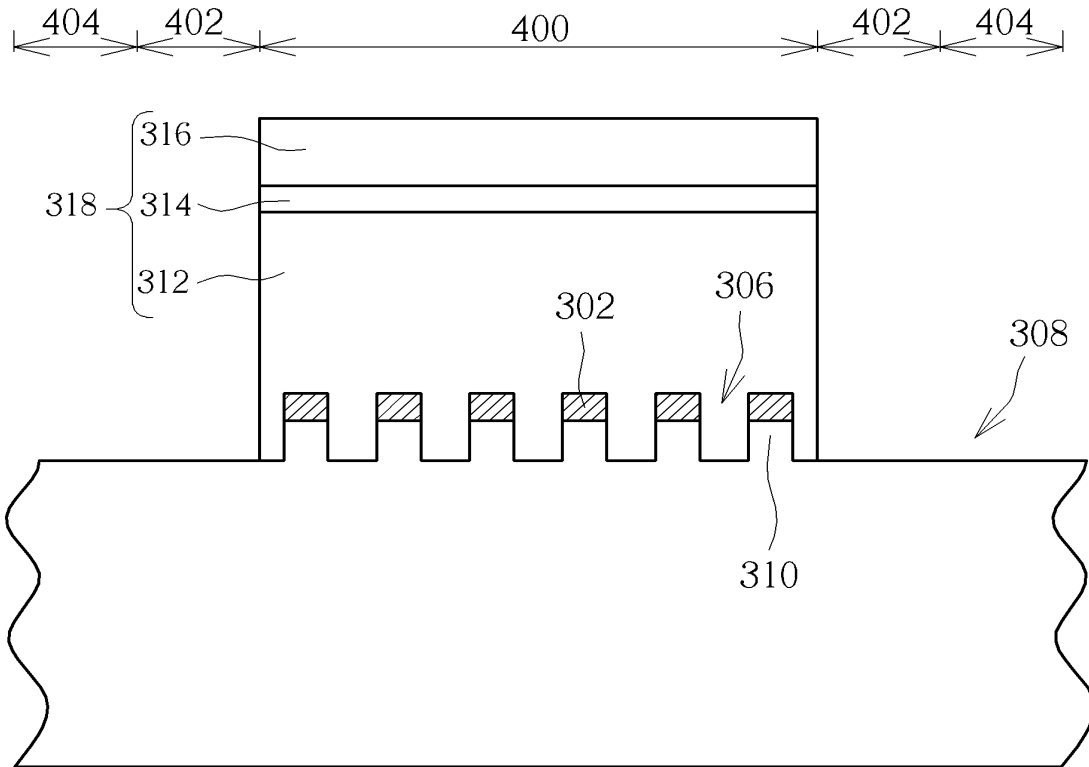


FIG. 4

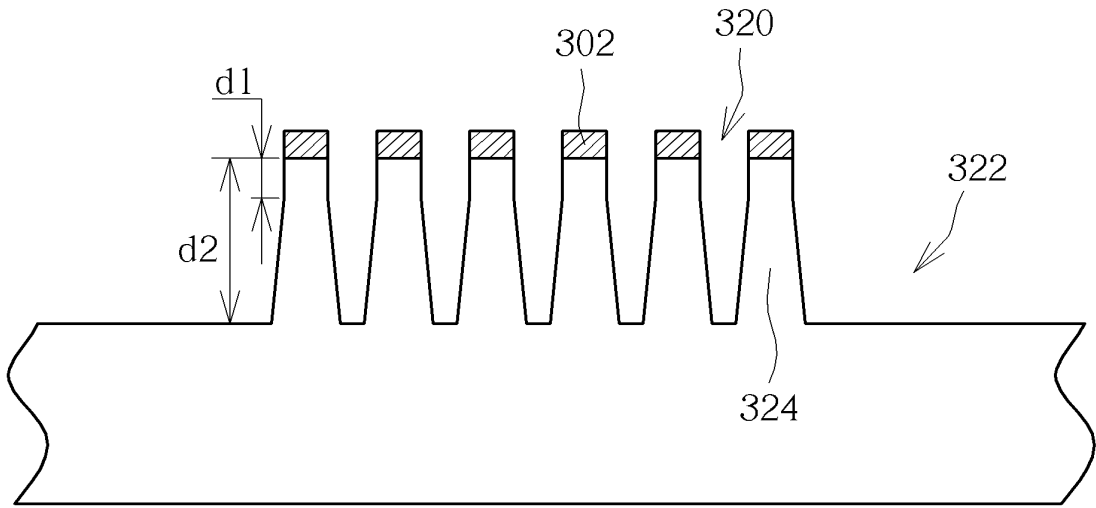
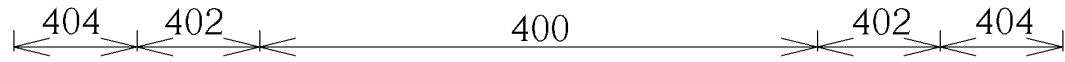


FIG. 5

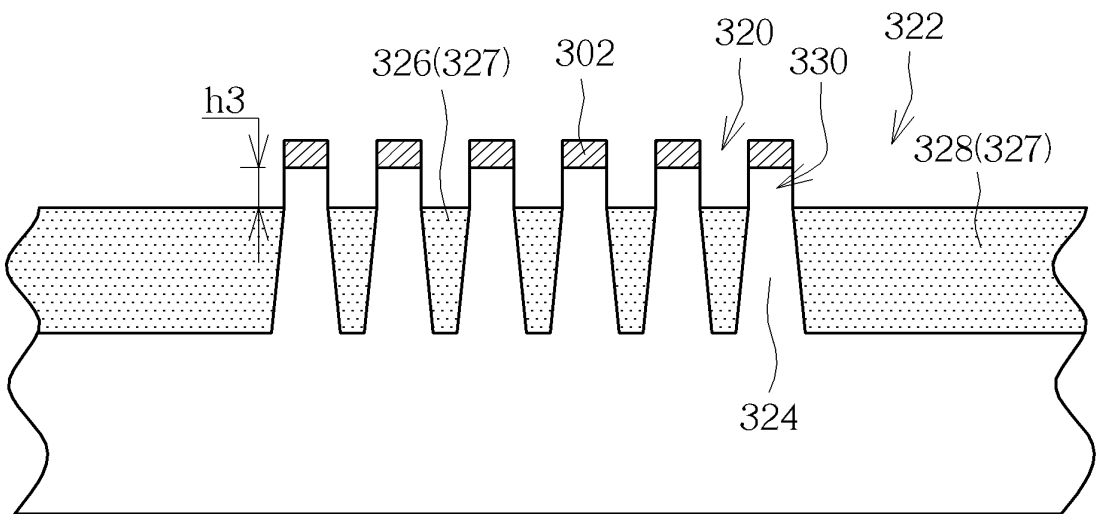
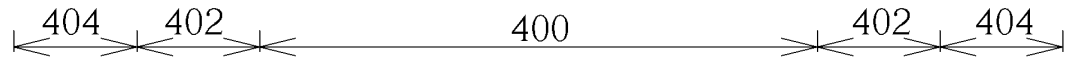


