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ADMINISTRATION

100101

Hanghai Plaza (1+1 Plaza), 10th Floor, No. 10 Caihefang Road, Haidian
District, Beijing
LIU SHEN & ASSOCIATES
Chen Xiaowen (62681616)

Issuance date:

November 18, 2014



Application No. or Patent No.: 201410454915.X

Issuance No.: 2014111401227380

Applicant/Patentee: UNITED MICROELECTRONICS CORP

Title of the invention: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF

**Notification of Preliminary Examination Approval for Invention Patent
Application**

1. The above patent application, upon preliminary examination, complies with the provisions of Rule 44 of the Implementing Regulations of the Patent Law.

2. In accordance with Article 34 of the Patent Law, the patent application will be published 18 months from the filing date.

3. The preliminary examination approval of the above invention patent application is based on the following documents:

Abstract of the specification submitted on September 9, 2014;

Abstract drawing submitted on September 9, 2014;

Claims submitted on September 9, 2014;

Specification submitted on September 9, 2014;

Drawings of the specification submitted on September 9, 2014.

Instruction:

1. The applicant for an invention patent may, within three years from the filing date, submit a request for substantive examination and pay the substantive examination fee. If the applicant fails to submit the request for substantive examination or fails to pay or fully pay the substantive examination fee within the specified period, the application shall be deemed withdrawn.

2. Fees may be paid directly at the China National Intellectual Property Administration, or remitted via post office or bank. Via post office, please pay to: Fee Collection Office of Patent Office, China National Intellectual Property Administration, Merchant Customer Number: 10000860; via bank, please pay to: CITIC Bank Beijing Zhichun Road Sub-branch, Account Name: Patent Office, China National Intellectual Property Administration of the People's Republic of China, Account Number: 7111710182600166032.

When remitting payment, please accurately indicate the application number, fee name (or abbreviation), and itemized amount. Payments without the application number and fee name (or abbreviation) will be considered as not having completed the payment procedure.

Examiner: Zong Linxia

Examination Department: Preliminary Examination and
Process Management Department

210304 For paper applications, replies should be sent to: The Filing Office, Patent Office, China National Intellectual Property Administration, 6 Xitucheng Road, Jimen Bridge, Haidian, Beijing, 100088

2010.04 For electronic applications, related documents should be submitted by means of the electronic patent application system in the form of electronic documents. Unless otherwise specified, documents submitted in paper or other forms will be deemed as not having been submitted.



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LIU SHEN & ASSOCIATES
Chen Xiaowen (62681616)

Issuance date:

April 13, 2016



Application No. or Patent No.: 201410454915.X

Issuance No.: 2016040601423080

Applicant/Patentee: UNITED MICROELECTRONICS CORP

Title of the invention: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF

Notification of Publication of Invention Patent Application

The above-mentioned patent application, after preliminary examination, complies with the provisions of Rule 44 of the Implementing Regulations of the Patent Law. In accordance with Article 34 of the Patent Law, the application has been published in the Patent Gazette, Volume 32, Issue 14, dated April 6, 2016.

Note: Attached is one copy of the single-page version of the invention patent application.

Instruction:

1. The applicant for an invention patent may, within three years from the filing date, submit a request for substantive examination and pay the substantive examination fee. If the applicant fails to submit the request for substantive examination or fails to pay or fully pay the substantive examination fee within the specified period, the application shall be deemed withdrawn.

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When remitting payment, please accurately indicate the application number, fee name (or abbreviation), and itemized amount. Payments without the application number and fee name (or abbreviation) will be considered as not having completed the payment procedure.

3. For patent applications filed electronically, a single-page version of the patent application is not provided. The applicant may visit the official website of the China National Intellectual Property Administration (www.sipo.gov.cn) and query the published text under the "Patent Search" section.

4. Format requirements for amendments to application documents:

Amendments to claims must be submitted as corresponding claim replacement pages. Where a dependency relationship in the claim set is involved, all related claims must be replaced and corrected together. If the applicant wishes to delete certain claims, the applicant shall submit a partial claim set with consecutive numbering after reorganization.

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Amendments to the specification must be submitted as corresponding replacement paragraphs. Paragraph numbers shall not be added or deleted; only entire paragraphs that have been amended may be replaced in full. If new content is to be added, it may only be added within an existing paragraph. If an entire paragraph is to be deleted, the paragraph number shall be retained and marked with the note: "This paragraph is deleted." Paragraph numbers shall be subjected to those in the specification returned by the China National Intellectual Property Administration or as published/announced in the granted version.

Amendments to the drawings of the specification, abstract, or abstract drawing shall be submitted as corresponding replacement pages.

Additionally, the applicant shall indicate in the amendment or statement of opinions the claim numbers, paragraph numbers, and page numbers affected by the amendments.

Examiner: Tan Xiaomei
Tel: 62356655

Examination Department: Preliminary Examination and
Process Management Department

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2010.04 For electronic applications, related documents should be submitted by means of the electronic patent application system in the form of electronic documents. Unless otherwise specified, documents submitted in paper or other forms will be deemed as not having been submitted.

Substantive Examination Request

Please fill in the blanks based on Note(s)

Filled by CNIPA

① patent application	Application No.: 201410454915X	Filing date:
	Invention title: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF	Application barcode
	Applicant (*fill the first-named applicant): UNITED MICROELECTRONICS CORP	Registration barcode

② Request Content

Substantive examination is requested for the aforementioned patent application according to Article 35 of the Patent Law.

The applicant declares that it waives the right to voluntary amendment as stipulated in Article 51 of the Implementing Rules for the Patent Law of the People's Republic of China.

③ annex list

④ remarks

The application is a PCT international application, and the substantive examination fee shall not be reduced or waived.

The application is a PCT international application for which international search reports have been issued by the European Patent Office (EPO), the Japan Patent Office (JPO), and the Swedish Patent and Registration Office (PRV). Accordingly, the substantive examination fee shall be reduced by 20%.

This application is a PCT international application for which the International Search Report and the International Preliminary Report on Patentability (IPRP) have been issued by China. Accordingly, the substantive examination fee shall be fully waived (100% reduction).

⑤ signature or seal of Re-examination petitioner or patent agency

LIU SHEN & ASSOCIATES

August 08, 2017

⑥ Opinions of CNIPA

Date



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LIU SHEN & ASSOCIATES
Chen Xiaowen (62681616)

Issuance date:

August 15, 2017



Application No. or Patent No.: 201410454915.X

Issuance No.: 2017081000242770

Applicant/Patentee: UNITED MICROELECTRONICS CORP

Title of the invention: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF

Notification of Invention Patent Application Entering Substantive Examination Stage

The aforementioned patent application, pursuant to the applicant's request for substantive examination, has been reviewed and found to comply with the provisions of Article 35 of the Patent Law and Article 96 of the Implementation Regulations. Accordingly, the application has now entered the substantive examination stage.

Instruction:

1. In accordance with the provisions of Article 51, Paragraph 1 of the Implementing Regulations of the Patent Law, the applicant for an invention patent may initiatively submit amendments to the invention patent application within three months from the date of receiving this notification.

2. Requirements for the format of amendments to application documents:

Amendments to claims must be submitted as corresponding claim replacement pages. Where a dependency relationship in the claim set is involved, all related claims must be replaced and corrected together. If the applicant wishes to delete certain claims, the applicant shall submit a partial claim set with consecutive numbering after reorganization.

Amendments to the specification must be submitted as corresponding replacement paragraphs. Paragraph numbers shall not be added or deleted; only entire paragraphs that have been amended may be replaced in full. If new content is to be added, it may only be added within an existing paragraph. If an entire paragraph is to be deleted, the paragraph number shall be retained and marked with the note: "This paragraph is deleted." Paragraph numbers shall be subjected to those in the specification returned by the China National Intellectual Property Administration or as published/announced in the granted version.

Amendments to the drawings of the specification, abstract, or abstract drawing shall be submitted as corresponding replacement pages.

Additionally, the applicant shall indicate in the amendment or statement of opinions the claim numbers, paragraph numbers, and page numbers affected by the amendments.

Examiner: Zong Linxia
Tel: 62356655

Examination Department: Preliminary Examination and
Process Management Department

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LIU SHEN & ASSOCIATES
Chen Xiaowen (62681616)

Issuance Date:

May 15, 2019



Application No. or Patent No.: 201410454915.X

Issued Document Serial No.: 2019051100279830

Applicant: UNITED MICROELECTRONICS CORP

Title of Invention: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF

FIRST OFFICE ACTION

- In response to the substantive examination request submitted by the applicant, the China National Intellectual Property Administration (hereafter "CNIPA") has performed substantive examination of the above-identified patent application for invention in accordance with Article 35, Paragraph 1, (hereafter "Article 35.1", mutatis mutandis) of the Patent Law.
 In accordance with Article 35.2 of the Patent Law, CNIPA has decided to voluntarily carry out substantive examination of the above patent application for invention.
- The applicant claims the following filing date:
 The applicant has submitted a duplicate of the first filed earlier application documents certified by the original accepting institution.
 The applicant has not submitted a duplicate of the first filed earlier application documents certified by the original accepting institution, and the priority is regarded as not having been claimed complying to Article 30 of the Patent Law.
- After examination, the amended document(s) provided by the applicant on DATE do not comply with Rule 51.1 of the Implementing Regulations of the Patent Law, and are not accepted.
- Examination has been carried out regarding the following application documents:
 The original filing documents. The filing documents submitted on the day when divisional application is filed. The following application documents:
- This Office Action is prepared without any search being conducted.
 This Office Action is prepared with searches being conducted.
 This Office Action cites the following reference document(s) (the same document numbers will be used throughout the examination process):

No.	Document No. or Title	Publication Date (or Filing Date of Conflicting Application)
1	CN 103050533A	20130417
2	CN 104022116A	20140903

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3	CN 101675513A	20100317
4	US 2014191323A1	20140710

6. Conclusive opinion of the examination:

Regarding the description:

- The content of the application falls within the scope of non-patentable material as prescribed in Article 5 of the Patent Law.
- The description does not comply with Article 26.3 of the Patent Law.
- The description does not comply with Article 33 of the Patent Law.
- The writing of the description does not comply with Rule 20 of the Implementing Regulations of the Patent Law.
- _____

Regarding the claims:

- Claim(s) _____ does/do not comply with Article 2.2 of the Patent Law.
- Claim(s) _____ does/do not comply with Article 9.1 of the Patent Law.
- Claim(s) 1-3, 6 lacks/lack novelty in the sense of Article 22.2 of the Patent Law.
- Claims 4, 5, 7, 8 do not involve an inventive step in the sense of Article 22.3 of the Patent Law.
- Claim(s) _____ lacks/lack practical applicability in the sense of Article 22.4 of the Patent Law.
- Claims _____ fall within the scope of non-patentable material as prescribed in Article 25 of the Patent Law.
- Claim(s) _____ does/do not comply with Article 26.4 of the Patent Law.
- Claim(s) 9, 14 does/do not comply with Article 31.1 of the Patent Law.
- Claim(s) _____ does/do not comply with Article 33 of the Patent Law.
- Claim(s) _____ does/do not comply with Rule 22 of the Implementing Regulations of the Patent Law.
- Claim(s) _____ does/do not comply with Rule 23 of the Implementing Regulations of the Patent Law.
- Claim(s) _____ does/do not comply with Rule 24 of the Implementing Regulations of the Patent Law.
- Claim(s) _____ does/do not comply with Rule 25 of the Implementing Regulations of the Patent Law.
- _____
- The application does not comply with Article 26.5 of the Patent Law or Rule 29 of the Implementing Regulations of the Patent Law.
- The application does not comply with Article 19.1 of the Patent Law.
- The application does not comply with Rule 11 of the Implementing Regulations of the Patent Law.
- The divisional application does not comply with Rule 49.1 of the Implementing Regulations of the Patent Law.

Please see the main text of this Office Action for the specific analysis of the above conclusive opinion.

7. Based on the above concluding comments, the examiner is of the opinion that:

- The applicant should make amendments to the application documents according to the requirements set out in the main text of the Office Action.
- The applicant shall, in a Response, set out the reasoning as to why the patent application should be granted a patent right, and shall also amend the parts defined by the Office Action as not in accordance with regulations; otherwise, the application will not be granted a patent right.

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The patent application has no substantive patentable content. If the applicant does not show reasoning to the contrary or said reasoning to the contrary is not sufficient, the application will be rejected.

8. The applicant shall note the following items:

(1) According to Article 37 of the Patent Law, the applicant shall submit the Response within four 4 months from the date of receiving this Office Action. If the applicant does not respond before this deadline without a reasonable explanation, the application will be considered to have been withdrawn.

(2) The amendments made to the application by the applicant shall comply with Article 33 of the Patent Law and may not exceed the scope of the original Description and list of claims. At the same time, the applicant's amendments to the patent application shall also comply with Rule 57.3 of the Implementing Regulations of the Patent Law and the amendments shall be prepared in accordance with the requirements set out in this Office Action.

(3) The applicant's Response and/or amendments shall be mailed or delivered to the Filing Office of CNIPA. Any documents not mailed or delivered to the Filing Office have no legal validity.

(4) Applicants and/or agents may not go to the Patent Office of CNIPA to speak with examiners without an appointment.

(5) With regards to invention applications entering the substantive examination phase, 50% of fee for substantive examination of the invention can be refunded upon request if the application is withdrawn on its own initiative before the deadline for replying to the First Office Action (except those for which the Responses have been submitted).

9. The main text of this Office Action is 4-page long and has the following attachments:

A total of ___ copy, ___ pages of the cited reference documents.

Examiner: Ding Ning

Tel: 010-62411182

Examination Dept.: Electricity Invention Examination
Department

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FIRST OFFICE ACTION

Application No.: 201410454915.X

The present application relates to a fin-shaped structure and a manufacturing method thereof. Upon examination, the following examination opinions are hereby provided.

1. Claim 1 lacks novelty as prescribed in Article 22.2 of the Patent Law.

Claim 1 seeks to protect a fin-shaped structure. Reference document 1 (CN103050533A) discloses a fin structure, and discloses the following technical content in paragraphs 4-61 of the description, and FIG. 3B, FIG. 4B, FIG. 5B, and FIG. 6B: comprising: a semiconductor substrate (equivalent to a substrate) having a regular fin (equivalent to a first fin-shaped structure) located in a first area and a shaped fin (equivalent to a second fin-shaped structure) located in a second area, wherein the shaped fin comprises a ladder-shaped cross-sectional profile part. Accordingly, it can be seen that reference document 1 has disclosed all technical features of claim 1. In addition, the technical solution disclosed in reference document 1 and the technical solution sought to be protected by claim 1 pertain to the same technical field, solve the same technical problem, and produce the same technical effect. Therefore, the technical solution sought to be protected by claim 1 lacks novelty.

2. Claim 2 lacks novelty as prescribed in Article 22.2 of the Patent Law.

The additional technical feature of claim 2 has been disclosed in reference document 1. Paragraphs 49-55 of the description, and FIG. 5B and FIG. 6B of reference document 1 disclose the following technical content: wherein the width of a top part of the regular fin is larger than the width of a top part of the shaped fin. Therefore, on the basis that the claim to which claim 2 refers lacks novelty, the technical solution sought to be protected by claim 2 lacks novelty, too.

3. Claim 3 lacks novelty as prescribed in Article 22.2 of the Patent Law.

The additional technical feature of claim 3 has been disclosed in reference document 1. Paragraphs 41-55 of the description, and FIG. 3B, FIG. 5B, and FIG. 6B of reference document 1 disclose the following technical content: an STI layer 303 (equivalent to an isolation structure) disposed beside the regular fin of the first area and beside the shaped fin of the second area respectively, and the ladder-shaped cross-sectional profile part is higher than a top surface of the STI layer. Therefore, on the basis that the claim to which claim 3 refers lacks novelty, the technical solution sought to be protected by claim 3 lacks novelty, too.

4. Claim 4 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The additional technical feature of claim 4 is not disclosed in reference document 1, and constitutes a distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by claim 4 is how to effectively adjust the channel width of the required area.

Reference document 2 (CN104022116A) discloses a fin structure, and discloses the following technical content in paragraphs 37-89 of the description and FIG. 11 thereof: a top surface of the interlayer dielectric layer 305d of the second area II (equivalent to the isolation structure of the first area) is higher than a top surface of the interlayer dielectric layer 305c of the first area I (equivalent to the isolation structure of the second area). In addition, reference document 2 can also achieve adjusting the channel width of the part of area of the transistor to the required width. That is to say, reference document 2 provides the inspiration for applying the additional technical feature to reference document 1 to further solve the technical problem thereof. Under this inspiration, those skilled in the art would have been motivated to obtain the technical solution further defined by claim 4

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based on reference document 1 in combination with reference document 2, which would have been obvious to those skilled in the art. Therefore, on the basis that the claim to which claim 4 refers lacks novelty, dependent claim 4 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

5. Claim 5 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The additional technical feature of claim 5 is not disclosed in reference document 1, and constitutes a distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by claim 5 is how to effectively adjust the driving current. Reference document 2 discloses the following technical content in paragraphs 48-74 of the description and FIG. 11: a height h_2 of a first fin 301a (equivalent to the first fin-shaped structure) protruding from the interlayer dielectric layer 305d is lower than a height h_1 of a second fin 301b (equivalent to the second fin-shaped structure) protruding from the interlayer dielectric layer 305c (see paragraph 74 of the description). In addition, reference document 2 can also achieve adjusting the driving current through the fin height. That is to say, reference document 2 provides the inspiration for applying the additional technical feature to reference document 1 to further solve the technical problem thereof. Under this inspiration, those skilled in the art would have been motivated to obtain the technical solution further defined by claim 5 based on reference document 1 in combination with reference document 2, which would have been obvious to those skilled in the art. Therefore, on the basis that the claim to which claim 5 refers lacks novelty, dependent claim 5 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

6. Claim 6 lacks novelty as prescribed in Article 22.2 of the Patent Law.

The additional technical feature of claim 6 has been disclosed in reference document 1. Paragraphs 41-55 of the description, and FIG. 3B, FIG. 5B, and FIG. 6B of reference document 1 disclose the following technical content: a height of the regular fin protruding from the substrate is higher than a height of the shaped fin protruding from the substrate. (Although reference document 1 does not directly disclose the heights of the fins and the substrate, reference document 1 discloses the heights of the fins relative to the bottom layer of the STI layer, so those skilled in the art could have clearly and unambiguously determined the heights of the fins relative to the substrate.) Therefore, on the basis that the claim to which claim 6 refers lacks novelty, the technical solution sought to be protected by claim 6 lacks novelty, too.

7. Claim 7 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The additional technical feature of claim 7 has been partially disclosed in reference document 1. Reference document 1 discloses the following technical content in paragraphs 41-61 of the description, and FIG. 3B, FIG. 5B, and FIG. 6B: a plurality of regular fins and a plurality of shaped fins (see paragraph 61 of the description). The technical feature “and the distance between top parts of the first fin-shaped structures is less than the distance between top parts of the second fin-shaped structures” constitutes a distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by claim 7 is how to better arrange the position of the fin structure. However, based on reference document 1 which discloses a plurality of fins, in order to better arrange the fin structure, equidistantly arranging the fin-shaped structures is a common technical means adopted by those skilled in the art. In this way, since the top parts of the shaped fins are thinner, the distance between the top parts thereof is larger than the distance between the top parts of the regular fins, thus forming the technical solution sought to be protected by claim 7. That is to say, those skilled in the art can arrive at the technical solution of claim 7 based on reference document

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1 in combination with the common technical means in the art. Therefore, the technical solution sought to be protected by claim 7 does not involve an inventive step.

8. Claim 8 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The additional technical feature of claim 8 is not disclosed in reference document 1, and constitutes a distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by claim 8 is how to allow different parts of a device to cope with different voltage conditions. Reference document 3 (CN101675513A) discloses a fin-shaped structure, and discloses the following technical content in line 19 on page 4 to line 21 on page 7 of the description, and FIG. 1: an NFET area (equivalent to the first area) comprises a high voltage threshold area (equivalent to a high voltage threshold area) and a PFET area (equivalent to the second area) comprises a low voltage threshold area (equivalent to a low voltage threshold area). That is to say, reference document 3 provides the inspiration for applying the method of allowing different device areas to comprise different threshold voltages to reference document 1 to further solve the technical problem thereof. Under this inspiration, those skilled in the art would have been motivated to obtain the technical solution further defined by claim 8 based on reference document 1 in combination with reference document 3, which would have been obvious to those skilled in the art. Therefore, on the basis that the claim to which claim 8 refers lacks novelty, dependent claim 8 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

9. Independent claim 9 and independent claim 14 lack unity therebetween as prescribed in Article 31.1 of the Patent Law.

Independent claim 9 relates to a method of forming a fin-shaped structure. Reference document 4 (US2014191323A1) is the closest prior art document, and discloses the following technical content in paragraphs 30-49 of the description and FIG. 1-12: providing a substrate 101 having a first group of fins 121, 122 (equivalent to a first fin-shaped structure) located in a left area (equivalent to a first area); and a second group of fins 123, 124 (equivalent to a second fin-shaped structure) located in a right area (equivalent to a second area); filling a dielectric layer 201 (equivalent to an isolation structure) beside the first group of fins 121, 122 of the left area and beside the second group of fins 123, 124 of the right area respectively; forming a patterned mask 321 covering the left area but exposing the right area; removing a top part of the dielectric layer 201 of the right area, thereby exposing a first top part of the second group of fins 123, 124; removing the patterned mask 321.

