Docket No.: 090104-0460
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Hae Youn HWANG et al.	:	Customer Number: 20277
Application No.: 13/844,783	:	Confirmation No.: 4782
Filed: March 15, 2013	:	Art Unit: 2814
For: SEMICONDUCTOR LIGHT EMITTING DEVICE, LIGHT EMITTING MODULE AND ILLUMINATION APPARATUS	:	Examiner: B. Jahan

AMENDMENT IN RESPONSE TO NON-FINAL OFFICE ACTION UNDER 37 C.F.R. 1.111

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

Madam:

INTRODUCTORY COMMENTS

In response to the Office Action dated August 11, 2014, please amend the above-identified U.S. patent application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims begin on page 3 of this paper.

Remarks/Arguments begin on page 8 of this paper.

AMENDMENT TO THE SPECIFICATION

Please amend the title to read – SEMICONDUCTOR LIGHT EMITTING DEVICE WITH WIRING UNIT ARRANGEMENT --.

Page 12, line 10, after "lateral" insert – (side) --.

Page 13, lines 5, 13, 20, 21, 23, after "lateral" insert – (side) --.

Page 14, lines 5, 9, 13, 23, after "lateral" insert – (side) --.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims.

Listing of Claims

1. (Currently Amended) A semiconductor light emitting device, comprising:

a substrate;

a semiconductor laminate disposed on the substrate and divided to a plurality of light emitting cells with an isolation region, wherein the plurality of light emitting cells include a first conductivity-type semiconductor layer disposed on the substrate, an active layer disposed on the first conductivity-type semiconductor layer and a second conductivity-type semiconductor layer disposed on the active layer; and

a wiring unit electrically connecting the plurality of light emitting cells,

wherein a region of ~~lateral~~ side surfaces of the first conductivity-type semiconductor layer of each of the light emitting cells in which the wiring unit is disposed has a slope gentler than slopes of other regions of the ~~lateral~~ side surfaces of the first conductivity-type semiconductor layer of each of the light emitting cells. .

2. (Currently Amended) The semiconductor light emitting device of claim 1, wherein:

the first conductivity-type semiconductor layer of the plurality of light emitting cells have a plurality of ~~lateral~~ side surfaces, respectively, and

the region in which the wiring unit is disposed is a portion of at least one ~~lateral~~ side surface of the first conductivity-type semiconductor layer of the light emitting cells.

3. (Currently Amended) The semiconductor light emitting device of claim 2, wherein the region in which the wiring unit is disposed has a recess portion having a sloped surface gentler than a sloped surface of other regions of the ~~lateral~~ side surfaces of the first conductivity-type semiconductor layer of each of the light emitting cells.

4. (Currently Amended) The semiconductor light emitting device of claim 1, wherein a slope angle of the ~~lateral~~ side surface in the region in which the wiring unit is disposed is less than a slope angle of a lateral surface in ~~lateral~~ side surface regions of the first conductivity-type semiconductor layer of the light emitting cells different than the ~~lateral~~ side surface in the region in which the wiring unit is not disposed, by about 10° or more.

5. (Currently Amended) The semiconductor light emitting device of claim 4, wherein:

a slope angle of the ~~lateral~~ side surface in the region in which the wiring unit is disposed ranges from 40° to 60°, and

a slope angle of the lateral surface in other ~~lateral~~ side surface regions of the first conductivity-type semiconductor layer of light emitting cells is 70° or more.

6. (Canceled)

7. (Currently Amended) The semiconductor light emitting device of claim ~~6~~ 1, wherein:

the plurality of light emitting cells include first and second contacts connected to the first and second conductivity-type semiconductor layers, respectively,

the semiconductor light emitting device further includes first and second bonding pads, and

the wiring unit includes sub-connection wirings connected to either of the first and second contacts of the light emitting cells and a main connection wiring connecting the sub-connection wirings and the first and second bonding pads.

8. (Original) The semiconductor light emitting device of claim 7, wherein the plurality of light emitting cells include a plurality of first and second contacts, respectively.

9. (Original) The semiconductor light emitting device of claim 1, wherein an irregular portion is defined on a lower surface of the isolation region.

10. (Currently Amended) The semiconductor light emitting device of claim 1, wherein an insulating layer is disposed on a ~~lateral~~ side surface of each of the light emitting cells to prevent an electrical connection between the wiring unit and a region of undesired electrical contact of each of the light emitting cells.

11. (Withdrawn) A method of fabricating a semiconductor light emitting device, the method comprising steps of:

forming a semiconductor laminate on a substrate;

forming an isolation region to divide the semiconductor laminate into a plurality of light emitting cells;

forming a wiring region on a portion of a lateral surface of each of the light emitting cells such that the wiring region has a slope gentler than slopes of other lateral surfaces of each of the light emitting cells; and

forming a wiring unit such that at least a portion thereof is positioned in the wiring region, the wiring unit electrically connecting the plurality of light emitting cells.

12. (Withdrawn) The method of claim 11, wherein the step of forming an isolation region and the step of forming a wiring region on a portion of a lateral surface of each of the light emitting cells are performed as a single process.

13. (Withdrawn) The method of claim 12, wherein:

the single process is performed by using a photoresist process, and

a mask used in the photoresist process has a pattern allowing an amount of light exposure to be gradually changed in the wiring region.

14. (Withdrawn) The method of claim 11, wherein the forming of the semiconductor laminate is sequentially forming a first conductivity-type semiconductor layer, an active layer, and a second conductivity-type semiconductor layer, and

further comprising the step of:

forming first and second contacts connected to the first and second conductivity-type semiconductor layers, respectively, in each of the plurality of light emitting cells, before the step of forming a wiring unit.