FIG. 6

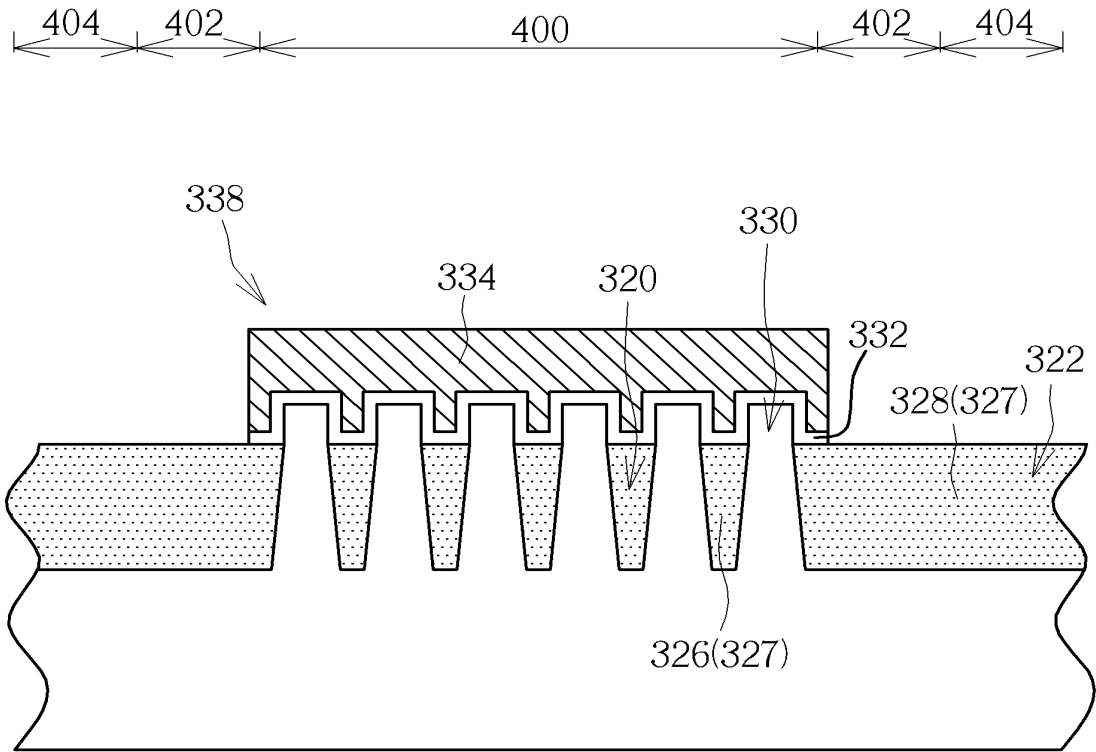


FIG. 7

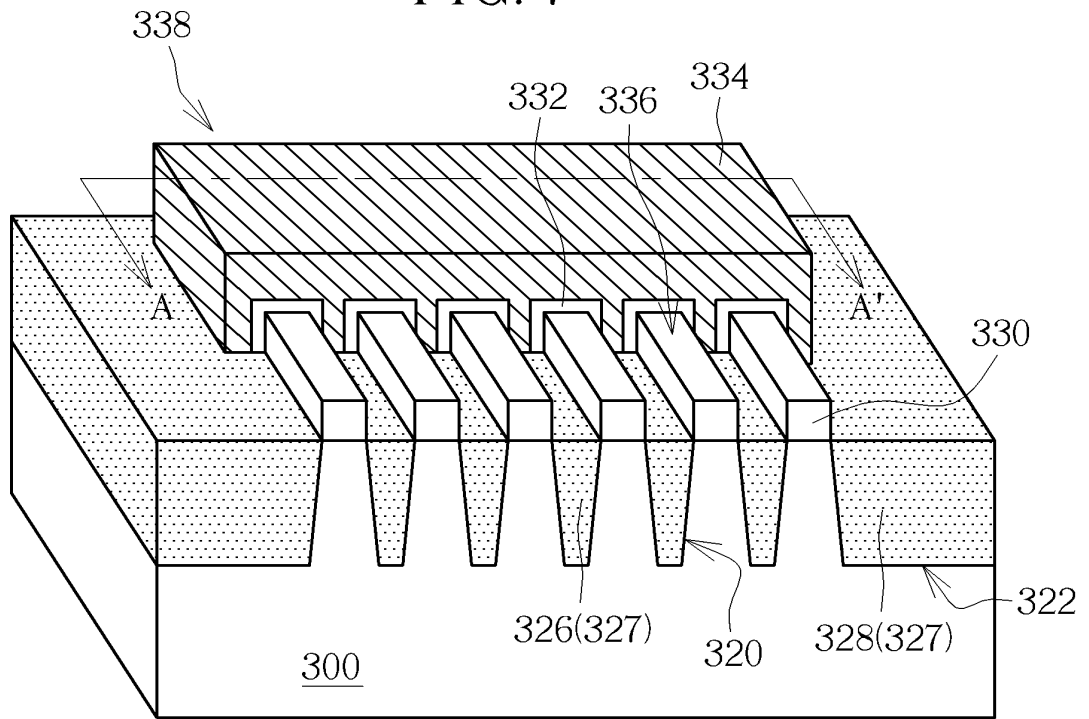


FIG. 8

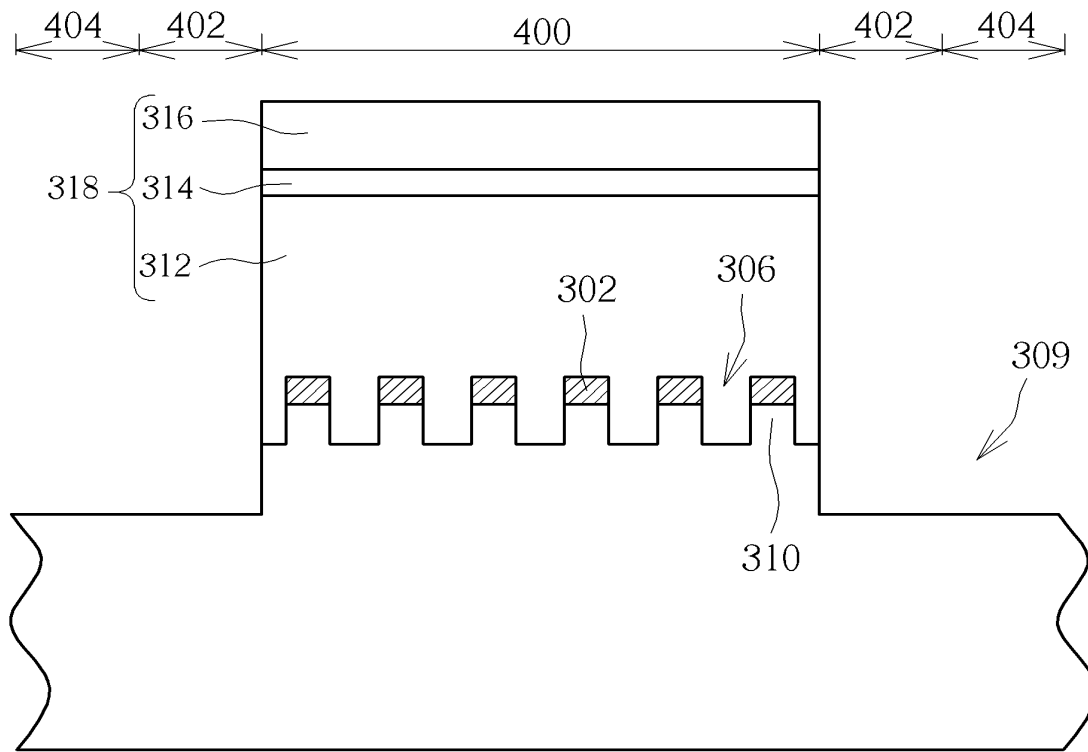


FIG. 9

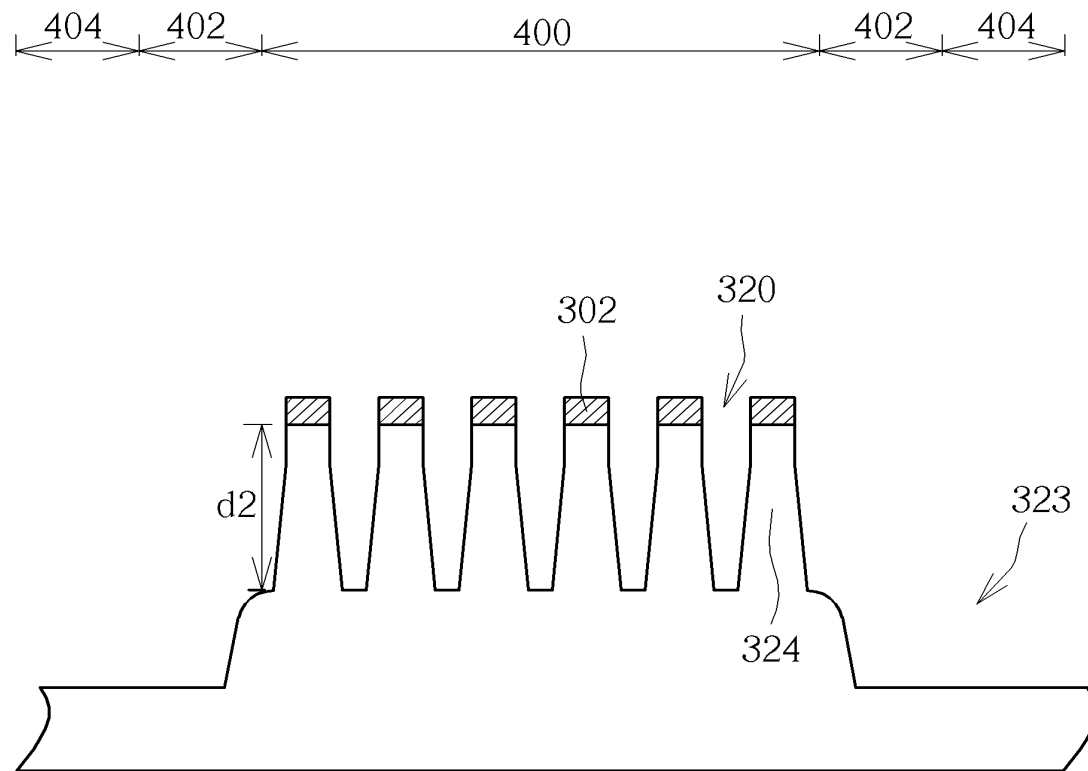


FIG. 10

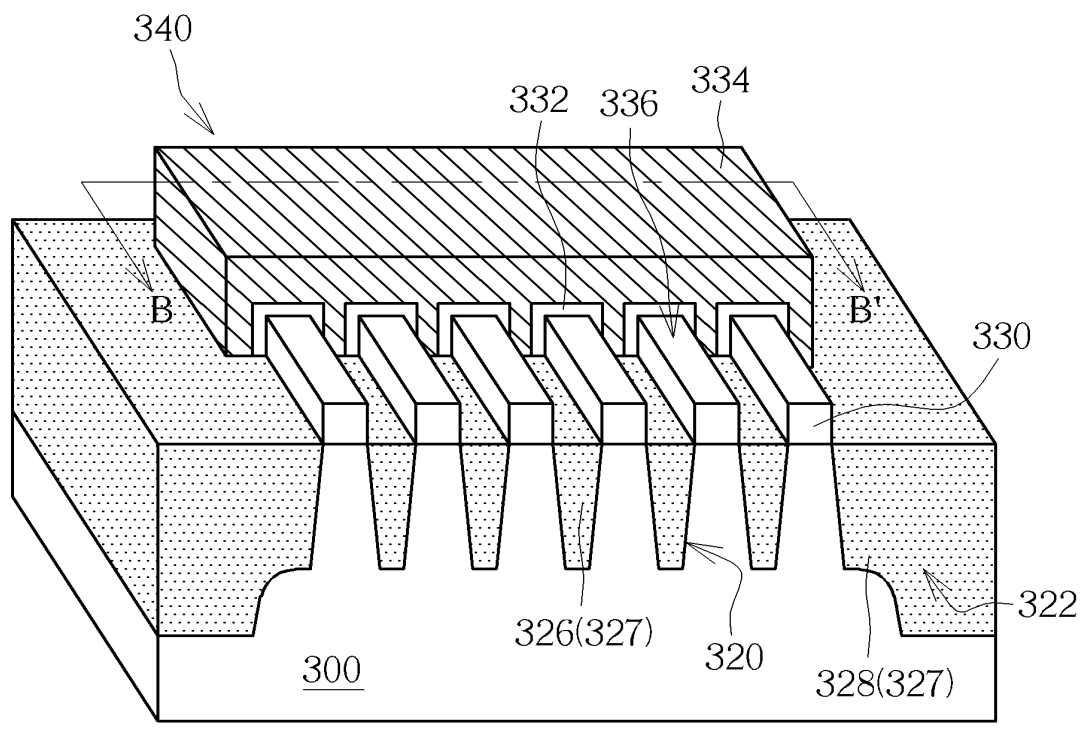


FIG. 13

Abstract of Disclosure

A method of forming a fin structure is provided. First, a substrate is provided, wherein a first region, a second region encompassing the first region, and a third region encompassing the second region are defined on the substrate. Then, a plurality of first trenches having a first depth are formed in the first region and the second region, wherein each two first trenches defines a first fin structure. The first fin structure in the second region is removed. Lastly, the first trenches are deepened to form a plurality of second trenches having a second depth, wherein each two second trenches define a second fin structure. The present invention further provides a structure of a non-planar transistor.

Claims

What is claimed is:

1. A non-planar transistor, comprising:
 - a substrate having an active region and an isolation region, wherein the isolation region encompasses the active region;
 - a plurality of second trenches disposed in the substrate in the active region, wherein a portion of the substrate between each two second trenches is defined as a second protruding structure;
 - a sixth trench disposed in the substrate in the isolation region, wherein the sixth trench is deeper than the second trenches;
 - an insulation layer disposed in the second trenches and the sixth trench, wherein an upper surface of the insulation layer in the second trenches is level with that in the sixth trench;
 - a portion of the second protruding structure that protrudes over the insulation layer defined as a fin structure;
 - a conductive layer disposed on the fin structure; and
 - a gate dielectric layer disposed between the fin structure and the conductive layer.

2. The non-planar transistor according to claim 1, wherein the second protruding structure has an upper portion having a substantial vertical sidewall, and a lower portion having a tilted sidewall.

3. The non-planar transistor according to claim 2, wherein the upper portion has a height between 200 and 400 angstroms.

4. The non-planar transistor according to claim 2, wherein the lower portion has a height between 1000 and 2000 angstroms.

5. The non-planar transistor according to claim 2, wherein the upper surface of the insulation layer is higher than the lower portion.

Title

NON-PLANAR TRANSISTOR

Cross Reference To Related Applications

[0001] This application is a Divisional of application Serial No. 13/863,393 filed Apr. 16, 2013, and included herein by reference.

Background of the Invention

1. Field of the Invention

[0002] The present invention is related to a method of forming a fin structure of a non-planar transistor, and more particularly, to a method of forming at least a fin structure having nearly identical critical dimension (CD).

2. Description of the Prior Art

[0003] In recent years, as various kinds of consumer electronic products are being constantly modified towards increased miniaturization, the size of semiconductor components are modified to be reduced accordingly, in order to meet high integration, high performance, low power consumption, and the demands of products.

[0004] However, with the increasing miniaturization of electronic products, current planar FETs no longer meet the requirements of the products. Thus, non-planar FETs such as Fin-shaped FETs (Fin-FET) have been developed, which includes a three-dimensional channel structure. The manufacturing processes of Fin-FET devices can be integrated into traditional logic device processes, and thus are more compatible. In addition, since the three-dimensional structure of the Fin-FET increases the overlapping area between the gate and the substrate, the channel region is controlled more effectively. This therefore reduces drain-induced barrier lowering (DIBL) effect and short channel effect. Moreover, the channel region is longer for the same gate length. Therefore, the current between the source and the drain is increased. In recent years, the development of the Fin-FETS is still aiming to be used in devices with smaller scales.

[0005] However, some issues, such as poor CD uniformity of the fin structures of Fin-FETs, are still problems that should be overcome.

Summary of the Invention

[0006] It is one objective of the present invention to provide a method of forming at least a fin structure having nearly identical CD.

[0007] According to one embodiment, a method of forming a fin structure is provided. First, a substrate is provided, wherein a first region, a second region encompassing the first region, and a third region encompassing the second region are defined on the substrate. Then, a plurality of first trenches having a first depth are formed in the first region and the second region, wherein each two first trenches defines a first fin structure. The first fin structure in the second region is removed. Lastly, the first trenches are deepened to form a plurality of second trenches having a second depth, wherein each two second trenches define a second fin structure.