The technical features “performing a treatment process to modify an external surface of the first top part of the second fin-shaped structure, thereby forming a modified part covering the first top part of the second fin-shaped structure; and performing a removing process to remove a part of the isolation structure and the modified part by a high removing selectivity to the first fin-shaped structure and the second fin-shaped structure, and the modified part and the isolation structure, thereby exposing a top part of the first fin-shaped structure and a second top part of the second fin-shaped structure” constitute distinguishing technical features over reference document 4. Based on the distinguishing technical features, the technical problems to be solved in practice by claim 9 are how to 1) better protect unrequired areas, 2) shape the top of the fin using a proper method, and 3) better adjust the channel.

Reference document 1 discloses a method of fabricating a fin structure, and discloses the following technical content in paragraphs 4-61 of the description, and FIG. 3B, FIG. 4B, FIG. 5B, and FIG. 6B: performing a conformal plasma doping process (equivalent to a treatment process) to oxidize (equivalent to modify) an external surface 403 of the first top part of the shaped fin (equivalent to the second fin-shaped structure), thereby forming an

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outer layer 403 (equivalent to a modified part) covering the first top part of the shaped fin; and performing etching process (equivalent to a removing process) to remove the silicon oxide outer layer. In addition, reference document 1 can also solve the technical problems of how to 1) better protect unrequired areas, and 2) shape the top of the fin using a proper method. Therefore, those skilled in the art would have been motivated to form a technical solution based on reference document 1 in combination with reference document 4. However, this technical solution does not comprise the technical feature “performing a removing process to remove a part of the isolation structure and the modified part by a high removing selectivity to the first fin-shaped structure and the second fin-shaped structure, and the modified part and the isolation structure, thereby exposing a top part of the first fin-shaped structure and a second top part of the second fin-shaped structure”. In addition, this technical feature is not common general knowledge of those skilled in the art. Therefore, this technical feature forms a specific technical feature of independent claim 9.

Independent claim 14 does not involve the same or corresponding recitation to this specific technical feature. Therefore, independent claim 14 and claim 9 do not have the same or corresponding specific technical feature therebetween, thus lacking novelty as prescribed in Article 31.1 of the Patent Law. Therefore, this office action does not examine claim 14. The applicant may delete claim 14. With regard to the invention no longer sought to be protected in the present application, the applicant may file a divisional application before the closure of the present application.

The applicant should make a reply to all the problems pointed out in this office action one by one within the reply deadline specified in this office action, should amend the patent application document according to the opinions provided in this office action, and should state in the Statement of Opinions the newly amended independent claim involves an inventive step relative to the prior art before the filing date mentioned in the reference documents and the original description cited in this office action. The applicant should amend the application document in accordance with Article 33 of the Patent Law without going beyond the scope recorded in the original description and claims.

Examiner Name: Ding Ning

Examiner Code: 319794

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Statement of Opinions

Please complete all columns of this form correctly in accordance with the “Instructions”.

① Patent application or patent	Application No. or Patent No.: 201410454915.X <hr/> Title of Invention/Creation: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF <hr/> Applicant or Patentee (the first applicant should be filled in): UNITED MICROELECTRONICS CORP
② Matter(s) for Statement: For opinions regarding fees, please use the Statement of Opinions (Regarding Fees). Only one of the following options may be selected. <input checked="" type="checkbox"/> State opinions regarding the First Office Action (Issuance No. 2019051100279830) issued by the China National Intellectual Property Administration on May 15, 2019. <input type="checkbox"/> State supplementary opinions regarding the ___ Office Action (Issuance No.) issued by the China National Intellectual Property Administration on (Month)__(Day),__(Year). <input type="checkbox"/> Voluntarily propose amendments (according to the provisions of Rule 51(1) and (2) of the Implementing Regulations of the Patent Law). <input type="checkbox"/> Others	
③ Opinions Stated: To the Esteemed Examiner, In response to the First Office Action you issued regarding the present invention, along with the cited prior art documents—reference document 1 (CN103050533A), reference document 2 (CN104022116A), reference document 3 (CN101675513A), and reference document 4 (US2014191323A1)—we have conducted a careful and thorough analysis. We hereby provide our specific responses and amendments as follows: 1. In view of the examiner's opinion that claim 1 lacks novelty relative to reference document 1, the applicant has incorporated claim 7 and the technical feature “the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures” into claim 1. The above amendments can be directly derived from lines 7-25 on page 4 of the original specification and FIG. 5 of the present application. Amended claim 1 has the following distinguishing technical feature over reference document 1: the distance between top parts of adjacent first fin-shaped structures is less than the distance between top parts of adjacent second fin-shaped structures, and the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures. It can be seen from the description in paragraphs [0061] to [0063] of reference document 1 that it only discloses that a FinFET device may include a plurality of regular fins (corresponding to the first fin-shaped structures in the present application) and a plurality of shaped fins (corresponding to the second fin-shaped structures in the present application). However, reference document 1 does not address the size relationship between the distance between top parts of two adjacent regular fins and the distance between top parts of two adjacent shaped fins, nor does it address the size relationship between the distance between their respective bottom parts. Therefore, reference document 1 does not disclose the specific content of the present application: “the distance between top parts of adjacent first fin-shaped structures is less than the distance between top parts of adjacent second fin-shaped structures, and the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures”. In this application, the distance between top parts of adjacent first fin-shaped structures is less than the distance between top parts of adjacent second fin-shaped structures, and the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures. Thus, fin-shaped structures with different critical dimensions can be formed in different areas (i.e.,	

the first area and the second area), thereby meeting the electrical requirements of transistors in each area and achieving the same effect within the same area.

Therefore, both the technical solution and technical effect of amended claim 1 are different from those of reference document 1, so it should possess novelty; moreover, the aforementioned distinguishing feature of the present application would not have been obvious to those skilled in the art, so it should also involve an inventive step; consequently, its dependent claims 2-8 should also possess novelty and involve an inventive step.

Similarly, reference documents 2-4 also do not disclose the aforementioned distinguishing technical feature of the present application, and therefore would not affect the inventive step of the present application.

2. In view of the examiner's opinion that claims 9 and 14 lack unity, the applicant has deleted claims 14-20 to overcome the aforementioned defect.

3. Based on the aforementioned amendment to claim 1, claim 7 has been adaptively deleted, and the numbering and reference signs of the other claims have been rewritten to form new claims 1-12.

The applicant believes that the amended claims have overcome the existing defects. Please continue the examination of the present application on the above basis. If the examiner considers that the present application still does not comply with the provisions of the Patent Law, we respectfully request another opportunity to state our opinions and amend the application document.

Finally, we sincerely thank the examiner for the hard work and effort devoted to the present patent application, and kindly request the examiner to continue examining the present application and grant the patent right as soon as possible.

Our Case No.: PXJ04315

Contact: Wang Yin (Tel: +86-10-62681616 ext. 7071)

④ List of Attachments

[Name of Attachment] Claims [Nature of Attachment] Electronic Copy

[Name of Attachment] Marked-up replacement sheets [Nature of Attachment] Electronic Copy

Filing Number of the Filed Certified Document(s): _____.

⑤ Signature/Seal of the Party or the Patent Agency
Beijing Liu, Shen & Associates

September 6, 2019

⑥ CNIPA Observations

(Month), (Day), (Year)

CLAIMS

1. A fin-shaped structure, comprising:

a substrate having a plurality of first fin-shaped structures located in a first area and a plurality of second fin-shaped structures located in a second area, wherein the second fin-shaped structure comprises a ladder-shaped cross-sectional profile part,

wherein the distance between top parts of adjacent first fin-shaped structures is less than the distance between top parts of adjacent second fin-shaped structures, and the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures.

2. The fin-shaped structure according to claim 1, wherein the width of a top part of the first fin-shaped structure is larger than the width of a top part of the second fin-shaped structure.

3. The fin-shaped structure according to claim 1, further comprising:

an isolation structure disposed beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively, and the ladder-shaped cross-sectional profile part is higher than a top surface of the isolation structure.

4. The fin-shaped structure according to claim 1, wherein a top surface of the isolation structure of the first area is higher than a top surface of the isolation structure of the second area.

5. The fin-shaped structure according to claim 1, wherein a height of the first fin-shaped structure protruding from the isolation structure is lower than a height of the second fin-shaped structure protruding from the isolation structure.

6. The fin-shaped structure according to claim 1, wherein a height of the first fin-shaped structure protruding from the substrate is higher than a height of the second fin-shaped structure protruding from the substrate.

~~7. The fin-shaped structure according to claim 1, further comprising:~~

~~a plurality of first fin-shaped structures and a plurality of second fin-shaped structures, and the distance between top parts of the first fin-shaped structures is less than the distance between top parts of the second fin-shaped structures.~~

~~87.~~ The fin-shaped structure according to claim 1, wherein the first area comprises a high voltage threshold (HVT) area and the second area comprises a low voltage threshold (LUT) area.

~~98.~~ A method of forming a fin-shaped structure, comprising:

providing a substrate having a first fin-shaped structure located in a first area and a second fin-shaped structure located in a second area;

filling an isolation structure beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively;

forming a patterned mask covering the first area but exposing the second area;

removing a top part of the isolation structure of the second area, thereby exposing a first top part of the second fin-shaped structure;

performing a treatment process to modify an external surface of the first top part of the second fin-shaped structure, thereby forming a modified part covering the first top part of the second fin-shaped structure;

removing the patterned mask; and

performing a removing process to remove a part of the isolation structure and the modified part by a high removing selectivity to the first fin-shaped structure and the second fin-shaped structure, and the modified part and the isolation structure, thereby exposing a top part of the first fin-shaped structure and a second top part of the second fin-shaped structure.

109. The method of forming a fin-shaped structure according to claim 98, wherein the isolation structure comprises oxide and the modified part comprises oxide.

110. The method of forming a fin-shaped structure according to claim 98, wherein the treatment process comprises an oxidation process.

111. The method of forming a fin-shaped structure according to claim 110, wherein the treatment process comprises an oxygen gas-containing process or an in-situ steam generated (ISSG) process.

112. The method of forming a fin-shaped structure according to claim 98, wherein the removing process comprises an ammonia and nitrogen trifluoride containing etching process.

~~14. A method of forming a fin-shaped structure, comprising:~~

~~providing a substrate having a first fin-shaped structure located in a first area and a second fin-shaped structure located in a second area;~~

~~forming a first gate across the first fin-shaped structure and a second gate across the second fin-shaped structure, wherein the first gate sequentially comprises a first dielectric layer and a first sacrificial gate covering the first fin-shaped structure, and the second gate sequentially comprises a second dielectric layer and a second sacrificial gate covering the second fin-shaped structure;~~

~~removing the first sacrificial gate and the second sacrificial gate, thereby exposing the first dielectric layer and the second dielectric layer;~~

~~covering a mask in the first area but exposing the second area;~~

~~performing a removing process to remove an external surface of a top part of the second fin-shaped structure; and~~

~~removing the mask.~~

~~15. The method of forming a fin-shaped structure according to claim 14, further comprising, after removing the mask:~~

~~forming a dielectric layer covering the first fin-shaped structure and the second fin-shaped structure.~~

~~16. The method of forming a fin-shaped structure according to claim 14, wherein the whole second dielectric layer and the external surface of the top part of the second fin-shaped structure are removed by the removing process.~~

~~17. The method of forming a fin-shaped structure according to claim 14, further comprising, after removing the mask:~~

~~removing the first dielectric layer completely.~~

~~18. The method of forming a fin-shaped structure according to claim 14, further comprising, before covering the mask:~~

~~removing the first dielectric layer and the second dielectric layer completely.~~

~~19. The method of forming a fin-shaped structure according to claim 14, further comprising, after providing the substrate:~~

~~forming an isolation structure beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively, a top part of the isolation structure of the second area being also removed while the removing process is performed.~~

~~20. The method of forming a fin-shaped structure according to claim 14, wherein the removing process has no removing selectivity to the isolation structure and the second fin-shaped structure.~~

CLAIMS

1. A fin-shaped structure, comprising:

a substrate having a plurality of first fin-shaped structures located in a first area and a plurality of second fin-shaped structures located in a second area, wherein the second fin-shaped structure comprises a ladder-shaped cross-sectional profile part,

wherein the distance between top parts of adjacent first fin-shaped structures is less than the distance between top parts of adjacent second fin-shaped structures, and the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures.

2. The fin-shaped structure according to claim 1, wherein the width of a top part of the first fin-shaped structure is larger than the width of a top part of the second fin-shaped structure.

3. The fin-shaped structure according to claim 1, further comprising:

an isolation structure disposed beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively, and the ladder-shaped cross-sectional profile part is higher than a top surface of the isolation structure.

4. The fin-shaped structure according to claim 1, wherein a top surface of the isolation structure of the first area is higher than a top surface of the isolation structure of the second area.

5. The fin-shaped structure according to claim 1, wherein a height of the first fin-shaped structure protruding from the isolation structure is lower than a height of the second fin-shaped structure protruding from the isolation structure.

6. The fin-shaped structure according to claim 1, wherein a height of the first fin-shaped structure protruding from the substrate is higher than a height of the second fin-shaped structure protruding from the substrate.

7. The fin-shaped structure according to claim 1, wherein the first area comprises a high voltage threshold (HVT) area and the second area comprises a low voltage threshold (LVT) area.

8. A method of forming a fin-shaped structure, comprising:

providing a substrate having a first fin-shaped structure located in a first area and a second fin-shaped structure located in a second area;

filling an isolation structure beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively;

forming a patterned mask covering the first area but exposing the second area;

removing a top part of the isolation structure of the second area, thereby exposing a first top part of the second fin-shaped structure;

performing a treatment process to modify an external surface of the first top part of the second fin-shaped structure, thereby forming a modified part covering the first top part of the second fin-shaped structure;

removing the patterned mask; and

performing a removing process to remove a part of the isolation structure and the modified part by a high removing selectivity to the first fin-shaped structure and the second fin-shaped structure, and the modified part and the isolation structure, thereby exposing a top part of the first fin-shaped structure and a second top part of the second fin-shaped structure.

9. The method of forming a fin-shaped structure according to claim 8, wherein the isolation structure comprises oxide and the modified part comprises oxide.

10. The method of forming a fin-shaped structure according to claim 8, wherein the treatment process comprises an oxidation process.

11. The method of forming a fin-shaped structure according to claim 10, wherein the treatment process comprises an oxygen gas-containing process or an in-situ steam generated (ISSG) process.

12. The method of forming a fin-shaped structure according to claim 8, wherein the removing process comprises an ammonia and nitrogen trifluoride containing etching process.



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Issuance Date:

October 30, 2019



Application No. or Patent No.: 201410454915.X

Issued Document Serial No.: 2019102501831560

Applicant: UNITED MICROELECTRONICS CORP

Title of Invention: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF

SECOND OFFICE ACTION

- 1. [X]The examiner has received the applicant's Statement of Opinions submitted on September 6, 2019 and has further carried out substantive examination of the above patent application on this basis.
[]In accordance with the review decision made on DATE by the Patent Reexamination Board of CNIPA, the examiner continued the substantive examination on the aforementioned patent application.
[]_____
2. []After examination, it is found that the amendment(s) provided by the applicant on DATE do not accord with the provisions in Rule 51, Paragraph 3 (hereafter "Rule 51.3", mutatis mutandis), of the Rules for the Implementation of the Patent Law, and are not accepted.
3. The examination is continued with respect to the following application documents:
[]The amended application documents attached to the aforementioned Statement of Opinions.
[X]The application documents to which the previous Office Action was directed and the replacement pages for the amended application documents attached to the aforementioned Statement of Opinions.
[]The application documents to which the previous office action was directed.
[]The application documents on which the aforementioned re-evaluation decision was made.
[]_____
4. [X]This Office Action does not cite any new reference documents.
[]This Office Action cites the following reference document(s) (the serial number follows the sequence of the serial number of the reference documents cited in the previous Office Action and continues to be used in the examination hereinafter):

Table with 3 columns: No., Document Name/No., Publication Date (or Filing Date of Conflicting Application)

5. Concluding comments of the examination:

Regarding the description:

- []The content of the application falls within the scope of non-patentable material as prescribed in Article 5

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of the Patent Law.

The description does not accord with Article 26.3 of the Patent Law.

The amendments of the description do not accord with Article 33 of the Patent Law.

The presentation of the description does not accord with Rule 20 of the Implementing Regulations of the Patent Law.

Regarding the claims:

Claims _____ do not accord with Article 2.2 of the Patent Law.

Claims _____ do not accord with Article 9.1 of the Patent Law.

Claims _____ do not possess novelty as defined in Article 22.2 of the Patent Law.

Claims 1-7 do not possess inventiveness as defined in Article 22.3 of the Patent Law.

Claims _____ do not possess practical applicability as defined in Article 22.4 of the Patent Law.

Claims _____ fall within the scope of non-patentable material as prescribed in Article 25 of the Patent Law.

Claims _____ do not accord with Article 26.4 of the Patent Law.

Claims _____ do not accord with Article 31.1 of the Patent Law.

The amendments of Claims _____ do not accord with Article 33 of the Patent Law.

Claims _____ do not accord with Rule 22 of the Implementing Regulations of the Patent Law.

Claims _____ do not accord with Rule 23 of the Implementing Regulations of the Patent Law.

Claims _____ do not accord with Rule 24 of the Implementing Regulations of the Patent Law.

Claims _____ do not accord with Rule 25 of the Implementing Regulations of the Patent Law.

The application does not accord with Article 26.5 of the Patent Law or Rule 26 of the Implementing Regulations of the Patent Law.

The application does not accord with Article 20.1 of the Patent Law.

The divisional application does not accord with Rule 43.1 of the Implementing Regulations of the Patent Law.

Please see the main text of this Office Action for the specific analysis of the above concluding comments.

6. Based on the above concluding comments, the examiner is of the opinion that:

The applicant should make amendments to the application documents according to the requirements put forth in the main text of this Office Action.

The applicant shall, in a Statement of Opinions, set out the reasoning as to why the patent application should be granted, and shall also amend the parts defined by this Office Action as not in accordance with rules; otherwise, the application will not be granted patent rights.

The patent application has no substantive patentable content; if the applicant does not show reasoning to the contrary or the reasoning to the contrary is insufficient, the application will be rejected.

7. The applicant shall note the following items:

(1) According to Article 37 of the Patent Law, the applicant shall submit the Statement of Opinions within two (2) months from the date of receiving this Office Action. If the applicant does not respond before _____

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this deadline without a reasonable explanation, the application will be considered to have been withdrawn.

(2) The amendments made to the application by the applicant shall accord with Article 33 of the Patent Law and may not exceed the scope of the original Description and list of claims. At the same time, the applicant's amendments to the patent application shall also accord with Rule 57.3 of the Implementing Regulations of the Patent Law and the amendments shall be prepared in accordance with the requirements set out in this Office Action.

(3) The applicant's Statement of Opinions and/or amendments shall be mailed or delivered to the Filing Office of CNIPA. Any documents not mailed or delivered to the Filing Office have no legal validity.

(4) Applicants and/or agents may not go to the Patent Office of CNIPA to speak with examiners without an appointment.

8. The main text of this Office Action is 3-page long and has the following attachments:

___ copy(ies) of cited reference documents, ___ pages in total.

Examiner: Ding Ning

Tel: 010-62411182

Examination Dept.: Electricity Invention Examination
Department

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Second Office Action

Application No.: 201410454915.X

The applicant submitted the Statement of Opinions and amended application document on September 6, 2019. After reading the aforementioned documents, the examiner continues the examination of the present application and hereby provides the following examination opinions.

1. Claim 1 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

Claim 1 seeks to protect a fin-shaped structure. Reference document 1 (CN103050533A) discloses a fin structure, and discloses the following technical content in paragraphs 4-61 of the description, and FIG. 3A-10 (especially FIG. 3B, FIG. 4B, FIG. 5B, and FIG. 6B): comprising: a semiconductor substrate (equivalent to a substrate) having a plurality of regular fins (equivalent to first fin-shaped structures) located in a first area and a plurality of shaped fins (equivalent to second fin-shaped structures) located in a second area, wherein the shaped fin comprises a ladder-shaped cross-sectional profile part.

The technical feature “wherein the distance between top parts of adjacent first fin-shaped structures is less than the distance between top parts of adjacent second fin-shaped structures, and the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures” constitutes a distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by Claim 1 is how to configure the shape of the fin according to the required electrical effect.