[0008] According to another embodiment of the present invention, a non-planar transistor is provided. The non-planar transistor comprises a substrate, a plurality of second trenches, a sixth trench, an insulation layer, a conductive layer and a gate dielectric layer. The substrate has an active region and an isolation region, wherein the isolation region encompasses the active region. The second trenches are disposed in the substrate in active region, wherein a portion of the substrate between each two second trenches is defined as a second fin structure. The sixth trench is disposed in the substrate in the isolation region, wherein the sixth trench is deeper than the second trench. An insulation layer is disposed in the second trench and the sixth trench, wherein the insulation layer in the second trench is level with that in the sixth trench. A portion of the second fin structure that protrudes over the insulation layer is defined as a fin structure. The conductive layer is disposed on the fin structure. The gate dielectric layer is disposed between the fin

structure and the conductive layer.

[0009] By using the method set forth in the present invention, the CD of the fin structures can be uniform and the quality of the devices can be improved.

[0010] These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

Brief Description of the Drawings

[0011] FIG. 1 to FIG. 8 are schematic diagrams of the fabrication method of a non-planar transistor according to the first embodiment in the present invention.

[0012] FIG. 9 to FIG. 13 are schematic diagrams of the fabrication method of a non-planar transistor according to the second embodiment in the present invention.

Detailed Description

[0013] To provide a better understanding of the present invention, preferred embodiments will be made in detail. The preferred embodiments of the present invention are illustrated in the accompanying drawings with numbered elements.

[0014] Please refer to FIG. 1 to FIG. 8, which are schematic diagrams of the fabrication method of a non-planar FET according to the first embodiment in the present invention. As shown in FIG. 1, a substrate 300 is provided. In one embodiment, the substrate 300 can be a silicon substrate, an epitaxial silicon substrate, a silicon germanium substrate or a silicon carbide substrate, but is not limited thereto. A first region 400, a second region 402 and a third region 404 are defined on the substrate 300. The second region 402 is disposed between the first region 400 and the third region 404 so that the second region 402 encompasses the first region 400, and the third region 404 encompasses both the first region 400 and the second region 402. A

patterned mask layer 302 is formed on the substrate 300. For example, a layer such as a silicon nitride (SiN) layer, a silicon oxynitride (SiON), silicon carbide (SiC) or an advanced pattern film (APF) provided by Applied Materials, is formed on the substrate 300 and a photo-etching-process (PEP) is performed to pattern the mask layer 302. In another embodiment, the method of forming the patterned mask layer 302 can include other processes such as a sidewall image transferring (SIT) process. The mask layer 302 contains a plurality of patterns 304, preferably stripe patterns that are parallel to each other in the first region 400 and the second region 402. In one embodiment, the stripe patterns 304 are disposed only in the first region 400 and the second region 402. As shown in FIG. 1, due to some manufacturing effects such as “dense-isolation effect” or “micro-loading effect”, the width of the stripe pattern 304 in the second region 402 would be a little larger than those in the first region 400.

[0015] As shown in FIG. 2, an etching process is performed by using the mask layer 302 as a mask to pattern the substrate 300, thereby forming a plurality of first trenches 306 in the first region 400 and the second region 402, and a third trench 308 in the third region 404. By adjusting the etching recipe or the etching rate, the first trench 306 preferably has a substantial vertical sidewall. In one embodiment, each first trench 306 has a depth d_1 (from bottom surface of the first trench 306 to a top surface of the substrate 300) which is substantially between 200 and 400 angstroms, preferably 300 and 350 angstroms. Simultaneously, the portion of the substrate 300 between each of the two first trenches 306 becomes a first protruding structure 310 (in the present invention, “the protruding structure” can also called “the fin structure” since the mask layer 302 has stripe patterns 304).

[0016] Next, the first protruding structures 310 in the second region 402 are removed. As shown in FIG. 3 to FIG. 4, a photo-etching-process (PEP) using a tri-layer photoresist material 318 is used for example.

In one embodiment, the tri-layer photoresist material 318 contains a photoresist layer 316, an anti-reflection coating (ARC) 314 and an auxiliary mask layer 312. In one embodiment, the photoresist layer 316 is a photoresist material suitable for light source having a wavelength of 193 nm. The ARC layer 314 includes a silicon-containing hard-mask bottom anti-reflection coating (SHB) layer and the auxiliary mask layer 312 includes an organic dielectric layer (ODL) provided by Shin-Etsu Chemical Co. Ltd., wherein the SHB layer is disposed directly under the photoresist layer to serve as a BARC and a mask layer, and the ODL layer is an organic underlayer, i.e., a hydrocarbon layer, which is used to serve as an auxiliary mask layer. As shown in FIG. 3, the photoresist layer 316 undergoes an exposure process and a development process to remove the photoresist layer 316 in the second region 402 and the third region 404. Then, as shown in FIG. 4, at least one etching process is performed by using the patterned photoresist layer 316 as a mask to sequentially pattern the ARC layer 314, the auxiliary mask layer 312, and then remove the mask layer 302 and the first protruding structure 310 in the second region 402. In the present embodiment, the etching process stops on the bottom surface of the third trench 308, so the third trench 308 is still level with the first trenches 306. Then, the tri-layer photoresist material 318 is stripped away. It is noted that besides using the tri-layer photoresist material 318, the first protruding structure 310 in the second region 402 can be removed by other methods.

[0017] As shown in FIG. 5, an etching process is performed by using the patterned mask layer 302 as a mask to simultaneously deepen the first trenches 306 and the third trench 308. Each first trench 306 in the first region 400 becomes a second trench 320, the third trench 308 in the second region 402 and the third region 404 becomes a fourth trench 322, and the first protruding structure 310 becomes a second protruding structure 324. In one embodiment, each second trench 320 has a depth d_2 which is substantially between 1200 angstroms and 2500 angstroms. In the present embodiment, the etching rate of forming the second trench 320 can be faster than that of forming the first

trench 306, so the lower portion of the second trench 320 may include tilted sidewalls.

[0018] As shown in FIG. 6, an insulation layer 327 is filled into the second trenches 320 and the fourth trench 322 to form a plurality of fin-STIs (shallow trench isolation) 326 in the second trench 320 and an STI 328 in the fourth trench 322. For example, an insulation layer containing SiO_2 is deposited on the substrate 300 to completely fill the second trenches 320 and the fourth trench 322. Then, a planarization process including an etching back step is performed to remove a part of the insulation layer 327 until exposing the second protruding structures 324. Preferably, the insulation layer 327 in the second trench 320 has a thickness equal to or greater than the second depth d_2 . That is, the exposed portion of the second protruding structure 324 has a height h_3 , and the height h_3 is substantially equal to the depth d_1 . In another embodiment, the height h_3 can be smaller than the depth d_1 . Preferably, the portion of the second protruding structure 324 having the tilted sidewalls is not exposed. After forming the fin-STIs 326 and the STI 328, a plurality of fin structures 330 are therefore formed. The fin structure 330 refers to the portion of the second protruding structures 324 that protrudes over the fin-STIs 326. In other words, the fin structure 330 is the portion of the substrate 300 that is exposed and not covered by the fin-STI 326, so the fin structure 330 has a height h_3 . In one embodiment, the mask layer 302 can be removed after forming the fin structures 330. In another embodiment, the mask layer 302 can remain.

[0019] Then, please see FIG. 7 and FIG. 8, wherein FIG. 8 is a three dimensional view of the non-planar transistor and FIG. 7 is a cross-sectional view taken along line AA' in FIG. 8. A gate dielectric layer 332 is then formed to cover the fin structure 330. The gate dielectric layer 332 can be, for example, a silicon layer or a high-k dielectric layer. Then, a gate layer 334 can be formed on the gate dielectric layer 332. The gate layer 334 can include a variety of conductive materials, such as poly-silicon or metal. Next, after

patterning the gate layer 334 to form the required gate structure, an ion implantation process is carried out to form the source/drain region 336 in the fin structure 330 as shown in FIG. 8. Through the above steps, a non-planar transistor 338 is completed. In the subsequent steps, an inter-layer dielectric (ILD) layer (not shown) can be further formed on the non-planar transistor 338, and a plurality of contact holes (not shown) are formed therein to provide appropriate input/output pathway toward outer circuits.

[0020] By using the method in the present invention, some drawbacks in conventional arts can be avoided. For example, in conventional arts, only an etching process is performed by using a patterned mask layer to directly form the second protruding structures. However, due to the “dense-isolation effect” or “micro-loading effect”, the width of the patterned mask layer in the second region will be larger (as shown FIG. 1), so the CD of the second protruding structures in the second region will become larger as well. Thus, the present invention includes the step of removing the first protruding structure 310 in the second region 402, so as to keep the CD uniformity of the fin structure 330.

[0021] Moreover, because the second protruding structures in conventional arts are formed by one single etching process, the second protruding structure in conventional arts is easy to have tapered sidewalls, especially those at the edge of the second protruding structures. Accordingly, the present invention uses two separated etching steps to form the second protruding structures 324. Since the fin structure 330 only refers to the upper portion of the second protruding structures 324 which has vertical sidewalls, the CD of the fin structure 330 can be on target and meet the desired value.

[0022] It is another salient feature that the step of removing the first fin structures 310 in the second region 402 (FIG. 3 to FIG. 4) is performed between the etching step for forming the first trench 306 (FIG. 2) and the etching step for forming the second trench 320

(FIG. 6). If the removing step is performed before the two etching steps, the edge CD problem may still occur. If the removing step is performed after the two etching steps, the removing step cannot completely remove the fin structure since the trench is too deep and a silicon pillar structure will remain in the second region. Accordingly, the method in the present invention can ensure the CD of the fin structures and therefore upgrade the quality of the devices.

[0023] Please refer to FIG. 9 to FIG. 12, which are schematic diagrams of the fabrication method of a non-planar FET according to the second embodiment in the present invention. The previous steps in the second embodiment are similar to those in the first embodiment as in FIG. 1 to FIG. 3. After the steps in FIG. 1 to FIG. 3, please see FIG. 9. At least one etching process is performed by using the patterned photoresist layer 316 as a mask to sequentially pattern the ARC layer 314, the auxiliary mask layer 312, and then remove the mask layer 302 and the first protruding structure 310 in the second region 402. In the present embodiment, the etching process further removes the substrate 300 in the second region 402 and the third region 404, thereby forming a fifth trench 309 in the second region 402 and the third region 404. The fifth trench 309 is not level with the first trench 306 but is deeper than the first trench 306.

[0024] As shown in FIG. 10, an etching process is performed by using the patterned mask layer 302 as a mask to simultaneously deepen the first trenches 306 and the fifth trench 309. In the first region 400, each first trench 306 is deepened to form a second trench 320. In the second region 402 and the third region, the fifth trench 309 is deepened to form a sixth trench 323. It is understood that the sixth trench 323 is also deeper than the second trench 320. Each first protruding structure 310 becomes a second protruding structure 324. In one embodiment, each second trench 320 has a depth d_2 which is substantially between 1200 angstroms and 2500 angstroms. The etching rate of forming the second trench 320 is faster than that of forming the first trench 306, so the lower portion of the second trench 320

may include tilted sidewalls.

[0025] As shown in FIG. 11, an insulation layer 327 is filled into the second trenches 320 and the sixth trench 323 to form a plurality of fin-STIs 326 in the second trench 320 and an STI 328 in the sixth trench 322. For example, an insulation layer containing SiO_2 is deposited on the substrate 300 to completely fill the second trenches 320 and the sixth trench 323. Then, a planarization process including an etching back step is performed to remove a part of the insulation layer until exposing the second protruding structures 324. In one embodiment, the second protruding structures 324 having a height h_3 is exposed, wherein the height h_3 is substantially equal to or smaller than the first depth d_1 . After forming the fin-STIs 326 and the STI 328, a plurality of fin structures 330 are formed simultaneously. The fin structure 330 refers to each upper portion of the second protruding structures 324 that protrudes over the fin-STIs 326. In other words, the fin structure 330 is the portion of the substrate 300 that is exposed and not covered by the fin-STI 326. In one embodiment, the mask layer 302 can be removed after forming the fin structures 330. In another embodiment, the mask layer 302 can remain.

[0026] Then, please see FIG. 12 and FIG. 13, wherein FIG. 13 is a three dimensional view of the non-planar transistor and FIG. 12 is a cross-sectional view taken along line BB' in FIG. 13. A gate dielectric layer 332 is formed to cover the fin structure 330. The gate dielectric layer 332 can be, for example, a silicon layer or a high-k dielectric layer. Then, a gate layer 334 can be formed on the gate dielectric layer 332. The gate layer 334 can include a variety of conductive materials, such as polysilicon or metal. Next, after patterning the gate layer 334 to form the required gate structure, an ion implantation process is carried out to form the source/drain region 336 in the fin structure 330 as shown in FIG. 13. Through the above steps, the Fin-FET 340 structure in FIG. 13 can be provided.