Paragraphs 4-61 of the description, and FIG. 3A and 7-10 of reference document 1 disclose another embodiment as follows: wherein the shaped fins may be arranged such that the distance between the bottom parts thereof is different from the distance between the top parts thereof, which can also solve the technical problem of how to configure the shape of the fin according to the required electrical effect. In addition, based on reference document 1 which discloses a plurality of fins, to simplify the production process, equidistantly arranging the fin-shaped structures is a common technical means adopted by those skilled in the art. Therefore, based on one embodiment of reference document 1 in combination with another embodiment of reference document 1 and the common technical means, those skilled in the art can arrive at the technical solution where the lower distances between the shaped fins is the same as the regular fins, and the upper distances is different from the regular fins, namely, the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures, and the distance between top parts thereof is larger than the distance between top parts of regular fins. That is to say, it would have been obvious to those skilled in the art to obtain the technical solution of claim 1 based on one embodiment of reference document 1 in combination with another embodiment of reference document 1 and the common technical means. Therefore, the technical solution sought to be protected by claim 1 does not involve an inventive step.

2. Claim 2 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The additional technical feature of claim 2 has been disclosed in reference document 1. Paragraphs 49-55 of the description, and FIG. 5B and FIG. 6B of reference document 1 disclose the following technical content: wherein the width of a top part of the regular fin is larger than the width of a top part of the shaped fin. Therefore, on the basis that the claim to which claim 2 refers does not involve an inventive step, the technical solution sought to be protected by claim 2 does not involve an inventive step, either.

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3. Claim 3 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The additional technical feature of claim 3 has been disclosed in reference document 1. Paragraphs 41-55 of the description, and FIG. 3B, FIG. 5B, and FIG. 6B of reference document 1 disclose the following technical content: an STI layer 303 (equivalent to an isolation structure) disposed beside the regular fin of the first area and beside the shaped fin of the second area respectively, and the ladder-shaped cross-sectional profile part is higher than a top surface of the STI layer. Therefore, on the basis that the claim to which claim 3 refers does not involve an inventive step, the technical solution sought to be protected by claim 3 does not involve an inventive step, either.

4. Claim 4 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The additional technical feature of claim 4 is not disclosed in reference document 1, and constitutes a distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by claim 4 is how to effectively adjust the channel width of the required area.

Reference document 2 (CN104022116A) discloses a fin structure, and discloses the following technical content in paragraphs 37-89 of the description and FIG. 11 thereof: a top surface of the interlayer dielectric layer 305d of the second area II (equivalent to the isolation structure of the first area) is higher than a top surface of the interlayer dielectric layer 305c of the first area I (equivalent to the isolation structure of the second area). In addition, reference document 2 can also achieve adjusting the channel width of the part of area of the transistor to the required width. That is to say, reference document 2 provides the inspiration for applying the additional technical feature to reference document 1 to further solve the technical problem thereof. Under this inspiration, those skilled in the art would have been motivated to obtain the technical solution further defined by claim 4 based on reference document 1 in combination with reference document 2, which would have been obvious to those skilled in the art. Therefore, on the basis that the claim to which claim 4 refers does not involve an inventive step, dependent claim 4 does not involve an inventive step, either.

5. Claim 5 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The additional technical feature of claim 5 is not disclosed in reference document 1, and constitutes a distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by claim 5 is how to effectively adjust the driving current. Reference document 2 discloses the following technical content in paragraphs 48-74 of the description and FIG. 11: a height h_2 of a first fin 301a (equivalent to the first fin-shaped structure) protruding from the interlayer dielectric layer 305d is lower than a height h_1 of a second fin 301b (equivalent to the second fin-shaped structure) protruding from the interlayer dielectric layer 305c (see paragraph 74 of the description). In addition, reference document 2 can also achieve adjusting the driving current through the fin height. That is to say, reference document 2 provides the inspiration for applying the additional technical feature to reference document 1 to further solve the technical problem thereof. Under this inspiration, those skilled in the art would have been motivated to obtain the technical solution further defined by claim 5 based on reference document 1 in combination with reference document 2, which would have been obvious to those skilled in the art. Therefore, on the basis that the claim to which claim 5 refers does not involve an inventive step, dependent claim 5 does not involve an inventive step, either.

6. Claim 6 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The additional technical feature of claim 6 has been disclosed in reference document 1. Paragraphs 41-55 of the description, and FIG. 3B, FIG. 5B, and FIG. 6B of reference document 1 disclose the following technical content:

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a height of the regular fin protruding from the substrate is higher than a height of the shaped fin protruding from the substrate. (Although reference document 1 does not directly disclose the heights of the fins and the substrate, reference document 1 discloses the heights of the fins relative to the bottom layer of the STI layer, so those skilled in the art could have clearly and unambiguously determined the heights of the fins relative to the substrate.) Therefore, on the basis that the claim to which claim 6 refers does not involve an inventive step, the technical solution sought to be protected by claim 6 does not involve an inventive step, either.

7. Claim 7 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The additional technical feature of claim 7 is not disclosed in reference document 1, and constitutes a distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by claim 7 is how to allow different parts of a device to cope with different voltage conditions. Reference document 3 (CN101675513A) discloses a fin-shaped structure, and discloses the following technical content in line 19 on page 4 to line 21 on page 7 of the description, and FIG. 1: an Nfet area (equivalent to the first area) comprises a high voltage threshold area (equivalent to a high voltage threshold area) and a Pfet area (equivalent to the second area) comprises a low voltage threshold area (equivalent to a low voltage threshold area). That is to say, reference document 3 provides the inspiration for applying the method of allowing different device areas to comprise different threshold voltages to reference document 1 to further solve the technical problem thereof. Under this inspiration, those skilled in the art would have been motivated to obtain the technical solution further defined by claim 7 based on reference document 1 in combination with reference document 3, which would have been obvious to those skilled in the art. Therefore, on the basis that the claim to which claim 7 refers does not involve an inventive step, dependent claim 7 does not involve an inventive step, either.

8. Replies to the statement of opinions of the applicant

The applicant considers as follows: reference document 1 does not disclose the relationship between the distance between top parts of two adjacent regular fins and the distance between top parts of two adjacent shaped fins, so reference document 1 does not give the technical inspiration of how to configure the distance between the fins, and cannot achieve the technical effect of forming in different areas fin-shaped structures with different critical dimensions in claim 1, and therefore claim 1 involves an inventive step.

However, the examiner holds a different opinion. Paragraphs 4-61 of the description, and FIG. 3A and 7-10 of reference document 1 disclose another embodiment as follows: wherein the distance between the bottom parts of the shaped fins is different from the distance between the top parts of the shaped fins. Therefore, based on one embodiment of reference document 1 which discloses that the top parts of the shaped fins are thin, in order to solve the technical problem of configuring the shape of the fin according to the required electrical effect, it can be combined with another embodiment to arrive at the technical solution where the top parts of the shaped fins are thin and the distance between the bottom parts of the shaped fins is different from the distance between the top parts of the shaped fins. In addition, to simplify the production process, in further combination with the common technical means in the art, the technical solution of claim 1 can be arrived at by equidistantly arranging different fins. Further, by arranging fins with different shapes at different parts, reference document 1 can also achieve the technical effect of forming different critical dimensions. Therefore, claim 1 does not involve an inventive step as prescribed in Article 22.3 of the Patent Law.

The applicant should make a reply within the reply deadline specified in this Office Action, should make detailed statement to all problems pointed out in this Office Action one by one, should amend the patent

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application document according to the opinions in this Office Action, especially should amend independent claims and corresponding dependent claims according to the reference documents cited in this Office Action, and should state in the Statement of Opinions the reasons that the amended independent claims involve an inventive step relative to the reference documents cited in this Office Action and the prior art before the filing date mentioned in the original description. Besides, the description should be adaptively amended according to the amended claims. The applicant should amend the application document in accordance with Article 33 of the Patent Law without going beyond the scope recorded in the original description and claims.

Examiner Name: Ding Ning

Examiner Code: 319794

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Statement of Opinions

Please complete all columns of this form correctly in accordance with the "Instructions".

<p>① Patent application or patent</p>	<p>Application No. or Patent No.: 201410454915.X</p> <hr/> <p>Title of Invention/Creation: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF</p> <hr/> <p>Applicant or Patentee (the first applicant should be filled in): UNITED MICROELECTRONICS CORP</p>
<p>② Matter(s) for Statement: For opinions regarding fees, please use the Statement of Opinions (Regarding Fees).</p> <p>Only one of the following options may be selected.</p> <p><input checked="" type="checkbox"/> State opinions regarding the Second Office Action (Issuance No. 2019102501831560) issued by the China National Intellectual Property Administration on October 30, 2019.</p> <p><input type="checkbox"/> State supplementary opinions regarding the ___Office Action (Issuance No.) issued by the China National Intellectual Property Administration on (Month)__(Day),__(Year).</p> <p><input type="checkbox"/> Voluntarily propose amendments (according to the provisions of Rule 51(1) and (2) of the Implementing Regulations of the Patent Law).</p> <p><input type="checkbox"/> Others</p>	
<p>③ Opinions Stated:</p> <p>To the Esteemed Examiner,</p> <p>In response to the Second Office Action issued regarding the present invention, along with the cited prior art documents—reference documents 1-4—we have conducted a careful and thorough analysis. We hereby provide our specific responses and amendments as follows:</p> <p>1. In view of the examiner's opinion that claim 1 does not involve an inventive step relative to reference document 1, the applicant has moved the group of product claims 1-7 to a position after the second group of method claims 8-12, on which the examiner did not comment, and amended the subject matter of the original claim 1 to "a fin-shaped structure manufactured by the method according to claim 1" to specifically define that the fin-shaped structure of the present application is manufactured through a specific manufacturing method. Since the examiner has not pointed out any inventive step defect in the method claims, the amended product claim 1 should involve an inventive step, and consequently, its dependent claims should also involve an inventive step.</p> <p>2. Based on the aforementioned amendment, the numbering and reference signs of the claims have been rewritten to form new claims 1-12.</p> <p>The applicant believes that the amended claims have overcome the existing defects. Please continue the examination of the present application on the above basis. If the examiner considers that the present application still does not comply with the provisions of the Patent Law, we respectfully request another opportunity to state our opinions and amend the application document.</p> <p>Finally, we sincerely thank the examiner for the hard work and effort devoted to the present patent application, and kindly request the examiner to continue examining the present application and grant the patent right as soon as possible.</p> <p>Our Case No.: PXJ04315</p> <p>Contact: Wang Yin (Tel: +86-10-62681616 ext. 7071)</p>	
<p>④ List of Attachments</p> <p>[Name of Attachment] Claims [Nature of Attachment] Electronic Copy</p>	

[Name of Attachment] Marked-up replacement sheets [Nature of Attachment] Electronic Copy

Filing Number of the Filed Certified Document(s): _____.

⑤ Signature/Seal of the Party or the Patent Agency

Beijing Liu, Shen & Associates

November 27, 2019

⑥ CNIPA Observations

(Month), (Day), (Year)

CLAIMS

~~1. A fin-shaped structure, comprising:~~

~~a substrate having a plurality of first fin-shaped structures located in a first area and a plurality of second fin-shaped structures located in a second area, wherein the second fin-shaped structure comprises a ladder-shaped cross-sectional profile part,~~

~~wherein the distance between top parts of adjacent first fin-shaped structures is less than the distance between top parts of adjacent second fin-shaped structures, and the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures.~~

~~2. The fin-shaped structure according to claim 1, wherein the width of a top part of the first fin-shaped structure is larger than the width of a top part of the second fin-shaped structure.~~

~~3. The fin-shaped structure according to claim 1, further comprising:~~

~~an isolation structure disposed beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively, and the ladder-shaped cross-sectional profile part is higher than a top surface of the isolation structure.~~

~~4. The fin-shaped structure according to claim 1, wherein a top surface of the isolation structure of the first area is higher than a top surface of the isolation structure of the second area.~~

~~5. The fin-shaped structure according to claim 1, wherein a height of the first fin-shaped structure protruding from the isolation structure is lower than a height of the second fin-shaped structure protruding from the isolation structure.~~

~~6. The fin-shaped structure according to claim 1, wherein a height of the first fin-shaped structure protruding from the substrate is higher than a height of the second fin-shaped structure protruding from the substrate.~~

~~7. The fin-shaped structure according to claim 1, wherein the first area comprises a high voltage threshold (HVT) area and the second area comprises a low voltage threshold (LVT) area.~~

~~8. A method of forming a fin-shaped structure, comprising:~~

~~providing a substrate having a first fin-shaped structure located in a first area and a second fin-shaped structure located in a second area;~~

~~filling an isolation structure beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively;~~

~~forming a patterned mask covering the first area but exposing the second area;~~

~~removing a top part of the isolation structure of the second area, thereby exposing a first top part of the second fin-shaped structure;~~

~~performing a treatment process to modify an external surface of the first top part of the second fin-shaped structure, thereby forming a modified part covering the first top part of the second fin-shaped structure;~~

~~removing the patterned mask; and~~

~~performing a removing process to remove a part of the isolation structure and the modified part by a high removing selectivity to the first fin-shaped structure and the second fin-shaped structure, and the~~

modified part and the isolation structure, thereby exposing a top part of the first fin-shaped structure and a second top part of the second fin-shaped structure.

92. The method of forming a fin-shaped structure according to claim 81, wherein the isolation structure comprises oxide and the modified part comprises oxide.

103. The method of forming a fin-shaped structure according to claim 81, wherein the treatment process comprises an oxidation process.

114. The method of forming a fin-shaped structure according to claim 103, wherein the treatment process comprises an oxygen gas-containing process or an in-situ steam generated (ISSG) process.

125. The method of forming a fin-shaped structure according to claim 81, wherein the removing process comprises an ammonia and nitrogen trifluoride containing etching process.

6. A fin-shaped structure manufactured by the method according to claim 1, comprising:
a substrate having a plurality of first fin-shaped structures located in a first area and a plurality of second fin-shaped structures located in a second area, wherein the second fin-shaped structure comprises a ladder-shaped cross-sectional profile part,

wherein the distance between top parts of adjacent first fin-shaped structures is less than the distance between top parts of adjacent second fin-shaped structures, and the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures.

7. The fin-shaped structure according to claim 6, wherein the width of a top part of the first fin-shaped structure is larger than the width of a top part of the second fin-shaped structure.

8. The fin-shaped structure according to claim 6, further comprising:
an isolation structure disposed beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively, and the ladder-shaped cross-sectional profile part is higher than a top surface of the isolation structure.

9. The fin-shaped structure according to claim 6, wherein a top surface of the isolation structure of the first area is higher than a top surface of the isolation structure of the second area.

10. The fin-shaped structure according to claim 6, wherein a height of the first fin-shaped structure protruding from the isolation structure is lower than a height of the second fin-shaped structure protruding from the isolation structure.

11. The fin-shaped structure according to claim 6, wherein a height of the first fin-shaped structure protruding from the substrate is higher than a height of the second fin-shaped structure protruding from the substrate.

12. The fin-shaped structure according to claim 6, wherein the first area comprises a high voltage threshold (HVT) area and the second area comprises a low voltage threshold (LUT) area.

CLAIMS

1. A method of forming a fin-shaped structure, comprising:
 - providing a substrate having a first fin-shaped structure located in a first area and a second fin-shaped structure located in a second area;
 - filling an isolation structure beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively;
 - forming a patterned mask covering the first area but exposing the second area;
 - removing a top part of the isolation structure of the second area, thereby exposing a first top part of the second fin-shaped structure;
 - performing a treatment process to modify an external surface of the first top part of the second fin-shaped structure, thereby forming a modified part covering the first top part of the second fin-shaped structure;
 - removing the patterned mask; and
 - performing a removing process to remove a part of the isolation structure and the modified part by a high removing selectivity to the first fin-shaped structure and the second fin-shaped structure, and the modified part and the isolation structure, thereby exposing a top part of the first fin-shaped structure and a second top part of the second fin-shaped structure.
2. The method of forming a fin-shaped structure according to claim 1, wherein the isolation structure comprises oxide and the modified part comprises oxide.
3. The method of forming a fin-shaped structure according to claim 1, wherein the treatment process comprises an oxidation process.
4. The method of forming a fin-shaped structure according to claim 3, wherein the treatment process comprises an oxygen gas-containing process or an in-situ steam generated (ISSG) process.
5. The method of forming a fin-shaped structure according to claim 1, wherein the removing process comprises an ammonia and nitrogen trifluoride containing etching process.
6. A fin-shaped structure manufactured by the method according to claim 1, comprising:
 - a substrate having a plurality of first fin-shaped structures located in a first area and a plurality of second fin-shaped structures located in a second area, wherein the second fin-shaped structure comprises a ladder-shaped cross-sectional profile part,
 - wherein the distance between top parts of adjacent first fin-shaped structures is less than the distance between top parts of adjacent second fin-shaped structures, and the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures.
7. The fin-shaped structure according to claim 6, wherein the width of a top part of the first fin-shaped structure is larger than the width of a top part of the second fin-shaped structure.
8. The fin-shaped structure according to claim 6, further comprising:
 - an isolation structure disposed beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively, and the ladder-shaped cross-sectional profile part is higher than a top surface of the isolation structure.

9. The fin-shaped structure according to claim 6, wherein a top surface of the isolation structure of the first area is higher than a top surface of the isolation structure of the second area.

10. The fin-shaped structure according to claim 6, wherein a height of the first fin-shaped structure protruding from the isolation structure is lower than a height of the second fin-shaped structure protruding from the isolation structure.

11. The fin-shaped structure according to claim 6, wherein a height of the first fin-shaped structure protruding from the substrate is higher than a height of the second fin-shaped structure protruding from the substrate.

12. The fin-shaped structure according to claim 6, wherein the first area comprises a high voltage threshold (HVT) area and the second area comprises a low voltage threshold (LVT) area.



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LIU SHEN & ASSOCIATES
Chen Xiaowen (62681616)

Issuance Date:

January 9, 2020



Application No.: 201410454915.X

Issued Document Serial No.: 2020010601804770

Applicant/Patentee: UNITED MICROELECTRONICS CORP

Title of the invention: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF

REJECTION DECISION

1. In accordance with Article 38 of the Chinese Patent Law and Rule 53 of the Implementing Regulations of Patent Law of People's Republic of China, the application is rejected on the basis of:

The application does not comply with the stipulation of Paragraph 3 of Article 22 of the Chinese Patent Law.

Please refer to the Rejection Decision for detailed rejection reasons.

2. The rejection decision is made with respect to the following documents:

Paragraphs 1-70 of the specification, drawings of the specification, abstract of the specification, abstract drawing submitted on the filing date.

Claims 1-12 submitted on November 27, 2019.

3. According to the stipulations of Article 41 and Rule 60 of the Implementing Regulations of the Patent Law, the applicant shall make a reexamination request to the Patent Reexamination Board within 3 months from receipt of this notification, if the applicant is not satisfied with the rejection decision. According to Rule 96 of the Implementation Rule of the Patent Law, the reexamination fee shall be paid at the expiry of the time limit. Where the fee has not been paid or fully paid at the expiry of the time limit, the request for reexamination shall be deemed to have not been filed.

Examiner: Ding Ning
Tel: 010-62411182

Examination Dept.: Electricity Invention Examination
Department

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REJECTION DECISION

Application Number: 201410454915X

This decision relates to an invention patent application entitled "FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF" with the application number 201410454915X. The applicant is United Microelectronics Corporation, and the filing date is September 09, 2014.

I. Cause of Action

The claims of the original application documents of this application include three independent claims which are claims 1, 9, and 14, as well as 17 dependent claims which are claims 2-8, 10-13, and 15-20.

At the applicant's request for substantive examination on August 08, 2017, the examiner carried out a substantive examination on this application, and issued the First Office Action on May 15, 2019, pointing out that claims 1, 3, and 6 lack novelty in the sense of Article 22.2 of the Patent Law; claims 4, 5, 7, and 8 do not involve an inventive step in the sense of Article 22.3 of the Patent Law; and claims 9 and 14 do not comply with Article 31.1 of the Patent Law. The following reference documents were cited in the Office Action:

Reference document 1: CN103050533A, published on April 17, 2013;

Reference document 2: CN104022116A, published on September 03, 2014;

Reference document 3: CN101675513A, published on March 17, 2010; and

Reference document 4: US2014191323A1, published on July 10, 2014.

The applicant submitted a statement of opinions and the amended claims on September 06, 2019 with regard to the First Office Action, which is summarized as follows: the applicant deleted claims 7 and 14-20, and added the additional technical feature of claim 7 to claim 1. The applicant stated the reasons why the amended claims are novel and involve an inventive step.

The examiner continued the examination, and issued the Second Office Action on October 30, 2019, pointing out that claims 1-7 do not involve an inventive step in the sense of Article 22.3 of the Patent Law.

The applicant submitted a statement of opinions and the amended claims on November 27, 2019 with regard to the Office Action above. The applicant moved claims 1-7 after claims 8-12, and amended the subject matter of the original claim 1 to "A fin-shaped structure manufactured by the method according to claim 1". The applicant deemed that since the examiner did not point out that the method claim has inventive defects, the amended product claim 1 shall involve an inventive step in the sense of Article 22.3 of the Patent Law.

The examiner thinks that the facts of the case are clear, and thus makes this rejection decision with regard to: paragraphs 1-70 of the specification, the drawings of the specification, the abstract of the specification, and the abstract drawing submitted on the filing date; and claims 6-12 submitted on November 27, 2019.