[0027] As shown in FIG. 13, the non-planar transistor 340 includes

a substrate 300, at least a fin structure 330, a gate dielectric layer 332, a gate 334, a source/drain region 336, at least a fin-STI 326 and an STI 323. An active region such as the first region 400 and an isolation region such as the third region 402 are defined on the substrate 300. At least a second trench 320 is disposed in the active region and a sixth trench 323 is disposed in the isolation region, wherein the sixth trench 323 is deeper than the second trench 320. An insulation layer 327 is disposed in the second trench 320 and the sixth trench 323, wherein the insulation layer 327 in the second trench 320 (fin-STI 326) is level with that in the sixth trench 323 (STI 328). The fin structure 330 is disposed between each of the two second trenches 320 and protrudes over the fin-STI 326. The gate 334 is disposed on the fin structure 330 and the gate dielectric layer 332 is disposed between the gate 334 and the fin structure 330. In one embodiment, the second protruding structure 324 has an upper portion 324b having a substantial vertical sidewall, and a lower portion 324a having a tilted sidewall. The upper portion 324b has a height between 200 and 400 angstroms and the lower portion 324a has a height between 1000 and 2000 angstroms. In one embodiment, an upper surface of the insulation layer 327 is level with the boundary between the upper portion 324b and the lower portion 324a. In another embodiment, the upper surface of the insulation layer 327 is higher than the lower portion 324a.

[0028] Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

Electronic Patent Application Fee Transmittal

Application Number:					
Filing Date:					
Title of Invention:	NON-PLANAR TRANSISTOR				
First Named Inventor/Applicant Name:	Lung-En Kuo				
Filer:	Winston Hsu/Hitomi Lin				
Attorney Docket Number:	NAUP1630USA1				
Filed as Large Entity					
Utility under 35 USC 111(a) Filing Fees					
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)	
Basic Filing:					
Utility application filing	1011	1	280	280	
Utility Search Fee	1111	1	600	600	
Utility Examination Fee	1311	1	720	720	
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 (\$)				1600

Electronic Acknowledgement Receipt

EFS ID:	19974447
Application Number:	14470957
International Application Number:	
Confirmation Number:	2945
Title of Invention:	NON-PLANAR TRANSISTOR
First Named Inventor/Applicant Name:	Lung-En Kuo
Customer Number:	27765
Filer:	Winston Hsu/Kate Yeh
Filer Authorized By:	Winston Hsu
Attorney Docket Number:	NAUP1630USA1
Receipt Date:	28-AUG-2014
Filing Date:	
Time Stamp:	05:37:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$1600
RAM confirmation Number	10902
Deposit Account	503105
Authorized User	

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Charge any Additional Fees required under 37 C.F.R. Section 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	Information Disclosure Statement (IDS) Form (SB08)	2041147.PDF	36486	no	5
			9a2e6b42bacb66d8a70e317108fe70fbda3bd5dd		
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
2	Authorization to access Appl. by Trilateral Office	2041146.PDF	36838	no	1
			8926690115ec8af50e2f4041500516cdcb3f3d81		
Warnings:					
Information:					
3	Oath or Declaration filed	2041145.PDF	282674	no	8
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Warnings:					
Information:					
4	Power of Attorney	2041144.pdf	3072601	no	11
			b15ba3ce32acd623362db7b7e33310aa74177da7		
Warnings:					
Information:					
5	Application Data Sheet	2041138.PDF	1671294	no	8
			7b5c74d374fdea0dd32acbf12c4c0b4909239a4		
Warnings:					
Information:					
6	Drawings-only black and white line drawings	2040772.PDF	148144	no	7
			ba2a8602516657f8a761c8c91f654bf4d7b58aa9		
Warnings:					
Information:					
7	Abstract	2040771.PDF	24585	no	1
			1ae33886250b128b41aceefbacc17c48539aca25		
Warnings:					
Information:					

8	Claims	2040770.PDF	25548	no	1
			27612d426c8adeb41e1ced1c45051aea500d1d25		
Warnings:					
Information:					
9	Specification	2040768.PDF	61997	no	10
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Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	32487	no	2
			d30a287bc841de11820f37f015de4425440873a4		
Warnings:					
Information:					
Total Files Size (in bytes):					5392654
<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>					

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/470,957
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APPLICATION AS FILED - PART I			SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	(Column 1)	(Column 2)					
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A			N/A	280
SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A			N/A	600
EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	5	minus 20 = *				x 80 =	0.00
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	1	minus 3 = *				x 420 =	0.00
APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	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
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

APPLICATION AS AMENDED - PART II					SMALL ENTITY		OR	OTHER THAN SMALL ENTITY		
	(Column 1)	(Column 2)	(Column 3)							
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=			x	=	
	Independent <small>(37 CFR 1.16(h))</small>	*	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			TOTAL ADD'L FEE		
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=			x	=	
	Independent <small>(37 CFR 1.16(h))</small>	*	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			TOTAL ADD'L FEE		
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.</p>										



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Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY DOCKET NO, TOT CLAIMS, IND CLAIMS. Row 1: 14/470,957, 08/28/2014, 2812, 1600, NAUP1630USA1, 5, 1

CONFIRMATION NO. 2945

27765
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P.O. BOX 506
MERRIFIELD, VA 22116

FILING RECEIPT



Date Mailed: 09/08/2014

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

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Power of Attorney: The patent practitioners associated with Customer Number 27765

Domestic Priority data as claimed by applicant

This application is a DIV of 13/863,393 04/16/2013

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 - A proper Authorization to Permit Access to Application by Participating Offices (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 09/05/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 14/470,957

Projected Publication Date: 12/18/2014

Non-Publication Request: No

Early Publication Request: No
Title

NON-PLANAR TRANSISTOR

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

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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).

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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
14/470,957 08/28/2014 Lung-En Kuo NAUPI630USA1 2945

27765 7590 11/28/2014
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

EXAMINER

PRENTY, MARK V

ART UNIT PAPER NUMBER

2822

NOTIFICATION DATE DELIVERY MODE

11/28/2014

ELECTRONIC

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

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

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

Patent.admin.uspto.Rcv@naipo.com
mis.ap.uspto@naipo.com

Office Action Summary	Application No. 14/470,957	Applicant(s) KUO ET AL.	
	Examiner MARK PRENTY	Art Unit 2822	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 August 28, 2014.
 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) 1-5 is/are pending in the application.
5a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 6) Claim(s) _____ is/are allowed.
- 7) Claim(s) 1-5 is/are rejected.
- 8) Claim(s) 3 and 4 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 8/28/2014 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

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

Certified copies:

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

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

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date 8/28/2014.
- 3) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 4) Other: _____.

This Office Action is in response to the papers filed on August 28, 2014.

Claims 3 and 4 are objected to because "potion" should be "portion." Correction is required.

Claims 1-5 are rejected under 35 U.S.C. 112(b) as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor regards as the invention.

Independent claim 1 is unclear in reciting "a plurality of second trenches" (line 4) because it does not earlier recite a plurality of first trenches.

Independent claim 1 is further unclear in reciting "a second protruding structure" (line 6) because it does not earlier recite a first protruding structure.

Independent claim 1 is further unclear in reciting "a sixth trench" (line 7) because it does not earlier recite first, third, fourth and fifth trenches.

Claims 2-5 depend on independent claim 1 and are thus similarly unclear.

Claim 1, at least insofar as understood, is rejected under 35 U.S.C. 102(a)(1) as being anticipated by United States Patent 7,247,887 to King et al. (hereafter King, cited in the Information Disclosure Statement filed on August 28, 2014).

As to independent claim 1, King discloses a non-planar transistor (see the entire patent, including the Fig. 1B disclosure), comprising: a substrate 190 having an active region and an isolation region, wherein the isolation region encompasses the active region; a plurality of [first] trenches (filled with ridge isolation material 192) disposed in the substrate in the active region, wherein a portion of the substrate between each two

[first] trenches is defined as a [first] protruding structure 191; a [second] trench (filled with device isolation material 193) disposed in the substrate in the isolation region, wherein the [second] trench is deeper than the [first] trenches; an insulation layer 192/193 disposed in the [first] trenches and the [second] trench, wherein an upper surface of the insulation layer in the [first] trenches is level with that in the [second] trench; a portion 120 of the [first] protruding structure 191 that protrudes over the insulation layer defined as a fin structure; a conductive layer 150 disposed on the fin structure; and a gate dielectric layer 140 disposed between the fin structure and the conductive layer.

Claim 1, at least insofar as understood, is thus rejected under 35 U.S.C. 102(a)(1) as being anticipated by King.

Claim 1, at least insofar as understood, is rejected under 35 U.S.C. 102(a)(1) as being anticipated by United States Patent 8,110,466 to Shieh et al. (hereafter Shieh).

As to independent claim 1, Shieh discloses a non-planar transistor (see the entire patent, including the Figs. 13 and 15 disclosure), comprising: a substrate 20 having an active region 36 and an isolation region, wherein the isolation region encompasses the active region; a plurality of [first] trenches 66 disposed in the substrate in the active region, wherein a portion of the substrate between each two [first] trenches is defined as a [first] protruding structure 68; a [second] trench 34 (Fig. 4) disposed in the substrate in the isolation region, wherein the [second] trench is deeper than the [first] trenches 66; an insulation layer 40/40' disposed in the [first] trenches and the [second] trench,

wherein an upper surface of the insulation layer in the [first] trenches is level with that in the [second] trench; a portion of the [first] protruding structure 68 that protrudes over the insulation layer defined as a fin structure; a conductive layer 74 disposed on the fin structure; and a gate dielectric layer 72 disposed between the fin structure and the conductive layer.