II. Cause for Rejection

1. Claim 6 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

Claim 6 sets forth a fin-shaped structure, and refers to the preceding claim 1 which relates to a method of forming a fin-shaped structure. In determining the scope of protection of claim 6, the actual defining effect of the features of claim 1 on the subject matter set forth in claim 6, in addition to the influence of the technical features of claim 6, is also reflected in the fact that: a ladder-shaped cross-sectional profile of a

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second fin-shaped structure of the fin-shaped structure in claim 6 should be a ladder that is narrow at the top and wide at the bottom (rather than wide at the top and narrow at the bottom); and a top surface of the isolation structure of the first area is higher than a top surface of the isolation structure of the second area.

On this basis, reference document 1 (CN103050533A) discloses a fin structure. In paragraphs 4-61 of the description, and figures 3A-10 (especially, figures 3B, 4B, 5B, and 6B), it is disclosed: comprising: a semiconductor substrate (equivalent to a substrate) having a plurality of regular fins (equivalent to first fin-shaped structures) located in a first area, and a plurality of shaped fins (equivalent to second fin-shaped structures) located in a second area, wherein the shaped fin comprises a ladder-shaped cross-sectional profile part (and the ladder is narrow at the top and wide at the bottom).

The distinguishing technical features of claim 1 over reference document 1 are that: (1) the distance between top parts of adjacent first fin-shaped structures is less than the distance between top parts of adjacent second fin-shaped structures, and the distance between bottom parts of adjacent first fin-shaped structures is equal to the distance between bottom parts of adjacent second fin-shaped structures; and (2) a top surface of the isolation structure of the first area is higher than a top surface of the isolation structure of the second area. Based on the distinguishing technical features, the technical problems solved in practice by claim 6 are how to: (1) configure the shape of the fin according to the required electrical effect, and (2) effectively adjust the electrical properties of the required area.

Based on distinguishing technical feature (1), in paragraphs 4-61 of the description, and figures 3A and 7-10 of reference document 1, another embodiment is disclosed in which the shaped fins can be configured such that the distance between the bottom parts thereof is different from the distance between the top parts thereof, and this can also solve the technical problem of how to configure the shape of the fin according to the required electrical effect. Moreover, on the basis that reference document 1 discloses a plurality of fins, in order to simplify the production process, equidistantly arranging the fin-shaped structures is a common technical means adopted by those skilled in the art.

Based on distinguishing technical feature (2), reference document 2 (CN104022116A) discloses a fin structure, and in paragraphs 37-89 of the description, and figure 11 of reference document 2, it is disclosed that: a top surface of the interlayer dielectric layer 305d of the second area II (equivalent to the isolation structure of the first area) is higher than a top surface of the interlayer dielectric layer 305C of the first area I (equivalent to the isolation structure of the second area). In addition, reference document 2 can also adjust the electrical properties of the part of area of the transistor as required.

Thus, those skilled in the art could have formed the technical solution of claim 6 by combining one embodiment of reference document 1 with another embodiment of reference document 1, reference document 2, and common technical means. Hence, it would have been obvious to those skilled in the art to arrive at the technical solution of claim 6 by combining one embodiment of reference document 1 with another embodiment of reference document 1, reference document 2, and common technical means. Therefore, the technical solution set forth in claim 6 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

2. Claim 7 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

The additional technical feature of claim 7 is disclosed by reference document 1. In paragraphs 49-55 of the description, and figures 5B and 6B of reference document 1, it is disclosed that the width of a top part of the regular fin is larger than the width of a top part of the shaped fin. Therefore, given that the claim to which

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claim 7 refers does not involve an inventive step, the technical solution set forth in claim 7 also does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

3. Claim 8 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

The additional technical feature of claim 8 is disclosed by reference document 1. In paragraphs 41-55 of the description, and figures 3B, 5B, and 6B of reference document 1, it is disclosed that: an STI layer 303 (equivalent to an isolation structure) disposed beside the regular fin of the first area and beside the shaped fin of the second area respectively, and the ladder-shaped cross-sectional profile part is higher than a top surface of the STI. Therefore, given that the claim to which claim 8 refers does not involve an inventive step, the technical solution set forth in claim 8 also does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

4. Claim 9 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

The additional technical feature of claim 9 is not disclosed by reference document 1, and constitutes a distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by claim 9 is how to effectively adjust the electrical properties of the required area.

Reference document 2 (CN104022116A) discloses a fin structure, and in paragraphs 37-89 of the description, and figure 11 of reference document 2, it is disclosed that: a top surface of the interlayer dielectric layer 305d of the second area II (equivalent to the isolation structure of the first area) is higher than a top surface of the interlayer dielectric layer 305c of the first area I (equivalent to the isolation structure of the second area). Moreover, reference document 2 can also adjust the electrical properties of the part of area of the transistor as required. That is, reference document 2 provides the inspiration for applying the above additional technical feature to reference document 1 to further solve the technical problem thereof. Given the inspiration, those skilled in the art would have been motivated to arrive at the technical solution further defined by claim 9 by combining reference document 1 with reference document 2, which would have been obvious to those skilled in the art. Therefore, given that the claim to which claim 9 refers does not involve an inventive step, dependent claim 9 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

5. Claim 10 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

The additional technical feature of claim 10 is not disclosed by reference document 1, and constitutes a distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by claim 10 is how to effectively adjust the driving current. In paragraphs 48-74 of the description, and figure 11 of reference document 2, it is disclosed that: a height h_2 of a first fin 301a (equivalent to the first fin-shaped structure) protruding from the interlayer dielectric layer 305d is lower than a height h_1 of a second fin 301b (equivalent to the second fin-shaped structure) protruding from the interlayer dielectric layer 305c (see paragraph 74 of the description). Moreover, reference document 2 can also adjust the driving current by means of the fin height. That is, reference document 2 provides the inspiration for applying the above additional technical feature to reference document 1 to further solve the technical problem thereof. Given the inspiration, those skilled in the art would have been motivated to arrive at the technical solution further defined by claim 10 by combining reference document 1 with reference document 2, which would have been obvious to those skilled in the art. Therefore, given that the claim to

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which claim 10 refers does not involve an inventive step, dependent claim 10 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

6. Claim 11 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

The additional technical feature of claim 11 is disclosed by reference document 1. In paragraphs 41-55 of the description, and figures 3B, 5B, and 6B of reference document 1, it is disclosed that a height of the regular fin protruding from the substrate is higher than a height of the shaped fin protruding from the substrate. (Although reference document 1 does not directly disclose the heights of the fins and the substrate, reference document 1 discloses the heights of the fins relative to the bottom layer of the STI layer, so those skilled in the art could have clearly and unambiguously determined the heights of the fins relative to the substrate.) Therefore, given that the claim to which claim 11 refers does not involve an inventive step, the technical solution set forth in claim 11 also does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

7. Claim 12 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

The additional technical feature of claim 10 is not disclosed by reference document 1, and constitutes another distinguishing technical feature over reference document 1. Based on the distinguishing technical feature, the technical problem to be solved in practice by claim 12 is how to allow different parts of a device to cope with different voltage conditions. Reference document 3 (CN101675513A) discloses a fin-shaped structure, and in line 19 of page 4 to line 21 of page 7 of the description, and figure 1, it is disclosed that: an NFET area (equivalent to the first area) comprises a high voltage threshold area (equivalent to a high voltage threshold area) and a PFET area (equivalent to the second area) comprises a low voltage threshold area (equivalent to a low voltage threshold area). That is, reference document 3 provides the inspiration for applying the method of allowing different device areas to comprise different threshold voltages to reference document 1 to further solve the technical problem thereof. Given the inspiration, those skilled in the art would have been motivated to arrive at the technical solution further defined by claim 12 by combining reference document 1 with reference document 3, which would have been obvious to those skilled in the art. Therefore, given that the claim to which claim 12 refers does not involve an inventive step, dependent claim 12 does not involve an inventive step in the sense of Article 22.3 of the Patent Law.

III. Decision

In summary, this invention patent application does not comply with Article 22.3 of the Patent Law, falling under the circumstance in Rule 53.2 of the Implementing Regulations of the Patent Law, and is thus rejected according to Article 38 of the Patent Law.

According to Article 41.1 of the Patent Law, where the applicant is not satisfied with this rejection decision, the applicant may, within three months from the date of receipt of this rejection decision, request the Reexamination and Invalidation Examination Ministry of the Patent Office to make a reexamination.

Examiner: Ding Ning

Examiner Code: 319794

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CLAIMS

1. A method of forming a fin-shaped structure, comprising:
 - providing a substrate having a first fin-shaped structure located in a first area and a second fin-shaped structure located in a second area;
 - filling an isolation structure beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively;
 - forming a patterned mask covering the first area but exposing the second area;
 - removing a top part of the isolation structure of the second area, thereby exposing a first top part of the second fin-shaped structure;
 - performing a treatment process to modify an external surface of the first top part of the second fin-shaped structure, thereby forming a modified part covering the first top part of the second fin-shaped structure;
 - removing the patterned mask; and
 - performing a removing process to remove a part of the isolation structure and the modified part by a high removing selectivity to the first fin-shaped structure and the second fin-shaped structure, and the modified part and the isolation structure, thereby exposing a top part of the first fin-shaped structure and a second top part of the second fin-shaped structure.
2. The method of forming a fin-shaped structure according to claim 1, wherein the isolation structure comprises oxide, and the modified part comprises oxide.
3. The method of forming a fin-shaped structure according to claim 1, wherein the treatment process comprises an oxidation process.
4. The method of forming a fin-shaped structure according to claim 3, wherein the treatment process comprises an oxygen gas-containing process or an in-situ steam generated (ISSG) process.
5. The method of forming a fin-shaped structure according to claim 1, wherein the removing process comprises an ammonia and nitrogen trifluoride containing etching process.

CLAIMS

1. A method of forming a fin-shaped structure, comprising:
 - providing a substrate having a first fin-shaped structure located in a first area and a second fin-shaped structure located in a second area;
 - filling an isolation structure beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively;
 - forming a patterned mask covering the first area but exposing the second area;
 - removing a top part of the isolation structure of the second area, thereby exposing a first top part of the second fin-shaped structure;
 - performing a treatment process to modify an external surface of the first top part of the second fin-shaped structure, thereby forming a modified part covering the first top part of the second fin-shaped structure;
 - removing the patterned mask; and
 - performing a removing process to remove a part of the isolation structure and the modified part by a high removing selectivity to the first fin-shaped structure and the second fin-shaped structure, and the modified part and the isolation structure, thereby exposing a top part of the first fin-shaped structure and a second top part of the second fin-shaped structure.
2. The method of forming a fin-shaped structure according to claim 1, wherein the isolation structure comprises oxide, and the modified part comprises oxide.
3. The method of forming a fin-shaped structure according to claim 1, wherein the treatment process comprises an oxidation process.
4. The method of forming a fin-shaped structure according to claim 3, wherein the treatment process comprises an oxygen gas-containing process or an in-situ steam generated (ISSG) process.
5. The method of forming a fin-shaped structure according to claim 1, wherein the removing process comprises an ammonia and nitrogen trifluoride containing etching process.

Re-examination Request

Please fill blanks according to Note(s)				Filled by CNIPA		
② Patent application	Application No. 201410454915X			① Case No.		
	Invention-creation title FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF					
③ Re-examination petitioner	Applicant (1)	Name: UNITED MICROELECTRONICS CORP	Code:	Application type	Industry and mining	
		Residence ID or Unified Social Credit Code/Organization Code			Email address	
		Nationality or registration Country(region)		Taiwan, China		
		Province/Autonomous Region/Municipality				
		County/City				
		District (town), Street, Address Number: Hsinchu Science Park, Hsinchu City, Taiwan, China				
		Residence/Business premise	Zip code	Tel		
	Applicant (2)	Name:	Code:	Application type		
		Nationality or registration Country(region)				
		Province/Autonomous Region/Municipality				
		County/City				
		District (town), Street, Address Number:				
		Residence/Business premise	Zip code	Tel		
	④ Recipient	Name:		Tel:		
Zip Code		Email address				
⑤ Agency	Name: LIU SHEN & ASSOCIATES			Firm code: 11105		
	agent (1)	Name: Chen Xiaowen		agent (2)	Name	
		License No.:1110500401.7			License No.	
		Tel: 62681616			Tel	

⑥ Pursuant to the stipulations of Paragraph 1, Article 41 of the Patent Law and Paragraph 1, Rule 60 of Implementing Rules of the Patent Law, the applicant refuses to accept the Rejection Decision made by China National Intellectual Property Administration on January 09, 2020 and makes the re-examination request.

⑦ Reasons for re-examination request:

To the Re-examination Panel:

The Applicant hereby files a request for re-examination with respect to the rejection decision issued by the China National Intellectual Property Administration on January 9, 2020, regarding this application.

I. Grounds for rejection

The examiner primarily argued in the grounds for rejection that, based on OA2, claims 6–12 of this case lack an inventive step in view of Reference document 1 (CN103050533A), Reference document 2 (CN104022116A), Reference document 3 (CN101675513A), and Reference document 4 (US2014191323A1), and the application was rejected on these grounds.

II. The applicant’s specific amendments and responses to the above grounds for rejection are as follows:

Regarding the examiner’s opinion that claims 6–12 lack an inventive step, the applicant has deleted claims 6–12 to overcome the above-mentioned defect.

III. Therefore, the applicant respectfully requests the re-examination panel to review the newly submitted claims of the present invention based on the above reasons, and to overturn the original decision.

Our Case No.: PXJ04315; Contact person: Wang Ying; Tel: 62681616 ext. 7071

⑧ annexes list

[Annex Name] Claims [Annex Attribute] Electronic Version

[Annex Name] Comparative Page of Amendments [Annex Attribute] Electronic Version

⑨ signature or seal of Re-examination petitioner or patent agency

LIU SHEN & ASSOCIATES

January 26, 2020

⑩ Opinions of CNIPA

Date

CLAIMS

1. A method of forming a fin-shaped structure, comprising:
 - providing a substrate having a first fin-shaped structure located in a first area and a second fin-shaped structure located in a second area;
 - filling an isolation structure beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively;
 - forming a patterned mask covering the first area but exposing the second area;
 - removing a top part of the isolation structure of the second area, thereby exposing a first top part of the second fin-shaped structure;
 - performing a treatment process to modify an external surface of the first top part of the second fin-shaped structure, thereby forming a modified part covering the first top part of the second fin-shaped structure;
 - removing the patterned mask; and
 - performing a removing process to remove a part of the isolation structure and the modified part by a high removing selectivity to the first fin-shaped structure and the second fin-shaped structure, and the modified part and the isolation structure, thereby exposing a top part of the first fin-shaped structure and a second top part of the second fin-shaped structure.
2. The method of forming a fin-shaped structure according to claim 1, wherein the isolation structure comprises oxide and the modified part comprises oxide.
3. The method of forming a fin-shaped structure according to claim 1, wherein the treatment process comprises an oxidation process.
4. The method of forming a fin-shaped structure according to claim 3, wherein the treatment process comprises an oxygen gas-containing process or an in-situ steam generated (ISSG) process.
5. The method of forming a fin-shaped structure according to claim 1, wherein the removing process comprises an ammonia and nitrogen trifluoride containing etching process.

CLAIMS

1. A method of forming a fin-shaped structure, comprising:
 - providing a substrate having a first fin-shaped structure located in a first area and a second fin-shaped structure located in a second area;
 - filling an isolation structure beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively;
 - forming a patterned mask covering the first area but exposing the second area;
 - removing a top part of the isolation structure of the second area, thereby exposing a first top part of the second fin-shaped structure;
 - performing a treatment process to modify an external surface of the first top part of the second fin-shaped structure, thereby forming a modified part covering the first top part of the second fin-shaped structure;
 - removing the patterned mask; and
 - performing a removing process to remove a part of the isolation structure and the modified part by a high removing selectivity to the first fin-shaped structure and the second fin-shaped structure, and the modified part and the isolation structure, thereby exposing a top part of the first fin-shaped structure and a second top part of the second fin-shaped structure.
2. The method of forming a fin-shaped structure according to claim 1, wherein the isolation structure comprises oxide and the modified part comprises oxide.
3. The method of forming a fin-shaped structure according to claim 1, wherein the treatment process comprises an oxidation process.
4. The method of forming a fin-shaped structure according to claim 3, wherein the treatment process comprises an oxygen gas-containing process or an in-situ steam generated (ISSG) process.
5. The method of forming a fin-shaped structure according to claim 1, wherein the removing process comprises an ammonia and nitrogen trifluoride containing etching process.
- ~~6. A fin-shaped structure fabricated by the method according to claim 1, comprising:
 - a substrate having a plurality of first fin-shaped structures located in a first area; and a plurality of second fin-shaped structure located in a second area,
 - wherein the distance between neighboring top parts of the first fin-shaped structures is less than the distance between neighboring top parts of the second fin-shaped structures, and the distance between neighboring bottom parts of the first fin-shaped structures is equal to the distance between neighboring top parts of the second fin-shaped structures.~~
- ~~7. The fin-shaped structure according to claim 6, wherein the width of a top part of the first fin-shaped structure is larger than the width of a top part of the second fin-shaped structure.~~
- ~~8. The fin-shaped structure according to claim 6, further comprising:
 - an isolation structure disposed beside the first fin-shaped structure of the first area and beside the second fin-shaped structure of the second area respectively, and the ladder-shaped cross-sectional profile part is higher than a top surface of the isolation structure.~~
- ~~9. The fin-shaped structure according to claim 6, wherein a top surface of the isolation structure of the first area is higher than a top surface of the isolation structure of the second area.~~

~~10. The fin shaped structure according to claim 6, wherein a height of the first fin shaped structure protruding from the isolation structure is lower than a height of the second fin shaped structure protruding from the isolation structure.~~

~~11. The fin shaped structure according to claim 6, wherein a height of the first fin shaped structure protruding from the substrate is higher than a height of the second fin shaped structure protruding from the substrate.~~

~~12. The fin shaped structure according to claim 6, wherein the first area comprises a high voltage threshold (HVT) area and the second area comprises a low voltage threshold (LVT) area.~~



**CHINA NATIONAL INTELLECTUAL PROPERTY
ADMINISTRATION**

100080

Hanghai Plaza (1+1 Plaza), 10th Floor, No. 10 Caihefang Road, Haidian
District, Beijing
LIU SHEN & ASSOCIATES
Chen Xiaowen (62681616)

Issuance date:

March 3, 2020



Application or Patent No.: 201410454915.X

Issuance No.: 2020022100014120

Case No.: 1F323094

Title of the invention: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF

Petitioner: UNITED MICROELECTRONICS CORP

ACCEPTANCE NOTICE OF REEXAMINATION

To the Reexamination Petitioner,

On February 26, 2020, the request for reexamination submitted by the petitioner in respect of the aforementioned patent application has, after a formal examination, been found to comply with the relevant provisions of the Patent Law of the People's Republic of China, Implementing Regulations of the Patent Law, and the Guidelines for Patent Examination, and is therefore approved for acceptance.

If the petitioner withdraws their request for reexamination, such withdrawal shall be handled in accordance with the provisions of Article 64 of the Implementing Regulations of the Patent Law of the People's Republic of China.

Note: please clearly indicate the case number and the patent application number during statement of opinions.

Examiner: Zhang Xuefei

Patent Reexamination and Invalidation Review
Department

200905 For paper applications, replies should be sent to: The Filing Office, Patent Office, China National Intellectual Property Administration, 6 Xitucheng Road, Jimen Bridge, Haidian, Beijing, 100088

2019. 4 For electronic applications, related documents should be submitted by means of the electronic patent application system in the form of electronic documents. Unless otherwise specified, documents submitted in paper or other forms will be deemed as not having been submitted.



CHINA NATIONAL INTELLECTUAL PROPERTY
ADMINISTRATION

100080

Hanghai Plaza (1+1 Plaza), 10th Floor, No. 10 Caihefang Road, Haidian
District, Beijing
LIU SHEN & ASSOCIATES
Chen Xiaowen (62681616)

Issuance date:

March 16, 2020



Application or Patent No.: 201410454915.X

Issuance No.: 2020031101883450

Case No.: 1F323094

Title of the invention: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF

Petitioner: UNITED MICROELECTRONICS CORP

Decision of Reexamination
(No. 205471)

According to the interlocutory examination opinions, the rejection decision made by China National Intellectual Property Administration on January 9, 2020 is withdrawn, and the original examination department is to continue the examination and approval procedure.

The rejection decision made by China National Intellectual Property Administration on _____ is maintained.

The rejection decision made by China National Intellectual Property Administration on _____ is withdrawn after examination.

If the requester is not satisfied with the decision, he may institute legal proceedings before Beijing Intellectual Property Court according to Article 41.2 within three months from the date of receipt of the reexamination decision.

Annex: ____ pages of the text of the decision (counted from page 2).

Chief of the Collegiate Panel: Feng Tao

Main examiner: Guo Lina

Assistant examiner: Zhang Liquan

Examination Department for Reexamination and
Invalidation of Patent Office

200905 For paper applications, replies should be sent to: The Filing Office, Patent Office, China National Intellectual Property Administration, 6 Xitucheng Road, Jimen Bridge, Haidian, Beijing, 100088

2019. 4 For electronic applications, related documents should be submitted by means of the electronic patent application system in the form of electronic documents. Unless otherwise specified, documents submitted in paper or other forms will be deemed as not having been submitted.