Claim 1, at least insofar as understood, is thus rejected under 35 U.S.C. 102(a)(1) as being anticipated by Shieh.

United States Patent 8,853,015 is related to this application.

Registered practitioners can telephone the examiner at (571) 272-1843. Any voicemail message left for the examiner must include the name and registration number of the registered practitioner calling, and the Application/Control (Serial) Number. Technology Center 2800's general telephone number is (571) 272-2800.

/MARK PRENTY/
Primary Examiner, Art Unit 2822

Notice of References Cited	Application/Control No. 14/470,957	Applicant(s)/Patent Under Reexamination KUO ET AL.	
	Examiner MARK PRENTY	Art Unit 2822	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-8,110,466	02-2012	Shieh et al.	438/268
*	B US-8,853,015	10-2014	Kuo et al.	438/151
	C US-			
	D US-			
	E US-			
	F US-			
	G US-			
	H US-			
	I US-			
	J US-			
	K US-			
	L US-			
	M US-			

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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



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BIB DATA SHEET

CONFIRMATION NO. 2945

SERIAL NUMBER 14/470,957	FILING or 371(c) DATE 08/28/2014 RULE	CLASS 438 257	GROUP ART UNIT 2822	ATTORNEY DOCKET NO. NAUP1630USA1	
APPLICANTS UNITED MICROELECTRONICS CORP., Hsin-Chu City, TAIWAN, Assignee (with 37 CFR 1.172 Interest); INVENTORS Lung-En Kuo, Tainan City, TAIWAN; Po-Wen Su, Kaohsiung City, TAIWAN; Chen-Yi Weng, New Taipei City, TAIWAN; Hsuan-Hsu Chen, Tainan City, TAIWAN; ** CONTINUING DATA ***** This application is a DIV of 13/863,393 04/16/2013 PAT 8853015 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 09/05/2014					
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and Acknowledged <u>/MARK V PRENTY/</u> Examiner's Signature	<input type="checkbox"/> Met after Allowance Initials	STATE OR COUNTRY TAIWAN	SHEETS DRAWINGS 7	TOTAL CLAIMS 5	INDEPENDENT CLAIMS 1
ADDRESS NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION P.O. BOX 506 MERRIFIELD, VA 22116 UNITED STATES					
TITLE NON-PLANAR TRANSISTOR					
FILING FEE RECEIVED 1600	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Lung-En Kuo
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	NAUP1630USA1

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code	Issue Date	Name	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	6043138		2000-03-28	Ibok; Effiong E.	all
	2	6492216		2002-12-10	Yeo; Yee-Chia	all
	3	6921963		2005-07-26	Krivokapic; Zoran	all
	4	7087477		2006-08-08	Fried; David M.	all
	5	7091551		2006-08-15	Anderson; Brent A.	all
	6	7247887		2007-07-24	King; Tsu-Jae	all
	7	7250658		2007-07-31	Doris; Bruce B.	all
	8	7309626		2007-12-18	leong; Mei-Kei	all

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.P./

Receipt date: 08/28/2014

14470957 - GAU: 2822

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Lung-En Kuo
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	NAUP1630USA1

	9	7352034		2008-04-01	Booth, Jr.; Roger Allen	all
	10	7470570		2008-12-30	Beintner; Jochen	all
	11	7531437		2009-05-12	Brask; Justin K.	all
	12	7569857		2009-08-04	Simon, legal representative, David Shaheen	all

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code	Publication Date	Name	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20140035066	A1	2014-02-06	Tsai	
	2	20040195624		2004-10-07	Liu, Chee-Wee;	all
	3	20050051825		2005-03-10	Fujiwara, Makoto;	all
	4	20060099830		2006-05-11	Walther; Steven R.;	all
	5	20060286729		2006-12-21	Kavalieros; Jack;	all

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.P./

Receipt date: 08/28/2014

14470957 - GAU: 2822

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Lung-En Kuo
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	NAUP1630USA1

	6	20070108528		2007-05-17	Anderson; Brent A.;	all
	7	20070158756		2007-07-12	Dreeskornfeld; Lars;	all
	8	20080157208		2008-07-03	Fischer; Kevin J.;	all
	9	20090124097		2009-05-14	Cheng; Kangguo;	all
	10	20090242964		2009-10-01	Akil; Nader;	all
	11	20090269916		2009-10-29	KANG; Inkuk;	all
	12	20100048027		2010-02-25	Cheng; Kangguo;	all
	13	20100072553		2010-03-25	XU; Jeff J.;	all
	14	20100144121		2010-06-10	Chang; Cheng-Hung;	all
	15	20100167506		2010-07-01	LIN; Simon Su-Hong;	all
FOREIGN PATENT DOCUMENTS						

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.P./

Receipt date: 08/28/2014

14470957 - GAU: 2822

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Lung-En Kuo
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	NAUP1630USA1

Examiner Initial*	Cite No	Foreign Document Number	Country Code	Kind Code	Publication Date	Name	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1						

NON-PATENT LITERATURE DOCUMENTS


Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.
	1	

EXAMINER SIGNATURE

Examiner Signature	/Mark Prenty/ (11/20/2014)	Date Considered	11/20/2014
--------------------	----------------------------	-----------------	------------

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

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.P./

Search Notes 	Application/Control No. 14470957	Applicant(s)/Patent Under Reexamination KUO ET AL.
	Examiner MARK PRENTY	Art Unit 2822

CPC- SEARCHED		
Symbol	Date	Examiner
H01L 29/66795, H01L 29/785	11/20/2014	mp

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
257	347, 510	11/20/2014	mp

SEARCH NOTES		
Search Notes	Date	Examiner
reviewed parent application	11/20/2014	mp

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

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/470,957	08/28/2014	Lung-En Kuo	NAUP1630USA1

CONFIRMATION NO. 2945

27765
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

PUBLICATION NOTICE



Title:NON-PLANAR TRANSISTOR
Publication No.US-2014-0367798-A1
Publication Date:12/18/2014

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 (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, 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

NON-PLANAR TRANSISTOR

Appl. No. : 14/470,957 Confirmation No. 2945
First Named Inventor : Lung-En Kuo
Filed : August 28, 2014
TC/A.U. : 2822
Examiner : Prenty, Mark V
Docket No. : NAUP1630USA1
Customer No. : 27765

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

AMENDMENT

Sir:

In response to the Office action of November 28, 2014, please amend the
5 above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2
of this paper.

Remarks/Arguments begin on page 4 of this paper.

Amendments to the Claims:

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

5 **Listing of Claims:**

Claim 1 (currently amended): A non-planar transistor, comprising:

- 20 a substrate having an active region and an isolation region, wherein the isolation region encompasses the active region;
- 10 a plurality of shallow second-trenches disposed in the substrate in the active region, wherein a portion of the substrate between each two shallow second-trenches is defined as a second-protruding structure, and the protruding structure has an upper portion having a substantial vertical sidewall and a lower portion having a tilted sidewall;
- 15 a deep sixth-trench disposed in the substrate in the isolation region, wherein the deep sixth-trench is deeper than the shallow second-trenches;
- an insulation layer disposed in the shallow second-trenches and the deep sixth-trench, wherein an upper surface of the insulation layer in the shallow second-trenches is level with that in the deep sixth-trench;
- 20 a portion of the second-protruding structure that protrudes over the insulation layer defined as a fin structure;
- a conductive layer disposed on the fin structure; and
- a gate dielectric layer disposed between the fin structure and the conductive layer.

25 Claim 2 (cancelled)

Claim 3 (currently amended): The non-planar transistor according to claim ~~[[2]]1~~, wherein the upper portion ~~portion~~ has a height between 200 and 400 angstroms.

30

Claim 4 (currently amended): The non-planar transistor according to claim [[2]]1,
wherein the lower portion ~~portion~~ has a height between 1000 and 2000
angstroms.

5 Claim 5 (currently amended): The non-planar transistor according to claim [[2]]1,
wherein the upper surface of the insulation layer is higher than the lower
portion.

Claim 6 (new): The non-planar transistor according to claim 1, wherein each of
10 the shallow trenches has a shoulder portion.

Claim 7 (new): The non-planar transistor according to claim 6, wherein the
shoulder portion includes a round corner.

15 Claim 8 (new): The non-planar transistor according to claim 1, wherein each of
the fin structures has a same size.

Electronic Acknowledgement Receipt

EFS ID:	21590610
Application Number:	14470957
International Application Number:	
Confirmation Number:	2945
Title of Invention:	NON-PLANAR TRANSISTOR
First Named Inventor/Applicant Name:	Lung-En Kuo
Customer Number:	27765
Filer:	Winston Hsu/Eve Hsieh
Filer Authorized By:	Winston Hsu
Attorney Docket Number:	NAUP1630USA1
Receipt Date:	25-FEB-2015
Filing Date:	28-AUG-2014
Time Stamp:	22:17:00
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	Applicant Arguments/Remarks Made in an Amendment	2185588.PDF	584529 aa7b32293ca0af317a4848cffdfc569962a3aa	no	2

Warnings:

Information:

2	Amendment/Req. Reconsideration-After Non-Final Reject	2185587.PDF	77209	no	1
			1bf7398fed5fecfa6985e34e06ba572e78b0 8dftb		
Warnings:					
Information:					
3	Claims	2185586.PDF	79573	no	2
			cd539e0c7330bbaae58d5bed08dd889a50 5d1cf2		
Warnings:					
Information:					
Total Files Size (in bytes):				741311	
<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>					

REMARKS/ARGUMENTS

Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with me concerning any subject matter of this application by electronic mail. I understand that a copy of these communications will be made of record
5 in the application file.

Rejections under 35 USC 102

Claim 1 was rejected under 35 U.S.C. 102(e)(1) as being anticipated by United States Patent 7,247,887 to King et al.

10 Claim 1 was rejected under 35 U.S.C. 102(e)(1) as being anticipated by United States Patent 8,110,466 to Shieh et al.

Response:

The applicant respectfully traverses the above rejections under 35 U.S.C. 102(e)(1)
15 for the following reasons.

Claim 1 has been amended to further recite features cited in original claim 2, in a manner to distinguish over King et al. and Shieh et al. The present invention, as currently amended, is mainly characterized by having the protruding structure having a vertical upper portion (for example element 324b shown in FIG. 12) and a tilted lower portion (for
20 example element 324a shown in FIG. 12), which is neither shown, described, taught, nor alluded to in any of the reference cited by the Examiner and by the applicant. Therefore, the Examiner is requested to allow Claim 1, as amended, of the present application. Favorable reconsideration and withdrawal of the 35 USC 102(e)(1) rejection are
25 respectfully requested.

New claim

New claims 6-8 are introduced to recite features of “each of the shallow trenches has a shoulder portion”, “the shoulder portion includes a round corner” and “each of the
30 fin structures has a same size”. Support thereof can be found in at least FIG. 13, and no

Appl. No. 14/470,957
Reply to Office action of November 28, 2014

new matter is introduced. Since said new claims 6-8 all depends upon Claim 1, the Examiner is requested to allow claims 6-8 if Claim 1 if found allowable.

5 Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Sincerely yours,

/Scott Margo/

Date: 02/24/2015

10 Scott Margo, Patent Agent No. 56,277
P.O. BOX 506, Merrifield, VA 22116, U.S.A.
Voice Mail: 302-729-1562
Facsimile: 806-498-6673
e-mail : ScottMargo@naipo.com

15

Note: Please leave a message in my voice mail if you need to talk to me. (The time in D.C. is 13 hours behind the Taiwan time, i.e. 9 AM in D.C. = 10 PM in Taiwan.)

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 14/470,957	Filing Date 08/28/2014	<input type="checkbox"/> To be Mailed
ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO					
APPLICATION AS FILED – PART I					
(Column 1)		(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A		
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A		
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A		
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>	minus 20 =	*	X \$	=	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$	=	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	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).				
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>					
* 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	02/25/2015	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 7	Minus	** 20	= 0	X \$80 =	0	
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X \$420 =	0	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							
	<input type="checkbox"/> 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		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 \$	=	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							
	<input type="checkbox"/> 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
/WANDA MITCHELL/

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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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
14/470,957 08/28/2014 Lung-En Kuo NAUPI630USA1 2945

27765 7590 03/12/2015
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

Table with 1 column: EXAMINER
PRENTY, MARK V

Table with 2 columns: ART UNIT, PAPER NUMBER
2822

Table with 2 columns: NOTIFICATION DATE, DELIVERY MODE
03/12/2015 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):

Patent.admin.uspto.Rcv@naipo.com
mis.ap.uspto@naipo.com

Office Action Summary	Application No. 14/470,957	Applicant(s) KUO ET AL.	
	Examiner MARK PRENTY	Art Unit 2822	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 February 25, 2015.
 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 and 3-8 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) 1, 3 and 8 is/are rejected.
- 8) Claim(s) 1 and 3-8 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 _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

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

Certified copies:

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

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

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date _____.
- 3) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 4) Other: _____.

This Office Action is in response to the amendment filed on February 25, 2015.

Claim 1 is objected to because "substantial" (line 7) should be "substantially." Correction is required. Claims 3-8 depend on claim 1 and are thus similarly objected to.

Claim 6 is further objected to because "shallow" should be "deep." Correction is required. Claim 7 depends on claim 6 and is thus similarly further objected to.

Claims 1, 3 and 8 are rejected under 35 U.S.C. 103 as being unpatentable over United States Patent 7,247,887 to King et al. (hereafter King, cited in the Information Disclosure Statement filed on August 28, 2014) together with newly cited United States Patent 8,946,829 to Wann et al. (hereafter Wann).

As to independent claim 1, King discloses a non-planar transistor (see the entire patent, including the Fig. 1B disclosure), comprising: a substrate 190 having an active region and an isolation region, wherein the isolation region encompasses the active region; a plurality of shallow trenches (filled with ridge isolation material 192) disposed in the substrate in the active region, wherein a portion of the substrate between each two shallow trenches is defined as a protruding structure 191; a deep trench (filled with device isolation material 193) disposed in the substrate in the isolation region, wherein the deep trench is deeper than the shallow trenches; an insulation layer 192/193 disposed in the shallow trenches and the deep trench, wherein an upper surface of the insulation layer in the shallow trenches is level with that in the deep trench; a portion 120 of the protruding structure 191 that protrudes over the insulation layer defined as a fin structure (see column 9, Table 1, No. 6); a conductive layer 150 disposed on the fin

structure; and a gate dielectric layer 140 disposed between the fin structure and the conductive layer.

The difference between claim 1 and King is claim 1's protruding structure has an upper portion having a [substantially] vertical sidewall and a lower portion having a tilted sidewall while King's protruding structure 191 has a substantially vertical sidewall throughout.

Wann teaches that the lower portion of a protruding structure such as King's can have tilted sidewalls "depending on etch parameters used when the trenches are formed" (see column 2, lines 40-43).

It would have been obvious to one skilled in the art that the lower portion of King's protruding structure 191 can have tilted sidewalls depending on the etch parameters used to form the shallow trenches, as taught by Wann.

Claim 1 is thus rejected under 35 U.S.C. 103 as being unpatentable over King together with Wann.

As to dependent claim 3, the upper portion 120 of King's protruding structure 191 has a height HG between 200 and 400 angstroms (see column 9, Table 1, No. 6).

Claim 3 is thus rejected under 35 U.S.C. 103 as being unpatentable over King together with Wann.

As to dependent claim 8, each of King's fin structures has a same size.

Claim 8 is thus rejected under 35 U.S.C. 103 as being unpatentable over King together with Wann.

Claims 4 and 5 are objected to as being dependent upon a rejected base claim, but would be allowable over the prior art of record if rewritten in independent form including all of the limitations of corrected claim 1.

Claims 6 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable over the prior art of record if claim 6 is corrected (see above) and rewritten in independent form including all of the limitations of corrected claim 1.

Registered practitioners can telephone the examiner at (571) 272-1843. Any voicemail message left for the examiner must include the name and registration number of the registered practitioner calling, and the Application/Control (Serial) Number. Technology Center 2800's general telephone number is (571) 272-2800.

/MARK PRENTY/
Primary Examiner, Art Unit 2822

Notice of References Cited	Application/Control No. 14/470,957	Applicant(s)/Patent Under Reexamination KUO ET AL.	
	Examiner MARK PRENTY	Art Unit 2822	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-8,946,829	02-2015	Wann et al.	257/401
	B US-			
	C US-			
	D US-			
	E US-			
	F US-			
	G US-			
	H US-			
	I US-			
	J US-			
	K US-			
	L US-			
	M US-			


FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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

Search Notes 	Application/Control No. 14470957	Applicant(s)/Patent Under Reexamination KUO ET AL.
	Examiner MARK PRENTY	Art Unit 2822

CPC- SEARCHED		
Symbol	Date	Examiner
H01L 29/7853	3/6/2015	mp

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner

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

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NON-PLANAR TRANSISTOR

Appl. No. : 14/470,957 Confirmation No. 2945
First Named Inventor : Lung-En Kuo
Filed : August 28, 2014
TC/A.U. : 2822
Examiner : Prenty, Mark V
Docket No. : NAUP1630USA1
Customer No. : 27765

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

AMENDMENT

Sir:

In response to the Office action of March 12, 2015, please amend the above-identified
5 application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2
of this paper.

Remarks/Arguments begin on page 4 of this paper.

Amendments to the Claims:

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

5 **Listing of Claims:**

Claim 1 (currently amended): A non-planar transistor, comprising:

- 20 a substrate having an active region and an isolation region, wherein the isolation region encompasses the active region;
- 10 a plurality of shallow trenches disposed in the substrate in the active region, wherein a portion of the substrate between each two shallow trenches is defined as a protruding structure, and the protruding structure has an upper portion having a ~~substantially~~ ~~substantial~~ vertical sidewall and a lower portion having a tilted sidewall;
- 15 a deep trench disposed in the substrate in the isolation region, wherein the deep trench is deeper than the shallow trenches and has a shoulder portion;
- an insulation layer disposed in the shallow trenches and the deep trench, wherein an upper surface of the insulation layer in the shallow trenches is level with that in the deep trench;
- 20 a portion of the protruding structure that protrudes over the insulation layer defined as a fin structure;
- a conductive layer disposed on the fin structure; and
- a gate dielectric layer disposed between the fin structure and the conductive layer.

25

Claim 2 (canceled)

Claim 3 (previously presented): The non-planar transistor according to claim 1, wherein the upper portion has a height between 200 and 400 angstroms.