CHINA NATIONAL INTELLECTUAL PROPERTY
ADMINISTRATION

100080

Hanghai Plaza (1+1 Plaza), 10th Floor, No. 10 Caihefang Road, Haidian
District, Beijing
LIU SHEN & ASSOCIATES
Chen Xiaowen (62681616)

Issuance date:

April 09, 2020



Application or Patent No.: 201410454915.X

Issuance No.: 202031800101980

Case No.: 1F323094

Title of the invention: FIN-SHAPED STRUCTURE AND MANUFACTURING METHOD THEREOF

Petitioner: UNITED MICROELECTRONICS CORP

Notification of Granting Invention Patent Right

1. According to the stipulations of Article 39 of the Patent Law and Rule 54 of Implementing Regulations of the Patent Law, above mentioned invention patent application has been subjected to substantive examination and no rejection reason is found, thereby an announcement is made for granting a patent right.

The applicant shall fulfill the registration formalities according to the content of the Notification of Fulfilling Registration Formalities.

After the applicant has fulfilled the formalities within the specified time limit, China National Intellectual Property Administration will make a decision of granting a patent right, grant a patent certificate, make a registration and announcement.

Where the registration formalities have not been fulfilled at the expiry of the time limit, the applicant shall be deemed to have been withdrawn the granted patent right.

2. Above mentioned invention patent application is granted a patent right based on the following application documents:

original application documents; the documents submitted on the divisional application submission date.

the following application documents:

Abstract of the specification, paragraphs 1-70 of the specification, abstract drawing, drawings of the specification submitted on filing date;

Claims 1-5 submitted on February 26, 2020.

3. The title of above mentioned invention that has been granted a patent right:

is not changed.

is changed from _____.

4. The "Declaration of Withdrawing Patent Rights" submitted by the applicant with respect to Patent No. on Month ____ Day ____, Year ____, after examination:

is entered into the formality of withdrawing patent rights.

210413 For paper applications, replies should be sent to: The Filing Office, Patent Office, China National Intellectual Property Administration, 6 Xitucheng Road, Jimen Bridge, Haidian, Beijing, 100088

2018.10 For electronic applications, related documents should be submitted by means of the electronic patent application system in the form of electronic documents. Unless otherwise specified, documents submitted in paper or other forms will be deemed as not having been submitted.



CHINA NATIONAL INTELLECTUAL PROPERTY ADMINISTRATION

is not yet entered into the formality of withdrawing patent rights. The reason is: the patent declared to be withdrawn by the applicant is not the same invention-creation as the present application for an invention patent.

5. The examiner makes the following amendments to the application document ex officio:
6. The application document that is received after the issuance of the Notification, and amended by the applicant on its own initiative will not be placed in consideration.

Examiner: Ding Ning
Tel: 010-62411182

Examination Department: Electricity Invention
Examination Department

210413 For paper applications, replies should be sent to: The Filing Office, Patent Office, China National Intellectual Property Administration, 6 Xitucheng Road, Jimen Bridge, Haidian, Beijing, 100088
2018.10 For electronic applications, related documents should be submitted by means of the electronic patent application system in the form of electronic documents. Unless otherwise specified, documents submitted in paper or other forms will be deemed as not having been submitted.



CERTIFICATE OF TRANSLATION

Questel-Orbit, Incorporated
2331 Mill Road, Suite 600
Alexandria, VA 22314, U.S.A.
www.questel.com

Client Name: **Sterne, Kessler, Goldstein & Fox**
Source Language: **Chinese**
Target Language: **English**
Project Number: **SKGF2540027UT-L_Q**
Application: **N/A**

The document identified below was translated by Questel-Orbit, Incorporated, through its translation subsidiary MultiLing Corporation or Morningside Translations, LLC. On behalf of the translating entity, the undersign certifies the following:

- 1) it is a professional translation company of multiple languages, including the source and target languages noted above, that has hired and assigned qualified translator(s) to translate the Original Document from the source language to the target language;
- 2) it has translated from the Original Document to the Translated Document (identified below and attached hereto), and to the best of its knowledge, information, and belief, the Translated Document is a true, accurate, and verified publication-quality translation of the Original Document;
- 3) all statements made of my own knowledge are true and accurate, and all statements made on information and belief are believed to be true and accurate; and
- 4) the above statements were made with the knowledge that willful false statements are punishable by fine or imprisonment under Section 1001 of Title 18 of the United States Code.

Original Document Identifier: 201410454915X-file history chronologically.pdf
Translated Document Identifier: 3630.032IPRO_OA_en-US.doc; 3630.032IPRO_OA_en-US.pdf

Signed this 5th day of December 2025.

Miriam Grover

Name: Miriam Grover
Title: Project Manager



100101

北京市彩和坊路 10 号 1 号楼 10 层 北京市柳沈律师事务所
陈小雯

发文日:

2014 年 11 月 18 日



申请号或专利号: **201410454915.X**

发文序号: **2014111401227380**

申请人或专利权人: 联华电子股份有限公司

发明创造名称: 鳍状结构及其制造方法

发明专利申请初步审查合格通知书

1. 上述专利申请, 经初步审查, 符合专利法实施细则第 44 条的规定。
2. 根据专利法第 34 条的规定, 专利申请自申请日起满十八个月即行公布。
3. 初步审查合格的上述发明专利申请是以:
2014 年 9 月 9 日提交的说明书摘要;
2014 年 9 月 9 日提交的摘要附图;
2014 年 9 月 9 日提交的权利要求书;
2014 年 9 月 9 日提交的说明书;
2014 年 9 月 9 日提交的说明书附图
为基础的。

提示:

1. 发明专利申请人可以自申请日起 3 年内提交实质审查请求书、缴纳实质审查费, 申请人期满未提交实质审查请求书或者期满未缴纳或未缴足实质审查费的, 该申请被视为撤回。

2. 费用可以直接到国家知识产权局缴纳, 也可以通过邮局或者银行汇付。如通过邮局汇付, 收款人姓名: 国家知识产权局专利局收费处; 商户客户号: 110000860。如通过银行汇付, 开户银行: 中信银行北京知春路支行; 户名: 中华人民共和国国家知识产权局专利局; 账号: 7111710182600166032。

汇款时应当准确写明申请号、费用名称(或简称)及分项金额。未写明申请号和费用名称(或简称)的视为未办理缴费手续。

审查员: 宗林霞

审查部门: 初审及流程管理部

210304
2010.4

纸件申请, 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局受理处收
电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。



100080

北京市彩和坊路 10 号 1 号楼 10 层 北京市柳沈律师事务所
陈小雯

发文日:

2016 年 04 月 13 日



申请号或专利号: 201410454915.X

发文序号: 2016040601423080

申请人或专利权人: 联华电子股份有限公司

发明创造名称: 鳍状结构及其制造方法

发明专利申请公布通知书

上述专利申请, 经初步审查, 符合专利法实施细则第 44 条的规定。根据专利法第 34 条的规定, 该申请在 32 卷 14 期 2016 年 04 月 06 日专利公报上予以公布。

注: 附发明专利申请单行本一份。

提示:

1. 发明专利申请人可以自申请日起 3 年内提交实质审查请求书、缴纳实质审查费, 申请人期满未提交实质审查请求书或期满未足额缴纳实质审查费的, 该申请被视为撤回。

2. 费用可以直接到国家知识产权局缴纳, 也可以通过邮局或者银行汇付。如通过邮局汇付, 收款人姓名: 国家知识产权局专利局收费处; 商户客户号: 110000860。如通过银行汇付, 开户银行: 中信银行北京知春路支行; 户名: 中华人民共和国国家知识产权局专利局; 账号: 7111710182600166032。

汇款时应当准确写明申请号、费用名称(或简称)及分项金额。未写明申请号和费用名称(或简称)的视为未办理缴费手续。

3. 专利电子申请不提供专利申请单行本, 申请人可以访问国家知识产权局政府网站 (www.sipo.gov.cn), 在专利检索栏目中查询公布文本。

4. 申请文件修改格式要求:

对权利要求修改的应当提交相应的权利要求替换项, 涉及权利要求引用关系时, 则需要将相应权项一起替换补正。如果申请人需要删除部分权项, 申请人应该提交整理后连续编号的部分权利要求书。

对说明书修改的应当提交相应的说明书替换段, 不得增加和删除段号, 仅只能对有修改部分段进行整段替换。如果要增加内容, 则只能增加在某一段中; 如果需要删除一个整段内容, 应该保留该段号, 并在此段号后注明: “此段删除” 字样。段号以国家知识产权局回传的或公布/授权公告的说明书段号为准。

对说明书附图、摘要、摘要附图修改的应当提交相应的说明书附图、摘要、摘要附图替换页。

同时, 申请人应当在补正书或意见陈述书中标明修改涉及的权项、段号、页。

210305
2010. 4

纸件申请, 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。



审 查 员：谭小海

审查部门：专利局初审及流程管理部

联系电话：62356655

210305 纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路6号 国家知识产权局专利局受理处收
2010.4 电子申请，应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外，以纸件等其他形式提交的文件视为未提交。

实 质 审 查 请 求 书

请按照“注意事项”正确填写本表各栏

本框由国家知识产权局填写

① 专 利 申 请	申请号 201410454915X 发明创造名称 鳍状结构及其制造方法 申请人 (*应当填写第一署名申请人) 联华电子股份有限公司	递交日 申请号条码 挂号条码
② 请求内容: 根据专利法第 35 条的规定, 请求对上述专利申请进行实质审查。 <input type="checkbox"/> 申请人声明, 放弃专利法实施细则第 51 条规定的主动修改的权利。		
③ 附件清单 		
④ 备注 <input type="checkbox"/> 该申请为 PCT 国际申请, 实质审查费不予减免 <input type="checkbox"/> 该申请为 PCT 国际申请, 已由欧洲专利局、日本专利局、瑞典专利局作出国际检索报告, 实质审查费减免 20% <input type="checkbox"/> 该申请为 PCT 国际申请, 已由中国作出国际检索报告及专利性国际初步报告, 实质审查费减免 100% <input type="checkbox"/>		
⑤ 申请人或专利代理机构签字或者盖章 北京市柳沈律师事务所 <div style="text-align: right;">2017年08月08日</div>		⑥ 国家知识产权局处理意见 <div style="text-align: right;">年 月 日</div>



100080

北京市彩和坊路 10 号 1 号楼 10 层 北京市柳沈律师事务所
陈小雯(62681616)

发文日:

2017 年 08 月 15 日



申请号或专利号: 201410454915.X

发文序号: 2017081000242770

申请人或专利权人: 联华电子股份有限公司

发明创造名称: 鳍状结构及其制造方法

发明专利申请进入实质审查阶段通知书

上述专利申请, 根据申请人提出的实质审查请求, 经审查, 符合专利法第 35 条及实施细则第 96 条的规定, 该专利申请进入实质审查阶段。

提示:

1. 根据专利法实施细则第 51 条第 1 款的规定, 发明专利申请人自收到本通知书之日起 3 个月内, 可以对发明专利申请主动提出修改。

2. 申请文件修改格式要求:

对权利要求修改的应当提交相应的权利要求替换项, 涉及权利要求引用关系时, 则需要将相应权项一起替换补正。如果申请人需要删除部分权项, 申请人应该提交整理后连续编号的部分权利要求书。

对说明书修改的应当提交相应的说明书替换段, 不得增加和删除段号, 仅只能对有修改部分段进行整段替换。如果要增加内容, 则只能增加在某一段中; 如果需要删除一个整段内容, 应该保留该段号, 并在此段号后注明: “此段删除” 字样。段号以国家知识产权局回传的或公布/授权公告的说明书段号为准。

对说明书附图、摘要、摘要附图修改的应当提交相应的说明书附图、摘要、摘要附图替换页。

同时, 申请人应当在补正书或意见陈述书中标明修改涉及的权项、段号、页。

审查员: 陈新

审查部门: 专利局初审及流程管理部

联系电话: 62356655

210307
2010.2

纸件申请, 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。



100080

北京市彩和坊路 10 号 1 号楼 10 层 北京市柳沈律师事务所
陈小雯(62681616)

发文日:

2019 年 05 月 15 日



申请号或专利号: 201410454915.X

发文序号: 2019051100279830

申请人或专利权人: 联华电子股份有限公司

发明创造名称: 鳍状结构及其制造方法

第一次审查意见通知书

1. 应申请人提出的实质审查请求, 根据专利法第 35 条第 1 款的规定, 国家知识产权局对上述发明专利申请进行实质审查。

根据专利法第 35 条第 2 款的规定, 国家知识产权局决定自行对上述发明专利申请进行审查。

2. 申请人要求以其在:

申请人已经提交了经原受理机构证明的第一次提出的在先申请文件的副本。

申请人尚未提交经原受理机构证明的第一次提出的在先申请文件的副本, 根据专利法第 30 条的规定视为未要求优先权要求。

3. 经审查, 申请人于____提交的修改文件, 不符合专利法实施细则第 51 条第 1 款的规定, 不予接受。

4. 审查针对的申请文件:

原始申请文件。 分案申请递交日提交的文件。 下列申请文件:

5. 本通知书是在未进行检索的情况下作出的。

本通知书是在进行了检索的情况下作出的。

本通知书引用下列对比文件(其编号在今后的审查过程中继续沿用):

编号	文件号或名称	公开日期 (或抵触申请的申请日)
1	CN 103050533A	20130417
2	CN 104022116A	20140903
3	CN 101675513A	20100317
4	US 2014191323A1	20140710

6. 审查的结论性意见:

关于说明书:

申请的内容属于专利法第 5 条规定的不授予专利权的范围。

说明书不符合专利法第 26 条第 3 款的规定。

说明书不符合专利法第 33 条的规定。

210401
2018.10

纸件申请, 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。



说明书的撰写不符合专利法实施细则第 17 条的规定。

关于权利要求书：

权利要求_____不符合专利法第 2 条第 2 款的规定。

权利要求_____不符合专利法第 9 条第 1 款的规定。

权利要求 1-3、6 不具备专利法第 22 条第 2 款规定的新颖性。

权利要求 4、5、7、8 不具备专利法第 22 条第 3 款规定的创造性。

权利要求_____不具备专利法第 22 条第 4 款规定的实用性。

权利要求_____属于专利法第 25 条规定的不授予专利权的范围。

权利要求_____不符合专利法第 26 条第 4 款的规定。

权利要求 9、14 不符合专利法第 31 条第 1 款的规定。

权利要求_____不符合专利法第 33 条的规定。

权利要求_____不符合专利法实施细则第 19 条的规定。

权利要求_____不符合专利法实施细则第 20 条的规定。

权利要求_____不符合专利法实施细则第 21 条的规定。

权利要求_____不符合专利法实施细则第 22 条的规定。

申请不符合专利法第 26 条第 5 款或者实施细则第 26 条的规定。

申请不符合专利法第 20 条第 1 款的规定。

分案申请不符合专利法实施细则第 43 条第 1 款的规定。

上述结论性意见的具体分析见本通知书的正文部分。

7. 基于上述结论性意见，审查员认为：

申请人应当按照通知书正文部分提出的要求，对申请文件进行修改。

申请人应当在意见陈述书中论述其专利申请可以被授予专利权的理由，并对通知书正文部分中指出的不符合规定之处进行修改，否则将不能授予专利权。

专利申请中没有可以被授予专利权的实质性内容，如果申请人没有陈述理由或者陈述理由不充分，其申请将被驳回。

8. 申请人应注意下列事项：

(1) 根据专利法第 37 条的规定，申请人应在收到本通知书之日起的 4 个月内陈述意见，如果申请人无正当理由逾期不答复，其申请被视为撤回。

(2) 申请人对其申请的修改应当符合专利法第 33 条的规定，不得超出原说明书和权利要求书记载的范围，同时申请人对专利申请文件进行的修改应当符合专利法实施细则第 51 条第 3 款的规定，按照本通知书的要求进行修改。

(3) 申请人的意见陈述书和/或修改文本应邮寄或递交国家知识产权局专利局受理处，凡未邮寄或递交给受理处的文件不具备法律效力。

(4) 未经预约，申请人和/或代理人不得前来国家知识产权局专利局与审查员举行会晤。

(5) 对进入实质审查阶段的发明专利申请，在第一次审查意见通知书答复期限届满前（已提交答复意见的除外），主动申请撤回的，可以请求退还 50% 的专利申请实质审查费。

9. 本通知书正文部分共有 4 页，并附有下列附件：

引用的对比文件的复印件共_____份_____页。

审查员：丁宁

联系电话：010-62411182

审查部门：电学发明审查部



第一次审查意见通知书

申请号:201410454915X

本申请涉及一种鳍状结构及其形成方法。经审查,现提出如下的审查意见。

1. 权利要求 1 不具备专利法第二十二条第二款规定的新颖性。

权利要求 1 请求保护一种鳍状结构,对比文件 1 (CN103050533A) 公开了一种鳍结构,在说明书的第 4-61 段,附图 3B、4B、5B、6B 公开了包含有:半导体衬底(相当于基底),具有规则鳍(相当于第一鳍状结构),位于一第一区;以及成型鳍(相当于第二鳍状结构),位于一第二区,其中该成型鳍包含一阶梯状的剖面结构部分。由此可见,对比文件 1 已经公开了该权利要求的全部技术特征,且对比文件 1 所公开的技术方案与该权利要求所要求保护的技术方案属于同一技术领域,能够解决同样的技术问题,并能产生相同的技术效果,因此该权利要求所要求保护的技术方案不具备新颖性。

2. 权利要求 2 不具备专利法第二十二条第二款规定的新颖性。

该权利要求的附加技术特征在对比文件 1 中被公开了,在对比文件 1 说明书第 49-55 段,附图 5B、6B 公开,其中该规则鳍的顶部宽度大于该成型鳍的顶部宽度。因此,该权利要求在其引用的权利要求不具备新颖性的基础上,该权利要求所要求保护的技术方案也不具备新颖性。

3. 权利要求 3 不具备专利法第二十二条第二款规定的新颖性。

该权利要求的附加技术特征在对比文件 1 中被公开了,在对比文件 1 说明书第 41-55 段,附图 3B、5B、6B 公开,STI 层 303 (相当于绝缘结构),分别设置于该第一区的该规则鳍侧边以及该第二区的该成型鳍侧边,且该阶梯状的剖面结构部分高于该 STI 的一顶面。因此,该权利要求在其引用的权利要求不具备新颖性的基础上,该权利要求所要求保护的技术方案也不具备新颖性。

4. 权利要求 4 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中没有被公开,构成了与对比文件 1 的区别技术特征,基于该区别技术特征,该权利要求实际解决的技术问题是,如何有效的调控需要区域的沟道宽度。

对比文件 2 (CN104022116A) 公开了一种鳍结构,其说明书 37-89 段,附图 11 公开了:位于第二区域 II 的层间介质层 305d (相当于第一区的绝缘结构) 的一顶面高于位于该第一区域 I 的层间介质层 305c (相当于第二区的绝缘结构) 的一顶面,并且对比文件 2 也能够调控晶体管部分区域的沟道宽度为需要的宽度。即对比文件 2 给出了将上述附加技术特征应用到对比文件 1 中以进一步解决其技术问题的启示,在该启示下,本领域技术人员有动力在对比文件 1 的基础上结合对比文件 2 得出该权利要求进一步限定的技术方案,对本领域的技术人员来说是显而易见的,因而在其引用的权利要求不具备新颖性的情况下,该从属权利要求不具备专利法第二十二条第三款规定的创造性。

5. 权利要求 5 不具备专利法第二十二条第三款规定的创造性。



该权利要求的附加技术特征在对比文件 1 中没有被公开，构成了与对比文件 1 的区别技术特征，基于该区别技术特征，该权利要求实际解决的技术问题是，如何有效的调控驱动电流。对比文件 2 说明书 48-74 段，附图 11 公开了：第一鳍部 301a（相当于第一鳍状结构）突出于层间介质层 305d 的一高度 h_2 ，小于第二鳍部 301b（相当于第二鳍状结构）突出于层间介质层 305c 的一高度 h_1 （参见说明书第 74 段），并且对比文件 2 也能够通过鳍高度调控驱动电流。即对比文件 2 给出了将上述附加技术特征应用到对比文件 1 中以进一步解决其技术问题的启示，在该启示下，本领域技术人员有动机在对比文件 1 的基础上结合对比文件 2 得出该权利要求进一步限定的技术方案，对本领域的技术人员来说是显而易见的，因而在其引用的权利要求不具备新颖性的情况下，该从属权利要求不具备专利法第二十二条第三款规定的创造性。

6. 权利要求 6 不具备专利法第二十二条第二款规定的新颖性。

该权利要求的附加技术特征在对比文件 1 中被公开了，在对比文件 1 说明书第 41-55 段，附图 3B、5B、6B 公开，该规则鳍突出于该衬底的一高度，大于该成型鳍突出于该衬底的一高度。（虽然对比文件 1 没有直接公开鳍与衬底的高度，但是对比文件 1 中公开了鳍相对于 STI 层底层的高度，本领域技术人员能够明确毫无疑问的确定出鳍相对于衬底的高度）因此，该权利要求在其引用的权利要求不具备新颖性的基础上，该权利要求所要求保护的技术方案也不具备新颖性。

7. 权利要求 7 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中被部分公开了，在对比文件 1 说明书第 41-61 段，附图 3B、5B、6B 公开，多个该规则鳍以及多个该成型鳍（参见说明书 61 段）。“且各该第一鳍状结构的顶部之间的间距小于各该第二鳍状结构的顶部之间的间距”构成了与对比文件 1 的区别技术特征，基于此区别技术特征，该权利要求实际解决的技术问题是，如何更好的设置鳍结构的位置。然而在对比文件 1 公开了多个鳍的基础上，为了更好的设置鳍结构，将鳍状结构等间距设置是本领域技术人员的常用技术手段，这样由于成型鳍的顶部更薄，其顶部之间的间距比规则鳍顶部之间的间距会更大，即形成了该权利要求要求保护的技术方案。即本领域技术人员在对比文件 1 的基础上结合本领域常用技术手段能够得到该权利要求的技术方案。因此，该权利要求所要求保护的技术方案不具备创造性。

8. 权利要求 8 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中没有被公开，构成了与对比文件 1 的区别技术特征，基于该区别技术特征，该权利要求实际解决的技术问题是，如何使器件的不同部位应对不同的电压条件。对比文件 3 (CN101675513A) 公开了一种鳍状结构说明书第 4 页第 19 行到第 7 页第 21 行，附图 1 公开了：NFET 区（相当于第一区）包含一高阈值电压区（相当于高临界电压区），PFET 区（相当于第二区）包含一低阈值电压区（相当于低临界电压区）。即对比文件 3 给出了将上述不同器件区域包括不同临界电压的方法应用到对比文件 1 中以进一步解决其技术问题的启示，在该启示下，本领域技术人员有动力在对比文件 1 的基础上结合对



比文件 3 得出该权利要求进一步限定的技术方案，对本领域的技术人员来说是显而易见的，因而在其引用的权利要求不具备新颖性的情况下，该从属权利要求不具备专利法第二十二条第三款规定的创造性。

9. 独立权利要求 9 与独立权利要求 14 之间不具备专利法第三十一条第一款规定的单一性。

独立权利要求 9 涉及一种形成鳍状结构的方法。对比文件 4(US2014191323A1)是其最接近的现有技术,其说明书第 30-49 段,附图 1-12 公开了:提供一基底 101,具有第一组鳍 121、122(相当于第一鳍状结构),位于一左边区域(相当于第一区);以及第二组鳍 123、124(相当于第二鳍状结构)位于一右边区域(相当于第二区);分别填入一介质层 201(相当于绝缘结构)于该左边区域的该第一组鳍 121、122 侧边以及该右边区域的该第二组鳍 123、124 侧边;形成一图案化掩模 321,覆盖该左边区域但暴露出该右边区域;移除该右边区域的该介质层 201 的一顶部,因而暴露出该第二组鳍 123、124 的一第一顶部;移除该图案化掩模 321。

“进行一处理制作工艺,将该第二鳍状结构的该第一顶部的一外表面改质,因而形成一改质部,覆盖该第二鳍状结构的该第一顶部;以及进行一移除制作工艺,经由对于该第一鳍状结构以及该第二鳍状结构与对于该改质部以及该绝缘结构的高移除选择比,而移除该绝缘结构的一部分以及该改质部,因而暴露出该第一鳍状结构的一顶部以及该第二鳍状结构的一第二顶部。”构成了与对比文件 4 的区别技术特征,基于此区别技术特征,该权利要求的技术方案实际解决的问题是如何 1 更好的保护不需要的区域,2 对鳍顶部利用合适的方法进行塑造 3 更好的调节沟道。

对比文件 1 公开了一种鳍结构制备方法,在说明书的第 4-61 段,附图 3B、4B、5B、6B 公开了:进行一共形等离子掺杂工艺(相当于处理制作工艺),将该成型鳍(相当于第二鳍状结构)的该第一顶部的一外表面 403 氧化(相当于改质),因而形成一外层 403(相当于改质部),覆盖该成型鳍的该第一顶部;以及进行一蚀刻(相当于移除制作工艺)移除氧化硅外层。并且对比文件 1 也能够解决 1 更好的保护不需要的区域,2 对鳍顶部利用合适的方法进行塑造的技术问题。因此本领域技术人员有动机将对比文件 1 结合到对比文件 4 中形成了一个技术方案,然而该技术方案不包括“进行一移除制作工艺,经由对于该第一鳍状结构以及该第二鳍状结构与对于该改质部以及该绝缘结构的高移除选择比,而移除该绝缘结构的一部分以及该改质部,因而暴露出该第一鳍状结构的一顶部以及该第二鳍状结构的一第二顶部”的技术特征,并且该技术特征也不是本领域技术人员的公知常识,因此该技术特征构成了独立权利要求 9 的特定技术特征。

独立权利要求 14 对该特定技术特征没有相同或相应的记载,因此独立权利要求 14 与权利要求 9 之间没有相同或相应的特定技术特征,不具备单一性,因此不符合专利法第三十一条第一款的规定,因此本通知书未对该权利要求进行审查。申请人可以删除权利要求 14。针对本申请中不再要求保护的发明,申请人可以在本申请结案之前另行提交分案申请。

申请人应在本通知书指定的答复期限内作出答复,对本通知书中提出的所有问题逐一详细地作出说明,



国家知识产权局

并根据本通知书的意见对专利申请文件作出修改，并在意见陈述书中论述新修改的独立权利要求相对于本通知书中引用的对比文件以及原说明书中提到的申请日前的现有技术具有创造性的理由。申请人对申请文件的修改应当符合专利法第三十三条的规定，不得超出原说明书和权利要求书记载的范围。

审查员姓名:丁宁
审查员代码:319794

210401 纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路6号 国家知识产权局专利局受理处收
2018.10 电子申请，应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外，以纸件等其他形式提交的文件视为未提交。



请按照“注意事项”正确填写本表各栏

① 专 专 利 利 或 申 申 请 请	申请号或专利号 201410454915X
	发明创造名称 鳍状结构及其制造方法
	申请人或专利权人 (*应当填写第一署名申请人) 联华电子股份有限公司
<p>② 陈述事项：关于费用的意见陈述请使用意见陈述书（关于费用）</p> <p>以下选项只能选择一项</p> <p><input checked="" type="checkbox"/> 针对国家知识产权局于 2019 年 05 月 15 日发出的第一次审查意见通知书（发文序号 2019051100279830）陈述意见。</p> <p><input type="checkbox"/> 针对国家知识产权局于 年 月 日发出的 通知书（发文序号 ）补充陈述意见。</p> <p><input type="checkbox"/> 主动提出修改（根据专利法实施细则第 51 条第 1 款、第 2 款的规定）。</p> <p><input type="checkbox"/> 其他事宜。</p>	
<p>③ 陈述的意见：</p> <p>尊敬的审查员：</p> <p>根据您对本发明发来的第一次审查意见通知书及对比文件 1（CN103050533A）、对比文件 2（CN104022116A）、对比文件 3（CN101675513A）、对比文件 4（US2014191323A1），我们进行了认真仔细地分析，现针对您的意见具体答复及修改如下：</p> <p>1. 针对审查员关于权利要求 1 相对于对比文件 1 不具备新颖性的意见，申请人将权利要求 7 与技术特征“相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距”一并加入权利要求 1 中。</p> <p>上述修改可从本申请原说明书第 4 页第 7-25 行以及附图 5 中直接得出。</p> <p>修改后的权利要求 1 与对比文件 1 的区别技术特征在于：相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距，且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距。</p> <p>参见对比文件 1 的说明书第[0061]-[0063]段的记载可知，其仅公开了 FinFET 器件可包括多个规则鳍（对应于本申请中的第一鳍状结构）以及多个成型鳍（对应于本申请中的第二鳍</p>	

状结构), 但对比文件 1 并未涉及两相邻规则鳍与两相邻成型鳍的顶部之间间距的大小关系, 以及两者底部之间间距的大小关系, 故此, 对比文件 1 并未公开本申请中“相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距, 且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距”的具体内容。

由于本申请中相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距, 且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距, 如此可在不同区域(即, 第一、第二区域)形成具有不同临界尺寸的鳍状结构, 以能符合各区域晶体管的电性要求, 并在相同的区域产生相同的效果。

因此, 修改后的权利要求 1 与对比文件 1 的技术方案和技术效果均不同, 故其应具备新颖性; 而且, 本申请的上述区别特征对于本领域技术人员而言并非显而易见, 故其还应具备创造性; 进而, 其从属权利要求 2-8 也应具备新颖性和创造性。

同样, 对比文件 2-4 也未披露本申请的上述区别技术特征, 故不会影响本申请的创造性。

2. 针对审查员关于权利要求 9 与 14 缺乏单一性的意见, 申请人删除权利要求 14-20, 以克服上述缺陷。

3. 基于上述权利要求 1 的修改, 适应性删除权利要求 7, 并重现编写其他权利要求的编号及引用号, 以构成新的权利要求 1-12。

申请人相信修改后的权利要求, 克服了存在的缺陷, 请审查员在以上的基础上继续对本申请进行审查。如果审查员认为本申请仍有不符合专利法规定之处, 恳请再给予一次陈述意见和修改申请文件的机会。

最后, 衷心感谢审查员在本专利申请案件中付出的辛勤劳动, 并恳请审查员继续对本案进行审查, 并早日授权。

我所案号: PXJ04315

联系人: 王颖 电话: 62681616 转 7071



④ 附件清单

【附件名称】 权利要求书 【附件属性】 电子件

【附件名称】 修改对照页 【附件属性】 电子件

已备案的证明文件备案编号：_____。

⑤ 当事人或专利代理机构签字或者盖章

北京市柳沈律师事务所

2019年09月06日

⑥ 国家知识产权局处理意见

年 月 日

PXJ04315

权 利 要 求 书

1. 一种鳍状结构，包含有：

5 基底，具有多个第一鳍状结构，位于一第一区；以及多个第二鳍状结构，
位于一第二区，其中该第二鳍状结构包含一阶梯状的剖面结构部分，

其中，相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距，且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距。

10 2. 如权利要求 1 所述的鳍状结构，其中该第一鳍状结构的顶部宽度大于
该第二鳍状结构的顶部宽度。

3. 如权利要求 1 所述的鳍状结构，还包含：

绝缘结构，分别设置于该第一区的该第一鳍状结构侧边以及该第二区的
15 该第二鳍状结构侧边，且该阶梯状的剖面结构部分高于该绝缘结构的一顶
面。

15 4. 如权利要求 1 所述的鳍状结构，其中位于该第一区的该绝缘结构的一
顶面高于位于该第二区的该绝缘结构的一顶面。

5. 如权利要求 1 所述的鳍状结构，其中该第一鳍状结构突出于该绝缘结
构的一高度，小于该第二鳍状结构突出于该绝缘结构的一高度。

20 6. 如权利要求 1 所述的鳍状结构，其中该第一鳍状结构突出于该基底的一
高度，大于该第二鳍状结构突出于该基底的一高度。

~~7. 如权利要求 1 所述的鳍状结构，还包含：~~

~~多个该第一鳍状结构以及多个该第二鳍状结构，且各该第一鳍状结构的
顶部之间的间距小于各该第二鳍状结构的顶部之间的间距。~~

25 ~~87. 如权利要求 1 所述的鳍状结构，其中该第一区包含一高临界电压
(high voltage threshold, HVT) 区以及该第二区包含一低临界电压 (low
voltage threshold, LVT) 区。~~

~~98. 一种形成鳍状结构的方法，包含有：~~

提供一基底，具有第一鳍状结构，位于一第一区；以及第二鳍状结构位
于一第二区；

30 分别填入一绝缘结构于该第一区的该第一鳍状结构侧边以及该第二区
的该第二鳍状结构侧边；

形成一图案化掩模，覆盖该第一区但暴露出该第二区；

移除该第二区的该绝缘结构的一顶部，因而暴露出该第二鳍状结构的一第一顶部；

5 进行一处理制作工艺，将该第二鳍状结构的该第一顶部的一外表面改质，因而形成一改质部，覆盖该第二鳍状结构的该第一顶部；

移除该图案化掩模；以及

10 进行一移除制作工艺，经由对于该第一鳍状结构以及该第二鳍状结构与对于该改质部以及该绝缘结构的高移除选择比，而移除该绝缘结构的一部分以及该改质部，因而暴露出该第一鳍状结构的一顶部以及该第二鳍状结构的一第二顶部。

109. 如权利要求 98 所述的形成鳍状结构的方法，其中该绝缘结构包含氧化物，且该改质部包含氧化物。

1110. 如权利要求 98 所述的形成鳍状结构的方法，其中该处理制作工艺包含一氧化制作工艺。

15 1211. 如权利要求 1110 所述的形成鳍状结构的方法，其中该处理制作工艺包含一含氧气的制作工艺或一原位蒸汽产生制作工艺。

1312. 如权利要求 98 所述的形成鳍状结构的方法，其中该移除制作工艺包含一含氮及三氟化氮的蚀刻制作工艺。

14. ~~一种形成鳍状结构的方法，包含有：~~

20 ~~提供一基底，具有第一鳍状结构，位于一第一区；以及第二鳍状结构位于一第二区；~~

25 ~~形成一第一栅极跨设该第一鳍状结构，以及一第二栅极跨设该第二鳍状结构，其中该第一栅极依序包含一第一介电层以及一第一牺牲栅极覆盖该第一鳍状结构，且该第二栅极依序包含一第二介电层以及一第二牺牲栅极覆盖该第二鳍状结构；~~

~~移除该第一牺牲栅极以及该第二牺牲栅极，因而暴露出该第一介电层以及该第二介电层；~~

~~覆盖一掩模于该第一区但暴露出该第二区；~~

30 ~~进行一移除制作工艺，移除该第二鳍状结构的一顶部的一外表面；以及移除该掩模。~~

15. ~~如权利要求 14 所述的形成鳍状结构的方法，在移除掩模之后，还包~~

~~含：~~

~~形成一介电层覆盖该第一鳍状结构以及该第二鳍状结构。~~

~~16. 如权利要求 14 所述的形成鳍状结构的方法，其中该移除制作工艺完全移除该第二介电层，且移除该第二鳍状结构的该顶部的该外表面。~~

5 ~~17. 如权利要求 14 所述的形成鳍状结构的方法，在移除掩模之后，还包含：~~

~~完全移除该第一介电层。~~

~~18. 如权利要求 14 所述的形成鳍状结构的方法，在覆盖掩模之前，还包含：~~

10 ~~完全移除该第一介电层以及该第二介电层。~~

~~19. 如权利要求 14 所述的形成鳍状结构的方法，其中在提供该基底之后，还包含形成一绝缘结构分别于该第一区的该第一鳍状结构侧边以及该第二区的该第二鳍状结构侧边，且位于该第二区的该绝缘结构的一顶部在进行移除制作工艺时一并移除。~~

15 ~~20. 如权利要求 14 所述的形成鳍状结构的方法，其中该移除制作工艺对于该绝缘结构以及该第二鳍状结构无移除选择比。~~

PXJ04315

权 利 要 求 书

1. 一种鳍状结构，包含有：

5 基底，具有多个第一鳍状结构，位于一第一区；以及多个第二鳍状结构，
位于一第二区，其中该第二鳍状结构包含一阶梯状的剖面结构部分，

其中，相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距，且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距。

10 2. 如权利要求 1 所述的鳍状结构，其中该第一鳍状结构的顶部宽度大于
该第二鳍状结构的顶部宽度。

3. 如权利要求 1 所述的鳍状结构，还包含：

绝缘结构，分别设置于该第一区的该第一鳍状结构侧边以及该第二区的
15 该第二鳍状结构侧边，且该阶梯状的剖面结构部分高于该绝缘结构的一顶
面。

4. 如权利要求 1 所述的鳍状结构，其中位于该第一区的该绝缘结构的一
顶面高于位于该第二区的该绝缘结构的一顶面。

5. 如权利要求 1 所述的鳍状结构，其中该第一鳍状结构突出于该绝缘结
构的一高度，小于该第二鳍状结构突出于该绝缘结构的一高度。

20 6. 如权利要求 1 所述的鳍状结构，其中该第一鳍状结构突出于该基底的一
高度，大于该第二鳍状结构突出于该基底的一高度。

7. 如权利要求 1 所述的鳍状结构，其中该第一区包含一高临界电压(high
voltage threshold, HVT) 区以及该第二区包含一低临界电压 (low voltage
threshold, LVT) 区。

8. 一种形成鳍状结构的方法，包含有：

25 提供一基底，具有第一鳍状结构，位于一第一区；以及第二鳍状结构位
于一第二区；

分别填入一绝缘结构于该第一区的该第一鳍状结构侧边以及该第二区
的该第二鳍状结构侧边；

形成一图案化掩模，覆盖该第一区但暴露出该第二区；

30 移除该第二区的该绝缘结构的一顶部，因而暴露出该第二鳍状结构的一
第一顶部；

进行一处理制作工艺，将该第二鳍状结构的该第一顶部的一外表面改质，因而形成一改质部，覆盖该第二鳍状结构的该第一顶部；

移除该图案化掩模；以及

5 进行一移除制作工艺，经由对于该第一鳍状结构以及该第二鳍状结构与对于该改质部以及该绝缘结构的高移除选择比，而移除该绝缘结构的一部分以及该改质部，因而暴露出该第一鳍状结构的一顶部以及该第二鳍状结构的一第二顶部。

9. 如权利要求 8 所述的形成鳍状结构的方法，其中该绝缘结构包含氧化物，且该改质部包含氧化物。

10 10. 如权利要求 8 所述的形成鳍状结构的方法，其中该处理制作工艺包含一氧化制作工艺。

11. 如权利要求 10 所述的形成鳍状结构的方法，其中该处理制作工艺包含一含氧气的制作工艺或一原位蒸汽产生制作工艺。

15 12. 如权利要求 8 所述的形成鳍状结构的方法，其中该移除制作工艺包含一含氮及三氟化氮的蚀刻制作工艺。



100080

北京市彩和坊路 10 号 1 号楼 10 层 北京市柳沈律师事务所
陈小雯(62681616)

发文日:

2019 年 10 月 30 日



申请号或专利号: 201410454915.X

发文序号: 2019102501831560

申请人或专利权人: 联华电子股份有限公司

发明创造名称: 鳍状结构及其制造方法

第二次审查意见通知书

1. 审查员已经收到申请人于 2019 年 09 月 06 日提交的意见陈述书, 在此基础上审查员对上述专利申请继续进行实质审查。

根据国家知识产权局于 _____ 年 _____ 月 _____ 日作出的复审决定, 审查员对上述专利申请继续进行实质审查。

2. 经审查, 申请人于 _____ 提交的修改文件, 不符合专利法实施细则第 51 条第 3 款的规定, 不予接受。

3. 继续审查是针对下列申请文件进行的:

上述意见陈述书中所附的经修改的申请文件。

前次审查意见通知书所针对的申请文件以及上述意见陈述书中所附的经修改的申请文件替换文件。

前次审查意见通知书所针对的申请文件。

上述复审决定所确定的申请文件。

4. 本通知书未引用新的对比文件。

本通知书引用下列对比文件(其编号续前, 并在今后的审查过程中继续沿用):

编号	文件号或名称	公开日期 (或抵触申请的申请日)

5. 审查的结论性意见:

关于说明书:

申请的内容属于专利法第 5 条规定的不予授予专利权的范围。

说明书不符合专利法第 26 条第 3 款的规定。

说明书的修改不符合专利法第 33 条的规定。

说明书的撰写不符合专利法实施细则第 17 条的规定。

关于权利要求书:

权利要求 _____ 不符合专利法第 2 条第 2 款的规定。

权利要求 _____ 不符合专利法第 9 条第 1 款的规定。



国家知识产权局

- 权利要求____不具备专利法第 22 条第 2 款规定的新颖性。
- 权利要求 1-7 不具备专利法第 22 条第 3 款规定的创造性。
- 权利要求____不具备专利法第 22 条第 4 款规定的实用性。
- 权利要求____属于专利法第 25 条规定的不授予专利权的范围。
- 权利要求____不符合专利法第 26 条第 4 款的规定。
- 权利要求____不符合专利法第 31 条第 1 款的规定。
- 权利要求____的修改不符合专利法第 33 条的规定。
- 权利要求____不符合专利法实施细则第 19 条的规定。
- 权利要求____不符合专利法实施细则第 20 条的规定。
- 权利要求____不符合专利法实施细则第 21 条的规定。
- 权利要求____不符合专利法实施细则第 22 条的规定。
- _____

- 申请不符合专利法第 26 条第 5 款或者实施细则第 26 条的规定。
- 申请不符合专利法第 20 条第 1 款的规定。
- 分案申请不符合专利法实施细则第 43 条第 1 款的规定。

上述结论性意见的具体分析见本通知书的正文部分。

6. 基于上述结论性意见，审查员认为：

- 申请人应当按照通知书正文部分提出的要求，对申请文件进行修改。
- 申请人应当在意见陈述书中论述其专利申请可以被授予专利权的理由，并对通知书正文部分中指出的不符合规定之处进行修改，否则将不能授予专利权。
- 专利申请中没有可以被授予专利权的实质性内容，如果申请人没有陈述理由或者陈述理由不充分，其申请将被驳回。
- _____