30

Claim 4 (previously presented): The non-planar transistor according to claim 1,
wherein the lower portion has a height between 1000 and 2000 angstroms.

5 Claim 5 (previously presented): The non-planar transistor according to claim 1,
wherein the upper surface of the insulation layer is higher than the lower
portion.

Claim 6 (canceled)

10 Claim 7 (currently amended): The non-planar transistor according to claim [[6]] 1,
wherein the shoulder portion includes a round corner.

15 Claim 8 (previously presented): The non-planar transistor according to claim 1,
wherein each of the fin structures has a same size.

Electronic Acknowledgement Receipt

EFS ID:	22435580
Application Number:	14470957
International Application Number:	
Confirmation Number:	2945
Title of Invention:	NON-PLANAR TRANSISTOR
First Named Inventor/Applicant Name:	Lung-En Kuo
Customer Number:	27765
Filer:	Winston Hsu/Lydia Wei
Filer Authorized By:	Winston Hsu
Attorney Docket Number:	NAUP1630USA1
Receipt Date:	26-MAY-2015
Filing Date:	28-AUG-2014
Time Stamp:	05:50:16
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	Applicant Arguments/Remarks Made in an Amendment	2259563.PDF	584408 <small>e1b11946b5be3020594c49be7991a5665941a197</small>	no	2

Warnings:

Information:

2	Amendment/Req. Reconsideration-After Non-Final Reject	2259562.PDF	77069 <small>31b1d2d820ee15abb85426d06e1a8837c9 5c5fb</small>	no	1
Warnings:					
Information:					
3	Claims	2259561.PDF	78889 <small>dfd5fd49ceb0f6f8e83ce1b52516049271eff 8a8</small>	no	2
Warnings:					
Information:					
Total Files Size (in bytes):				740366	
<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>					

REMARKS/ARGUMENTS

Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with me concerning any subject matter of this application by electronic mail. I understand that a copy of these communications will be made of record
5 in the application file.

Objections

Claims 1 and 6 were objected to because of the following reasons:
“substantial” (line 7) in claim 1 should be “substantially”;
10 “shallow” in claim 6 should be “deep”.

Response:

Claims 1 and 6 have been properly amended or canceled to overcome these objections: Acceptance of the corrected specification is therefore respectfully requested.
15

Rejections under 35 USC 103

Claim 1 was rejected under 35 U.S.C. 103 as being unpatentable over United States Patent 7,247,887 to King et al together with newly cited United States Patent 8,946,829 to Wann et al.
20 Claims 3 and 8 were thus rejected under 35 U.S.C. 103 as being unpatentable over King together with Wann.

Response:

The applicant respectfully traverses the above rejections under 35 U.S.C. 103 for
25 the following reasons.

Claim 1 has been amended to recite all of the limitations in claim 6 “the deep trench has a shoulder portion” in a manner to distinguish over King et al. and Mann et al. Since original claim 6 was only objected due to being dependent upon rejected base claim,
30 Claim 1 as currently present, which incorporates all limitations of claim 6 shall be allowed

for the aforementioned reason. Further, the Examiner is requested to also allow claims 3 and 8, which are dependent upon claim 1 and incorporate all the limitations thereof. Favorable reconsideration and withdrawal of the 35 USC 103 rejections are respectfully requested.

5

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Sincerely yours,

10

/Scott Margo/

Date: 05/25/2015

Scott Margo, Patent Agent No. 56,277
P.O. BOX 506, Merrifield, VA 22116, U.S.A.
Voice Mail: 302-729-1562

15

Facsimile: 806-498-6673
e-mail : ScottMargo@naipo.com

Note: Please leave a message in my voice mail if you need to talk to me. (The time in D.C. is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.)

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 14/470,957	Filing Date 08/28/2014	<input type="checkbox"/> To be Mailed
ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO					
APPLICATION AS FILED – PART I					
(Column 1)		(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A		
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (i), or (m))</small>	N/A	N/A	N/A		
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A		
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>	minus 20 =	*	X \$ =		
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =		
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	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).				
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>					
* 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	05/26/2015	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 6	Minus	** 20	= 0	X \$80 =	0	
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X \$420 =	0	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							
	<input type="checkbox"/> 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		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 \$ =		
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							
	<input type="checkbox"/> 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 /SHARAIN MORELAND/		

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

27765 7590 06/02/2015
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

EXAMINER

PRENTY, MARK V

ART UNIT PAPER NUMBER

2822

DATE MAILED: 06/02/2015

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

14/470,957 08/28/2014 Lung-En Kuo NAUP1630USA1 2945

TITLE OF INVENTION: NON-PLANAR TRANSISTOR

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

nonprovisional UNDISCOUNTED \$960 \$0 \$0 \$960 09/02/2015

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: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

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.

27765 7590 06/02/2015
 NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
 P.O. BOX 506
 MERRIFIELD, VA 22116

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.
14/470,957	08/28/2014	Lung-En Kuo	NAUP1630USA1	2945

TITLE OF INVENTION: NON-PLANAR TRANSISTOR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	09/02/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
PRENTY, MARK V	2822	438-151000

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. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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14/470,957 08/28/2014 Lung-En Kuo NAUP1630USA1 2945

27765 7590 06/02/2015
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

EXAMINER

PRENTY, MARK V

ART UNIT PAPER NUMBER

2822

DATE MAILED: 06/02/2015

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. 14/470,957	Applicant(s) KUO ET AL.	
	Examiner MARK PRENTY	Art Unit 2822	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 the amendment filed on May 26, 2015.
 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 1,3-5,7 and 8. 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)

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material 4. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Examiner's Amendment/Comment 6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance 7. <input type="checkbox"/> Other _____. |
|---|---|

/MARK PRENTY/
Primary Examiner, Art Unit 2822

<i>Index of Claims</i> 	Application/Control No. 14470957	Applicant(s)/Patent Under Reexamination KUO ET AL.
	Examiner MARK PRENTY	Art Unit 2822

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

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


CLAIM		DATE								
Final	Original	05/27/2015								
	1	=								
	2	-								
	3	=								
	4	=								
	5	=								
	6	-								
	7	=								
	8	=								

Issue Classification 	Application/Control No. 14470957	Applicant(s)/Patent Under Reexamination KUO ET AL.	
	Examiner MARK PRENTY	Art Unit 2822	

CPC					
Symbol				Type	Version
H01L	29	7851		F	2013-01-01
H01L	21	76224		I	2013-01-01
H01L	29	7853		I	2013-01-01
H01L	29	66795		I	2013-01-01
H01L	27	0886		I	2013-01-01
H01L	29	0649		I	2013-01-01


CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	6	
/MARK PRENTY/ Primary Examiner. Art Unit 2822	5/27/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	13

Issue Classification 	Application/Control No. 14470957	Applicant(s)/Patent Under Reexamination KUO ET AL.
	Examiner MARK PRENTY	Art Unit 2822

<input checked="" type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		Total Claims Allowed:	
		6	
(Assistant Examiner)	(Date)	O.G. Print Claim(s)	O.G. Print Figure
/MARK PRENTY/ Primary Examiner. Art Unit 2822	5/27/2015	1	13
(Primary Examiner)	(Date)		

Search Notes 	Application/Control No. 14470957	Applicant(s)/Patent Under Reexamination KUO ET AL.
	Examiner MARK PRENTY	Art Unit 2822

CPC- SEARCHED		
Symbol	Date	Examiner
update	5/27/2015	mp

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
H01L	29/7853	5/27/2015	mp

--	--

Electronic Patent Application Fee Transmittal

Application Number:	14470957				
Filing Date:	28-Aug-2014				
Title of Invention:	NON-PLANAR TRANSISTOR				
First Named Inventor/Applicant Name:	Lung-En Kuo				
Filer:	Winston Hsu/Shelley Kuo				
Attorney Docket Number:	NAUP1630USA1				
Filed as Large Entity					
Filing Fees for Utility under 35 USC 111(a)					
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)	
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Utility Appl Issue Fee	1501	1	960	960	

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				960

Electronic Acknowledgement Receipt

EFS ID:	22906417
Application Number:	14470957
International Application Number:	
Confirmation Number:	2945
Title of Invention:	NON-PLANAR TRANSISTOR
First Named Inventor/Applicant Name:	Lung-En Kuo
Customer Number:	27765
Filer:	Winston Hsu/Shelley Kuo
Filer Authorized By:	Winston Hsu
Attorney Docket Number:	NAUP1630USA1
Receipt Date:	15-JUL-2015
Filing Date:	28-AUG-2014
Time Stamp:	04:36:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$960
RAM confirmation Number	6473
Deposit Account	503105
Authorized User	HSU, WINSTON

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

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)
 Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)
 Charge any Additional Fees required under 37 C.F.R. Section 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	Issue Fee Payment (PTO-85B)	NAUP1630USA1_AN_1_NP072.pdf	332595 a0995bd8e9cdf33c5b2115a71485b28654145706	no	1

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30090 a2c4db4c70b748e06f0d37e3d2a38633aded21f5	no	2
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Warnings:

Information:

Total Files Size (in bytes):	362685
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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.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
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Table with 5 columns: APPLICATION NO., ISSUE DATE, PATENT NO., ATTORNEY DOCKET NO., CONFIRMATION NO.
14/470,957 08/25/2015 9117909 NAUP1630USA1 2945

27765 7590 08/05/2015
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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.

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