7. 申请人应注意下列事项：

(1) 根据专利法第 37 条的规定，申请人应在收到本通知书之日起的 2 个月内陈述意见，如果申请人无正当理由逾期不答复，其申请被视为撤回。

(2) 申请人对其申请的修改应当符合专利法第 33 条的规定，不得超出原说明书和权利要求书记载的范围，同时申请人对专利申请文件进行的修改应当符合专利法实施细则第 51 条第 3 款的规定，按照本通知书的要求进行修改。

(3) 申请人的意见陈述书和/或修改文本应当邮寄或递交国家知识产权局专利局受理处，凡未邮寄或递交给受理处的文件不具备法律效力。

(4) 未经预约，申请人和/或代理人不得前来国家知识产权局与审查员举行会晤。

8. 本通知书正文部分共有 3 页，并附有下列附件：

- 引用的对比文件的复印件共____份____页。
- _____

审查员：丁宁

联系电话：010-62411182

审查部门：电学发明审查部

210403
2019.4

纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请，应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外，以纸件等其他形式提交的文件视为未提交。



第二次审查意见通知书

申请号:201410454915X

申请人于2019年09月06日提交了意见陈述书和经过修改的申请文件,审查员在阅读了上述文件后,对本案继续进行审查,再次提出如下审查意见。

1. 权利要求1不具备专利法第二十二条第三款规定的创造性。

权利要求1请求保护一种鳍状结构,对比文件1(CN103050533A)公开了一种鳍状结构,在说明书的第4-61段,附图3A-10(尤其是3B、4B、5B、6B)公开了包含有:半导体衬底(相当于基底),具有多个规则鳍(相当于第一鳍状结构),位于一第一区;以及多个成型鳍(相当于第二鳍状结构),位于一第二区,其中该成型鳍包含一阶梯状的剖面结构部分。

“其中,相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距,且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距”构成了与对比文件1的区别技术特征,基于此区别技术特征,该权利要求实际解决的技术问题是,如何根据需要的电学效果设置鳍的形状。

对比文件1的说明书的第4-61段,附图3A、7-10公开了另一实施例:其成型鳍能够设置为其底部之间的间距与其顶部之间间距不同,并且其也能够解决如何根据需要的电学效果设置鳍的形状的技术问题。并且在对比文件1公开了多个鳍的基础上,为了简化生产工艺,将鳍状结构等间距设置是本领域技术人员的常用技术手段。因此本领域技术人员在对比文件1的一个实施例的基础上结合对比文件1的另一个实施例与常用技术手段,即能够形成成型鳍下部间距与规则鳍相同而上部间距与规则鳍不同的技术方案,即相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距,其顶部之间的间距比规则鳍顶部之间的间距会更大。即本领域技术人员在对比文件1的一个实施例的基础上结合对比文件1的另一个实施例与常用技术手段得到该权利要求的技术方案是显而易见的。因此,该权利要求所要求保护的技术方案不具备创造性。

2. 权利要求2不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件1中被公开了,在对比文件1说明书第49-55段,附图5B、6B公开,其中该规则鳍的顶部宽度大于该成型鳍的顶部宽度。因此,该权利要求在其引用的权利要求不具备创造性的基础上,该权利要求所要求保护的技术方案也不具备创造性。

3. 权利要求3不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件1中被公开了,在对比文件1说明书第41-55段,附图3B、5B、6B公开,STI层303(相当于绝缘结构),分别设置于该第一区的该规则鳍侧边以及该第二区的该成型鳍侧边,且该阶梯状的剖面结构部分高于该STI的一顶面。因此,该权利要求在其引用的权利要求不具备创造性的基础上,该权利要求所要求保护的技术方案也不具备创造性。



4. 权利要求 4 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中没有被公开，构成了与对比文件 1 的区别技术特征，基于该区别技术特征，该权利要求实际解决的技术问题是，如何有效的调控需要区域的沟道宽度。

对比文件 2 (CN104022116A) 公开了一种鳍结构，其说明书 37-89 段，附图 11 公开了：位于第二区域 II 的层间介质层 305d (相当于第一区的绝缘结构) 的一顶面高于位于该第一区域 I 的层间介质层 305c (相当于第二区的绝缘结构) 的一顶面，并且对比文件 2 也能够调控晶体管部分区域的沟道宽度为需要的宽度。即对比文件 2 给出了将上述附加技术特征应用到对比文件 1 中以进一步解决其技术问题的启示，在该启示下，本领域技术人员有动力在对比文件 1 的基础上结合对比文件 2 得出该权利要求进一步限定的技术方案，对本领域的技术人员来说是显而易见的，因而在其引用的权利要求不具备创造性的情况下，该从属权利要求不具备专利法第二十二条第三款规定的创造性。

5. 权利要求 5 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中没有被公开，构成了与对比文件 1 的区别技术特征，基于该区别技术特征，该权利要求实际解决的技术问题是，如何有效的调控驱动电流。对比文件 2 说明书 48-74 段，附图 11 公开了：第一鳍部 301a (相当于第一鳍状结构) 突出于层间介质层 305d 的一高度 h_2 ，小于第二鳍部 301b (相当于第二鳍状结构) 突出于层间介质层 305c 的一高度 h_1 (参见说明书第 74 段)，并且对比文件 2 也能够通过鳍高度调控驱动电流。即对比文件 2 给出了将上述附加技术特征应用到对比文件 1 中以进一步解决其技术问题的启示，在该启示下，本领域技术人员有动机在对比文件 1 的基础上结合对比文件 2 得出该权利要求进一步限定的技术方案，对本领域的技术人员来说是显而易见的，因而在其引用的权利要求不具备创造性的情况下，该从属权利要求不具备专利法第二十二条第三款规定的创造性。

6. 权利要求 6 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中被公开了，在对比文件 1 说明书第 41-55 段，附图 3B、5B、6B 公开，该规则鳍突出于该衬底的一高度，大于该成型鳍突出于该衬底的一高度。(虽然对比文件 1 没有直接公开鳍与衬底的高度，但是对比文件 1 中公开了鳍相对于 STI 层底层的高度，本领域技术人员能够明确毫无疑问的确定出鳍相对于衬底的高度) 因此，该权利要求在其引用的权利要求不具备创造性的基础上，该权利要求所要求保护的技术方案也不具备创造性。

7. 权利要求 7 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中没有被公开，构成了与对比文件 1 的区别技术特征，基于该区别技术特征，该权利要求实际解决的技术问题是，如何使器件的不同部位应对不同的电压条件。对比文件 3 (CN101675513A) 公开了一种鳍状结构说明书第 4 页第 19 行到第 7 页第 21 行，附图 1 公开了：NFET 区 (相当于第一区) 包含一高阈值电压区 (相当于高临界电压区)，PFET 区 (相当于第二区) 包含一低阈值电压区



(相当于低临界电压区)。即对比文件 3 给出了将上述不同器件区域包括不同临界电压的方法应用到对比文件 1 中以进一步解决其技术问题的启示, 在该启示下, 本领域技术人员有动力在对比文件 1 的基础上结合对比文件 3 得出该权利要求进一步限定的技术方案, 对本领域的技术人员来说是显而易见的, 因而在其引用的权利要求不具备创造性的情况下, 该从属权利要求不具备专利法第二十二条第三款规定的创造性。

8. 对申请人意见陈述的评述

申请人认为: 对比文件 1 没有公开两相邻规则鳍与两相邻成型鳍的顶部之间间距的关系, 因此对比文件 1 没有给出如何设置鳍间距的技术启示, 也达不到权利要求 1 的在不同区域形成不同临界尺寸的鳍状结构的技术效果。因此该权利要求具备创造性。

审查员对比有不同意见: 对比文件 1 的说明书的第 4-61 段, 附图 3A、7-10 公开的另一实施例, 其中成型鳍底部之间距离与顶部之间距离不同。因此在对比文件 1 的一个实施例公开了其成型鳍顶部较薄的基础上, 为了解决如何根据需要的电学效果设置鳍的形状的技术问题, 能够将其与另一个实施例相结合, 形成成型鳍顶部较薄并且成型鳍底部之间距离与顶部之间距离不同的技术方案, 并且为了简化生产工艺, 进一步结合本领域常用技术手段将不同鳍设为等间距即能够形成该权利要求的技术方案。并且, 对比文件 1 通过在不同部分设置不同形状的鳍, 也能够达到形成不同的临界尺寸的技术效果。因此该权利要求不具备专利法第二十二条第三款规定的创造性。

申请人应在本通知书指定的答复期限内作出答复, 对本通知书中提出的所有问题逐一详细地作出说明, 并根据本通知书的意见对专利申请文件作出修改, 尤其是应根据本通知书中引用的对比文件修改独立权利要求以及相应的从属权利要求, 并在意见陈述书中论述新修改的独立权利要求相对于本通知书中引用的对比文件以及原说明书中提到的申请日前的现有技术具有创造性的理由。此外, 说明书应根据修改后的权利要求书作适应性修改。申请人对申请文件的修改应当符合专利法第三十三条的规定, 不得超出原说明书和权利要求书记载的范围。

审查员姓名: 丁宁

审查员代码: 319794

意见陈述书

进行审查，并早日授权。

我所案号：PXJ04315

联系人：王颖 电话：62681616 转 7071

④ 附件清单

【附件名称】 权利要求书 【附件属性】 电子件

【附件名称】 修改对照页 【附件属性】 电子件

已备案的证明文件备案编号：_____。

⑤ 当事人或专利代理机构签字或者盖章

北京市柳沈律师事务所

2019年11月27日

⑥ 国家知识产权局处理意见

年 月 日

权 利 要 求 书

1. ~~一种鳍状结构，包含有：~~

5 ~~基底，具有多个第一鳍状结构，位于一第一区；以及多个第二鳍状结构，
位于一第二区，其中该第二鳍状结构包含一阶梯状的剖面结构部分，~~

~~其中，相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距，且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距。~~

10 ~~2. 如权利要求1所述的鳍状结构，其中该第一鳍状结构的顶部宽度大于
该第二鳍状结构的顶部宽度。~~

3. ~~如权利要求1所述的鳍状结构，还包含：~~

~~绝缘结构，分别设置于该第一区的该第一鳍状结构侧边以及该第二区的
该第二鳍状结构侧边，且该阶梯状的剖面结构部分高于该绝缘结构的一顶
面。~~

15 ~~4. 如权利要求1所述的鳍状结构，其中位于该第一区的该绝缘结构的一
顶面高于位于该第二区的该绝缘结构的一顶面。~~

~~5. 如权利要求1所述的鳍状结构，其中该第一鳍状结构突出于该绝缘结
构的一高度，小于该第二鳍状结构突出于该绝缘结构的一高度。~~

20 ~~6. 如权利要求1所述的鳍状结构，其中该第一鳍状结构突出于该基底的一
高度，大于该第二鳍状结构突出于该基底的一高度。~~

~~7. 如权利要求1所述的鳍状结构，其中该第一区包含一高临界电压(high
voltage threshold, HVT) 区以及该第二区包含一低临界电压(low voltage
threshold, LVT) 区。~~

81. 一种形成鳍状结构的方法，包含有：

25 提供一基底，具有第一鳍状结构，位于一第一区；以及第二鳍状结构位
于一第二区；

分别填入一绝缘结构于该第一区的该第一鳍状结构侧边以及该第二区
的该第二鳍状结构侧边；

形成一图案化掩模，覆盖该第一区但暴露出该第二区；

30 移除该第二区的该绝缘结构的一顶部，因而暴露出该第二鳍状结构的一
第一顶部；

进行一处理制作工艺，将该第二鳍状结构的该第一顶部的一外表面改质，因而形成一改质部，覆盖该第二鳍状结构的该第一顶部；

移除该图案化掩模；以及

5 进行一移除制作工艺，经由对于该第一鳍状结构以及该第二鳍状结构与对于该改质部以及该绝缘结构的高移除选择比，而移除该绝缘结构的一部分以及该改质部，因而暴露出该第一鳍状结构的一顶部以及该第二鳍状结构的一第二顶部。

92. 如权利要求 81 所述的形成鳍状结构的方法，其中该绝缘结构包含氧化物，且该改质部包含氧化物。

10 103. 如权利要求 81 所述的形成鳍状结构的方法，其中该处理制作工艺包含一氧化制作工艺。

114. 如权利要求 103 所述的形成鳍状结构的方法，其中该处理制作工艺包含一含氧气的制作工艺或一原位蒸汽产生制作工艺。

15 125. 如权利要求 81 所述的形成鳍状结构的方法，其中该移除制作工艺包含一含氮及三氟化氮的蚀刻制作工艺。

6. 一种如权利要求 1 所述方法制得的鳍状结构，包含有：

基底，具有多个第一鳍状结构，位于一第一区；以及多个第二鳍状结构，位于一第二区，其中该第二鳍状结构包含一阶梯状的剖面结构部分，

20 其中，相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距，且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距。

7. 如权利要求 6 所述的鳍状结构，其中该第一鳍状结构的顶部宽度大于该第二鳍状结构的顶部宽度。

8. 如权利要求 6 所述的鳍状结构，还包含：

25 绝缘结构，分别设置于该第一区的该第一鳍状结构侧边以及该第二区的该第二鳍状结构侧边，且该阶梯状的剖面结构部分高于该绝缘结构的一顶面。

9. 如权利要求 6 所述的鳍状结构，其中位于该第一区的该绝缘结构的一顶面高于位于该第二区的该绝缘结构的一顶面。

30 10. 如权利要求 6 所述的鳍状结构，其中该第一鳍状结构突出于该绝缘结构的一高度，小于该第二鳍状结构突出于该绝缘结构的一高度。

11. 如权利要求 6 所述的鳍状结构，其中该第一鳍状结构突出于该基底的一高度，大于该第二鳍状结构突出于该基底的一高度。

12. 如权利要求 6 所述的鳍状结构，其中该第一区包含一高临界电压（high voltage threshold, HVT）区以及该第二区包含一低临界电压（low

5 voltage threshold, LVT）区。

权 利 要 求 书

1. 一种形成鳍状结构的方法，包含有：

5 提供一基底，具有第一鳍状结构，位于一第一区；以及第二鳍状结构位于一第二区；

分别填入一绝缘结构于该第一区的该第一鳍状结构侧边以及该第二区的该第二鳍状结构侧边；

形成一图案化掩模，覆盖该第一区但暴露出该第二区；

10 移除该第二区的该绝缘结构的一顶部，因而暴露出该第二鳍状结构的第一顶部；

进行一处理制作工艺，将该第二鳍状结构的该第一顶部的一外表面改质，因而形成一改质部，覆盖该第二鳍状结构的该第一顶部；

移除该图案化掩模；以及

15 进行一移除制作工艺，经由对于该第一鳍状结构以及该第二鳍状结构与对于该改质部以及该绝缘结构的高移除选择比，而移除该绝缘结构的一部分以及该改质部，因而暴露出该第一鳍状结构的一顶部以及该第二鳍状结构的一第二顶部。

2. 如权利要求 1 所述的形成鳍状结构的方法，其中该绝缘结构包含氧化物，且该改质部包含氧化物。

20 3. 如权利要求 1 所述的形成鳍状结构的方法，其中该处理制作工艺包含一氧化制作工艺。

4. 如权利要求 3 所述的形成鳍状结构的方法，其中该处理制作工艺包含一含氧气的制作工艺或一原位蒸汽产生制作工艺。

25 5. 如权利要求 1 所述的形成鳍状结构的方法，其中该移除制作工艺包含一含氨及三氟化氮的蚀刻制作工艺。

6. 一种如权利要求 1 所述方法制得的鳍状结构，包含有：

基底，具有多个第一鳍状结构，位于一第一区；以及多个第二鳍状结构，位于一第二区，其中该第二鳍状结构包含一阶梯状的剖面结构部分，

30 其中，相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距，且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距。

7. 如权利要求 6 所述的鳍状结构,其中该第一鳍状结构的顶部宽度大于该第二鳍状结构的顶部宽度。

8. 如权利要求 6 所述的鳍状结构, 还包含:

5 绝缘结构, 分别设置于该第一区的该第一鳍状结构侧边以及该第二区的该第二鳍状结构侧边, 且该阶梯状的剖面结构部分高于该绝缘结构的一顶面。

9. 如权利要求 6 所述的鳍状结构,其中位于该第一区的该绝缘结构的一顶面高于位于该第二区的该绝缘结构的一顶面。

10 10. 如权利要求 6 所述的鳍状结构, 其中该第一鳍状结构突出于该绝缘结构的一高度, 小于该第二鳍状结构突出于该绝缘结构的一高度。

11. 如权利要求 6 所述的鳍状结构, 其中该第一鳍状结构突出于该基底的一高度, 大于该第二鳍状结构突出于该基底的一高度。

15 12. 如权利要求 6 所述的鳍状结构, 其中该第一区包含一高临界电压 (high voltage threshold, HVT) 区以及该第二区包含一低临界电压 (low voltage threshold, LVT) 区。



100080

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陈小雯 (62681616)

发文日:

2020 年 01 月 09 日



申请号或专利号: 201410454915.X

发文序号: 2020010601804770

申请人或专利权人: 联华电子股份有限公司

发明创造名称: 鳍状结构及其制造方法

驳 回 决 定

1. 根据专利法第 38 条及其实施细则第 53 条的规定, 决定驳回上述专利申请, 驳回的依据是:
申请不符合专利法第 22 条第 3 款的规定。
详细的驳回理由见驳回决定正文部分。
2. 本驳回决定是针对下列申请文件作出的:
申请日提交的说明书第 1-70 段、说明书附图、说明书摘要、摘要附图;
2019 年 11 月 27 日提交的权利要求第 1-12 项。
3. 根据专利法第 41 条及实施细则第 60 条的规定, 申请人对本驳回决定不服的, 可以在收到本决定之日起 3 个月内向专利局复审和无效审理部请求复审。根据专利法实施细则第 96 条的规定, 复审费应在上述期限内缴纳, 期满未缴纳或者未缴足的, 视为未提出请求。

审查员: 丁宁

审查部门: 电学发明审查部

联系电话: 010-62411182

210407 纸件申请 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
2019.4 电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。



驳 回 决 定

申请号：201410454915X

本决定涉及的是申请号为 201410454915.X 的名称为“鳍状结构及其制造方法”的发明专利申请，申请人为联华电子股份有限公司，申请日为 2014 年 09 月 09 日。

一、案由

本申请原申请文件权利要求书包括 3 项独立权利要求 1、9、14 以及 17 项从属权利要求 2-8、10-13、15-20。

应申请人于 2017 年 08 月 08 日提出的实质审查请求，审查员对本申请进行了实质审查，并于 2019 年 05 月 15 日发出了第一次审查意见通知书，指出权利要求 1、3、6 不具备专利法第二十二条第二款规定的新颖性；权利要求 4、5、7、8 不具备专利法第二十二条第三款规定的创造性；权利要求 9、14 不符合专利法第三十一条第一款的规定。通知书中引用了如下对比文件：

对比文件 1：CN103050533A，公开日为 2013 年 04 月 17 日；

对比文件 2：CN104022116A，公开日为 2014 年 09 月 03 日；

对比文件 3：CN101675513A，公开日为 2010 年 03 月 17 日；

对比文件 4：US2014191323A1，公开日为 2014 年 07 月 10 日。

申请人于 2019 年 09 月 06 日针对第一次审查意见通知书提交了意见陈述书与修改后的权利要求。概述如下：申请人删除权利要求 7、14-20，并将权利要求 7 的附加技术特征加入权利要求 1 中。申请人陈述了其修改后的权利要求具备新颖性与创造性的理由。

审查员继续审查，并于 2019 年 10 月 30 日发出第二次审查意见通知书，指出权利要求 1-7 不具备专利法第二十二条第三款规定的创造性。

针对上述审查意见通知书，申请人于 2019 年 11 月 27 日递交了意见陈述书与修改后的权利要求。申请人将权利要求 1-7 移至权利要求 8-12 之后，并将原权利要求 1 的主题名称修改为“一种如权利要求 1 所述方法制得的鳍状结构”。申请人认为，由于审查员并未指出方法权利要求具有创造性缺陷，故此，修改后的产品权利要求 1 应具备专利法第二十二条第三款规定的创造性。

审查员认为，本案事实已经清楚，因此针对申请日提交的说明书第 1-70 段、说明书附图、说明书摘要、摘要附图：

2019 年 11 月 27 日提交的权利要求第 6-12 项作出本驳回决定。

二、驳回理由

1. 权利要求 6 不具备专利法第二十二条第三款规定的创造性。

权利要求 6 请求保护一种鳍状结构，其引用了在先的形成鳍状结构的方法的权利要求 1。在确定权利要求 6 的保护范围时，权利要求 1 的特征对于权利要求 6 的保护主题的实际限定作用，除权利要求 6 中技术特征体现出的影响以外，还体现在对权利要求 6 的鳍状结构中的第二鳍状结构的阶梯状剖面结构应当为上窄下宽的阶梯（而不是上宽下窄的）；并且位于该第一区的该绝缘结构的一顶面高于位于该第二区的该绝缘结构的一顶面。

基于此，对比文件 1（CN103050533A）公开了一种鳍结构，在说明书的第 4-61 段，附图 3A-10（尤其是 3B、4B、5B、6B）公开了包含有：半导体衬底（相当于基底），具有多个规则鳍（相当于第一鳍状结构），位于一第一区；以及多个成型鳍（相当于第二鳍状结构），位于一第二区，其中该成型鳍包含一阶梯状的剖面结构部分（并且该阶梯为上窄下宽）。

权利要求 1 与对比文件 1 的区别技术特征在于：①相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距，且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距；②位于该第一区的该绝缘结构的一顶面高于位于该第二区的该绝缘结构的一顶面，基于



区别技术特征，该权利要求实际解决的技术问题是，如何①根据需要的电学效果设置鳍的形状②有效的调控需要区域的电学性能。

基于区别技术特征①：对比文件 1 的说明书的第 4-61 段，附图 3A、7-10 公开了另一实施例：其成型鳍能够设置为其底部之间的间距与其顶部之间间距不同，并且其也能够解决如何根据需要的电学效果设置鳍的形状的技术问题。并且在对比文件 1 公开了多个鳍的基础上，为了简化生产工艺，将鳍状结构等间距设置是本领域技术人员的常用技术手段。

基于区别技术特征②：对比文件 2 (CN104022116A) 公开了一种鳍结构，其说明书 37-89 段，附图 11 公开了：位于第二区域 II 的层间介质层 305d (相当于第一区的绝缘结构) 的一顶面高于位于该第一区域 I 的层间介质层 305c (相当于第二区的绝缘结构) 的一顶面，并且对比文件 2 也能够根据需要调控晶体管部分区域的电学性能。

因此本领域技术人员在对比文件 1 的一个实施例的基础上结合对比文件 1 的另一个实施例、对比文件 2 与常用技术手段，即能够形成该权利要求的技术方案。因此本领域技术人员在对比文件 1 的一个实施例的基础上结合对比文件 1 的另一个实施例、对比文件 2 与常用技术手段得到该权利要求的技术方案是显而易见的。因此，该权利要求所要求保护的技术方案不具备专利法第二十二条第三款规定的创造性。

2. 权利要求 7 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中被公开了，在对比文件 1 说明书第 49-55 段，附图 5B、6B 公开，其中该规则鳍的顶部宽度大于该成型鳍的顶部宽度。因此，该权利要求在其引用的权利要求不具备创造性的基础上，该权利要求所要求保护的技术方案也不具备专利法第二十二条第三款规定的创造性。

3. 权利要求 8 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中被公开了，在对比文件 1 说明书第 41-55 段，附图 3B、5B、6B 公开，STI 层 303 (相当于绝缘结构)，分别设置于该第一区的该规则鳍侧边以及该第二区的该成型鳍侧边，且该阶梯状的剖面结构部分高于该 STI 的一顶面。因此，该权利要求在其引用的权利要求不具备创造性的基础上，该权利要求所要求保护的技术方案也不具备专利法第二十二条第三款规定的创造性。

4. 权利要求 9 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中没有被公开，构成了与对比文件 1 的区别技术特征，基于该区别技术特征，该权利要求实际解决的技术问题是，如何有效的调控需要区域的电学性能。

对比文件 2 (CN104022116A) 公开了一种鳍结构，其说明书 37-89 段，附图 11 公开了：位于第二区域 II 的层间介质层 305d (相当于第一区的绝缘结构) 的一顶面高于位于该第一区域 I 的层间介质层 305c (相当于第二区的绝缘结构) 的一顶面，并且对比文件 2 也能够根据需要调控晶体管部分区域的电学性能。即对比文件 2 给出了将上述附加技术特征应用到对比文件 1 中以进一步解决其技术问题的启示，在该启示下，本领域技术人员有动力在对比文件 1 的基础上结合对比文件 2 得出该权利要求进一步限定的技术方案，对本领域的技术人员来说是显而易见的，因而在其引用的权利要求不具备创造性的情况下，该从属权利要求不具备专利法第二十二条第三款规定的创造性。

5. 权利要求 10 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中没有被公开，构成了与对比文件 1 的区别技术特征，基于该区别技术特征，该权利要求实际解决的技术问题是，如何有效的调控驱动电流。对比文件 2 说明书 48-74 段，附图 11 公开了：第一鳍部 301a (相当于第一鳍状结构) 突出于层间介质层 305d 的一高度 h_2 ，小于第二鳍部 301b (相当于第二鳍状结构) 突出于层间介质层 305c 的一高度 h_1 (参见说明书第 74 段)，并且对比文件 2 也能够通过鳍高度调控驱动电流。即对比文件 2 给出了将上述附加技术特征应用到对比文件 1 中以进一步解决其技术问题的启示，在该启示下，本领域技术人员有动机在对比文件 1 的基础上结合对比文件 2 得出该权利要求进一步限定的技术方案，对本领域的技术人员来说是显而易见的，因而在其引用的权利要求不具备创造性的情况下，该从属权利要求不具备专利法第二十二条第三款规定的创造性。

6. 权利要求 11 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中被公开了，在对比文件 1 说明书第 41-55 段，附图 3B、5B、6B 公开，该规则鳍突出于该衬底的一高度，大于该成型鳍突出于该衬底的一高度。(虽然对比文件 1 没有直



接公开鳍与衬底的高度，但是对比文件 1 中公开了鳍相对于 STI 层底层的高度，本领域技术人员能够明确毫无疑问的确定出鳍相对于衬底的高度）因此，该权利要求在其引用的权利要求不具备创造性的基础上，该权利要求所要求保护的技术方案也不具备专利法第二十二条第三款规定的创造性。

7. 权利要求 12 不具备专利法第二十二条第三款规定的创造性。

该权利要求的附加技术特征在对比文件 1 中没有被公开，构成了与对比文件 1 的又一区别技术特征，基于该区别技术特征，该权利要求实际解决的技术问题是，如何使器件的不同部位应对不同的电压条件。对比文件 3（CN101675513A）公开了一种鳍状结构说明书第 4 页第 19 行到第 7 页第 21 行，附图 1 公开了：NFET 区（相当于第一区）包含一高阈值电压区（相当于高临界电压区），PFET 区（相当于第二区）包含一低阈值电压区（相当于低临界电压区）。即对比文件 3 给出了将上述不同器件区域包括不同临界电压的方法应用到对比文件 1 中以进一步解决其技术问题的启示，在该启示下，本领域技术人员有动力在对比文件 1 的基础上结合对比文件 3 得出该权利要求进一步限定的技术方案，对本领域的技术人员来说是显而易见的，因而在其引用的权利要求不具备创造性的情况下，该从属权利要求不具备专利法第二十二条第三款规定的创造性。

三、决定

综上所述，本发明专利申请不符合专利法第二十二条第三款的规定，属于专利法实施细则第五十三条第二项的情况，因此根据专利法第三十八条予以驳回。

根据专利法第四十一条第一款的规定，申请人如果对本驳回决定不服，可以在收到本驳回决定之日起三个月内，向专利局复审和无效审理部请求复审。

审查员姓名:丁宁
审查员代码:319794



1. 一种形成鳍状结构的方法，包含有：

5 提供一基底，具有第一鳍状结构，位于一第一区；以及第二鳍状结构位于一第二区；

分别填入一绝缘结构于该第一区的该第一鳍状结构侧边以及该第二区的该第二鳍状结构侧边；

形成一图案化掩模，覆盖该第一区但暴露出该第二区；

10 移除该第二区的该绝缘结构的一顶部，因而暴露出该第二鳍状结构的第一顶部；

进行一处理制作工艺，将该第二鳍状结构的该第一顶部的一外表面改质，因而形成一改质部，覆盖该第二鳍状结构的该第一顶部；

移除该图案化掩模；以及

15 进行一移除制作工艺，经由对于该第一鳍状结构以及该第二鳍状结构与对于该改质部以及该绝缘结构的高移除选择比，而移除该绝缘结构的一部分以及该改质部，因而暴露出该第一鳍状结构的一顶部以及该第二鳍状结构的一第二顶部。

2. 如权利要求 1 所述的形成鳍状结构的方法，其中该绝缘结构包含氧化物，且该改质部包含氧化物。

20 3. 如权利要求 1 所述的形成鳍状结构的方法，其中该处理制作工艺包含一氧化制作工艺。

4. 如权利要求 3 所述的形成鳍状结构的方法，其中该处理制作工艺包含一含氧气的制作工艺或一原位蒸汽产生制作工艺。

25 5. 如权利要求 1 所述的形成鳍状结构的方法，其中该移除制作工艺包含一含氮及三氟化氮的蚀刻制作工艺。



1. 一种形成鳍状结构的方法，包含有：

5 提供一基底，具有第一鳍状结构，位于一第一区；以及第二鳍状结构位于一第二区；

分别填入一绝缘结构于该第一区的该第一鳍状结构侧边以及该第二区的该第二鳍状结构侧边；

形成一图案化掩模，覆盖该第一区但暴露出该第二区；

10 移除该第二区的该绝缘结构的一顶部，因而暴露出该第二鳍状结构的第一顶部；

进行一处理制作工艺，将该第二鳍状结构的该第一顶部的一外表面改质，因而形成一改质部，覆盖该第二鳍状结构的该第一顶部；

移除该图案化掩模；以及

15 进行一移除制作工艺，经由对于该第一鳍状结构以及该第二鳍状结构与对于该改质部以及该绝缘结构的高移除选择比，而移除该绝缘结构的一部分以及该改质部，因而暴露出该第一鳍状结构的一顶部以及该第二鳍状结构的一第二顶部。


2. 如权利要求 1 所述的形成鳍状结构的方法，其中该绝缘结构包含氧化物，且该改质部包含氧化物。

20 3. 如权利要求 1 所述的形成鳍状结构的方法，其中该处理制作工艺包含一氧化制作工艺。

4. 如权利要求 3 所述的形成鳍状结构的方法，其中该处理制作工艺包含一含氧气的制作工艺或一原位蒸汽产生制作工艺。

25 5. 如权利要求 1 所述的形成鳍状结构的方法，其中该移除制作工艺包含一含氨及三氟化氮的蚀刻制作工艺。

复 审 请 求 书

请按照“注意事项”正确填写本表各栏		此框内容由国家知识产权局填写			
② 专利申请	申请号 201410454915X		① 案件编号 		
发明创造名称 鳍状结构及其制造方法					
③ 复 审 请 求 人	申 请 人 (1)	姓名或名称 联华电子股份有限公司	用户代码	申请人类型 工矿企业	
		居民身份证号码或统一社会信用代码/组织机构代码		电子邮箱	
		国籍或注册国家(地区)	中国台湾		
		省、自治区、直辖市			
		市县			
		城区(乡)、街道、门牌号 中国台湾省 新竹市新竹科学工业园区			
	经常居所地或营业所所在地		邮政编码	电话	
	申 请 人 (2)	姓名或名称	用户代码	申请人类型	
		国籍或注册国家(地区)			
		省、自治区、直辖市			
		市县			
		城区(乡)、街道、门牌号			
经常居所地或营业所所在地		邮政编码	电话		
④ 收 件 人	姓 名		电 话		
	邮政编码		电子邮箱		
	省、自治区、直辖市				
	市县				
	城区(乡)、街道、门牌号				
⑤ 专 利 代 理 机 构	名称 北京市柳沈律师事务所		代码 11105		
	代 理 人 (1)	姓 名 陈小雯	姓 名		
		执业证号 1110500401.7	执业证号		
		电 话 62681616	电 话		
	代 理 人 (2)				

复 审 请 求 书

⑥根据专利法第 41 条第 1 款及专利法实施细则第 60 条第 1 款的规定，对国家知识产权局于 2020 年 1 月 9 日发出的对上述专利申请的驳回决定不服，请求复审。

⑦复审请求的理由：

尊敬的复审委员：

申请人针对中国国家知识产权局于 2020 年 1 月 9 日就本申请发来的驳回决定提出复审请求。

一. 驳回理由

审查员在驳回理由中主要提出：基于 OA2，本案的权利要求 6-12 相对于对比文件 1 (CN103050533A)、对比文件 2 (CN104022116A)、对比文件 3 (CN101675513A) 和对比文件 4 (US2014191323A1) 不具备创造性，并以此理由驳回本案。

二. 申请人针对上述驳回理由，具体修改及答复如下：

针对审查员关于权利要求 6-12 不具备创造性的意见，申请人将该组权利要求 6-12 删除，以克服上述缺陷。

三. 因此，申请人敬请复审委员就上述理由对本发明新提交的权利要求书重新审查，以驳回原判。谢谢。

我所案号：PXJ04315；联系人：王颖 电话：62681616 转 7071

复 审 请 求 书

⑧附件清单

【附件名称】 权利要求书 【附件属性】 电子件

【附件名称】 修改对照页 【附件属性】 电子件

⑨复审请求人或专利代理机构签字或者盖章
北京市柳沈律师事务所

2020 年 02 月 26 日

⑩国家知识产权局处理意见

年 月 日



1. 一种形成鳍状结构的方法，包含有：

5 提供一基底，具有第一鳍状结构，位于一第一区；以及第二鳍状结构位于一第二区；

分别填入一绝缘结构于该第一区的该第一鳍状结构侧边以及该第二区的该第二鳍状结构侧边；

形成一图案化掩模，覆盖该第一区但暴露出该第二区；

10 移除该第二区的该绝缘结构的一顶部，因而暴露出该第二鳍状结构的第一顶部；

进行一处理制作工艺，将该第二鳍状结构的该第一顶部的一外表面改质，因而形成一改质部，覆盖该第二鳍状结构的该第一顶部；

移除该图案化掩模；以及

15 进行一移除制作工艺，经由对于该第一鳍状结构以及该第二鳍状结构与对于该改质部以及该绝缘结构的高移除选择比，而移除该绝缘结构的一部分以及该改质部，因而暴露出该第一鳍状结构的一顶部以及该第二鳍状结构的一第二顶部。

2. 如权利要求 1 所述的形成鳍状结构的方法，其中该绝缘结构包含氧化物，且该改质部包含氧化物。

20 3. 如权利要求 1 所述的形成鳍状结构的方法，其中该处理制作工艺包含一氧化制作工艺。

4. 如权利要求 3 所述的形成鳍状结构的方法，其中该处理制作工艺包含一含氧气的制作工艺或一原位蒸汽产生制作工艺。

25 5. 如权利要求 1 所述的形成鳍状结构的方法，其中该移除制作工艺包含一含氮及三氟化氮的蚀刻制作工艺。



1. 一种形成鳍状结构的方法，包含有：

5 提供一基底，具有第一鳍状结构，位于一第一区；以及第二鳍状结构位于一第二区；

分别填入一绝缘结构于该第一区的该第一鳍状结构侧边以及该第二区的该第二鳍状结构侧边；

形成一图案化掩模，覆盖该第一区但暴露出该第二区；

10 移除该第二区的该绝缘结构的一顶部，因而暴露出该第二鳍状结构的第一顶部；

进行一处理制作工艺，将该第二鳍状结构的该第一顶部的一外表面改质，因而形成一改质部，覆盖该第二鳍状结构的该第一顶部；

移除该图案化掩模；以及

15 进行一移除制作工艺，经由对于该第一鳍状结构以及该第二鳍状结构与对于该改质部以及该绝缘结构的高移除选择比，而移除该绝缘结构的一部分以及该改质部，因而暴露出该第一鳍状结构的一顶部以及该第二鳍状结构的一第二顶部。

2. 如权利要求 1 所述的形成鳍状结构的方法，其中该绝缘结构包含氧化物，且该改质部包含氧化物。

20 3. 如权利要求 1 所述的形成鳍状结构的方法，其中该处理制作工艺包含一氧化制作工艺。

4. 如权利要求 3 所述的形成鳍状结构的方法，其中该处理制作工艺包含一含氧气的制作工艺或一原位蒸汽产生制作工艺。

25 5. 如权利要求 1 所述的形成鳍状结构的方法，其中该移除制作工艺包含一含氨及三氟化氮的蚀刻制作工艺。

~~6. 一种如权利要求 1 所述方法制得的鳍状结构，包含有：~~

~~基底，具有多个第一鳍状结构，位于一第一区；以及多个第二鳍状结构，位于一第二区，其中该第二鳍状结构包含一阶梯状的剖面结构部分，~~

30 ~~其中，相邻的该第一鳍状结构的顶部之间的间距小于相邻的该第二鳍状结构的顶部之间的间距，且相邻的该第一鳍状结构的底部之间的间距等于相邻的该第二鳍状结构的底部之间的间距。~~

7. ~~如权利要求 6 所述的鳍状结构, 其中该第一鳍状结构的顶部宽度大于该第二鳍状结构的顶部宽度。~~

8. ~~如权利要求 6 所述的鳍状结构, 还包含:~~

5 ~~绝缘结构, 分别设置于该第一区的该第一鳍状结构侧边以及该第二区的该第二鳍状结构侧边, 且该阶梯状的剖面结构部分高于该绝缘结构的一顶面。~~

9. ~~如权利要求 6 所述的鳍状结构, 其中位于该第一区的该绝缘结构的一顶面高于位于该第二区的该绝缘结构的一顶面。~~

10 ~~10. 如权利要求 6 所述的鳍状结构, 其中该第一鳍状结构突出于该绝缘结构的一高度, 小于该第二鳍状结构突出于该绝缘结构的一高度。~~

11. ~~如权利要求 6 所述的鳍状结构, 其中该第一鳍状结构突出于该基底的一高度, 大于该第二鳍状结构突出于该基底的一高度。~~

12. ~~如权利要求 6 所述的鳍状结构, 其中该第一区包含一高临界电压 (high voltage threshold, HVT) 区以及该第二区包含一低临界电压 (low voltage threshold, LVT) 区。~~

15



100080

北京市彩和坊路10号1号楼10层
北京市柳沈律师事务所 陈小雯(62681616)

发文日:

2020年03月03日



申请号或专利号: 201410454915.X

发文序号: 2020022700014120

案件编号: 1F323094

发明创造名称: 鳍状结构及其制造方法

复审请求人: 联华电子股份有限公司

复 审 请 求 受 理 通 知 书

复审请求人:

2020年02月26日复审请求人就上述专利申请提出的复审请求,经形式审查符合专利法及其实施细则和审查指南的有关规定,准予受理。

复审请求人撤回其复审请求的,应当根据专利法实施细则第64条的规定办理。

注:陈述意见时请注明案件编号及专利申请号。

审查员:张雪飞

专利局复审和无效审理部



100080

北京市彩和坊路10号1号楼10层
北京市柳沈律师事务所 陈小雯(62681616)

发文日:

2020年03月16日



申请号或专利号: 201410454915.X

发文序号: 2020031101883450

案件编号: 1F323094

发明创造名称: 鳍状结构及其制造方法

复审请求人: 联华电子股份有限公司

复 审 决 定 书

(第 205471 号)

- 根据前置审查意见书的意见, 撤销国家知识产权局于2020年01月09日作出的驳回决定, 由原审查部门继续进行审批程序。
- 维持国家知识产权局于_____作出的驳回决定。
- 经审查, 撤销国家知识产权局于_____作出的驳回决定。

根据专利法第四十一条第二款的规定, 复审请求人对本决定不服的, 可以在收到本通知之日起3个月内向北京知识产权法院起诉。

附: 决定正文____页(正文自第2页起算)。

合议组组长: 冯涛 主审员: 郭丽娜 参审员: 张立泉

专利局复审和无效审理部



100080

北京市彩和坊路 10 号 1 号楼 10 层 北京市柳沈律师事务所
陈小雯(62681616)

发文日:

2020 年 04 月 09 日



申请号或专利号: 201410454915.X

发文序号: 2020031800701980

申请人或专利权人: 联华电子股份有限公司

发明创造名称: 鳍状结构及其制造方法

授 予 发 明 专 利 权 通 知 书

1. 根据专利法第 39 条及实施细则第 54 条的规定, 上述发明专利申请经实质审查, 没有发现驳回理由, 现作出授予专利权的通知。

申请人收到本通知书后, 还应当依照办理登记手续通知书的内容办理登记手续。

申请人按期办理登记手续后, 国家知识产权局将作出授予专利权的决定, 颁发发明专利证书, 并予以登记和公告。

期满未办理登记手续的, 视为放弃取得专利权的权利。

2. 授予专利权的上述发明专利申请是以下列申请文件为基础的:

原始申请文件。 分案申请递交日提交的文件。 下列申请文件:

申请日提交的说明书摘要、说明书第 1-70 段、摘要附图、说明书附图;

2020 年 2 月 26 日提交的权利要求第 1-5 项

3. 授予专利权的上述发明专利申请的名称:

未变更。

由__变更为上述名称。

4. 申请人于__年__月__日提交专利号为__的“放弃专利权声明”, 经审查:

进入放弃专利权的程序。

未进入放弃专利权的程序。理由是: 申请人声明放弃的专利与本发明专利申请不属于相同的发明创造。

5. 审查员依职权对申请文件修改如下:

6. 在本通知书发出后收到的申请人主动修改的申请文件, 不予考虑。

审查员: 丁宁

审查部门: 电学发明审查部

联系电话: 010-62411182

210413
2018.10

纸件申请, 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。