15. (Withdrawn) The method of claim 11, further comprising the step of:

forming an insulating layer on a lateral surface of each of the light emitting cells to prevent an electrical connection with a region of undesired electrical contact of each of the light emitting cells, before the forming of the wiring unit.

16. (Withdrawn) The method of claim 11, wherein the plurality of light emitting cells have a plurality of lateral surfaces, respectively, and the wiring region is a portion of at least one lateral surface of the light emitting cells, and

wherein the wiring region has a recess portion formed to have a sloped surface gentler than that of other regions.

17. (Withdrawn) The method of claim 11, wherein a slope angle of the lateral surface in the wiring region is less than that of a lateral surface in different lateral surface regions of the light emitting cells by about 10° or more.

18. (Withdrawn) The method of claim 17, wherein a slope angle of the lateral surface in the wiring region ranges from 40° to 60°, and a slope angle of the lateral surface in other lateral surface regions of the light emitting cells is 70° or more.

19. (Withdrawn) A method of fabricating a semiconductor light emitting device, the method comprising steps of:

forming a semiconductor laminate on a substrate;

preparing a mask having a pattern allowing an amount of light exposure to be gradually changed; and

performing a photoresist process using the mask to divide the semiconductor laminate into a plurality of light emitting cells and to form a wiring region on a portion of a lateral surface of each of the light emitting cells such that the wiring region has a slope gentler than slopes of other lateral surfaces of each of the light emitting cells.

20. (Withdrawn) The method of claim 16, further comprising the step of:

forming a wiring unit such that at least a portion thereof is positioned in the wiring region, the wiring unit electrically connecting the plurality of light emitting cells.

21 (New) The semiconductor light emitting device of claim 1, wherein the light emitting cells each includes first and second semiconductor layers and active region therebetween, and length of the active region is smaller in the region where the wiring unit is disposed than in other regions where the wiring unit is not disposed.

REMARKS

Introduction

Claims 1-20 are pending in this application, of which claims 1, 11 and 19 are independent. Claims 11-20 are withdrawn. By this response, claims 1, 2, 3, 4, 5, 7 and 10 are amended. Claim 6 is canceled and 21 added. All amendments made to the claims are fully supported by the specification as originally filed. Hence, no new matter has been introduced. Entry of various comments regarding the claims and/or the art, in the Office Action, should not be construed as any acquiescence or agreement by Applicants with the stated reasoning, regardless of whether or not these remarks specifically address any particular comment from the Office Action.

Interview

An interview between the examiner and undersigned was undertaken on November 3, 2014. At that time, the current amendment of claim 1 was discussed, and the examiner indicated her belief that claim 1 as now presented patentably distinguishes the subject matter of the invention over the Lee reference.

Specification

The title of the invention is said not to be descriptive.

The title has been amended to overcome the Examiner's objection of the specification; therefore Applicants respectfully request that the objections be withdrawn.

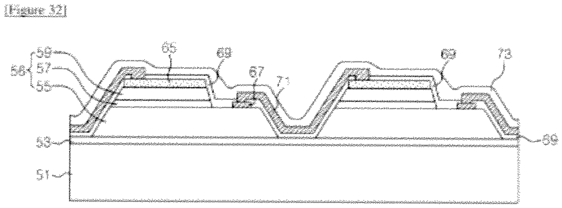
Amendments have been made at appropriate places to add the term "side," neighboring the term "lateral," a synonym of "lateral," in accord with the examiner's preference expressed during the November 3, 2014 interview conference.

Claim Rejection Under Pre-AIA 35 U.S.C. §102(b)

Claims 1-4, 9 and 10 are rejected under pre-AIA 35 U.S.C. §102(b) as being anticipated by Lee et al. (US 2010/0047943). The rejection, as it would apply to the claims as amended, is respectfully traversed.

In rejecting these claims, the examiner points to Fig. 32 of LEE, reproduced below, to show a portion of the LEE device having a lateral surface region in which wiring unit 71 is disposed has a slope gentler than slopes 69 of other regions of the lateral surfaces of each light emitting cell.

[Figure 32]



LEE

Claim 1, as amended, requires (in pertinent part):

wherein a region of side surfaces of the first conductivity-type semiconductor layer of each of the light emitting cells in which the wiring unit is disposed has a slope gentler than slopes of other regions of the side surfaces of the first conductivity-type semiconductor layer of each of the light emitting cells.

The structure that is claimed can be appreciated, and disclosure support is provided, by reference to application Figs. 4 and 5, which are cross sections taken from Fig. 3, and corresponding written description. Claim 1 requires slopes of different side surfaces of the **first semiconductor layer** (the layer 52a on the substrate 51) depending on whether or not the side surface underlies a wiring unit. The slope of the lateral surface is gentler where the surface underlies the wiring unit (see X1 in Fig. 3; Fig. 4) than where it does not (X2 in Fig. 3; Fig. 5). As clear from Fig. 5, different regions of the first semiconductor layer have sides that differ in slope depending on whether the region underlies a wiring unit.

In Lee, slopes among different layers 55, 57 and 59 are ***different***, whereas slopes of layer 55 (corresponding to the claimed first semiconductor layer) are the ***same*** whether underlying a wiring unit or not, contrary to what amended claim 1 requires.

Lee, accordingly, is not relevant. Claim 1 together with claims 2-4, 9 and 10 dependent therefrom, is believed clearly to be allowable over Lee.

<u>Claim Rejection Under Pre-AIA 35 U.S.C. § 103(a)</u>

Claims 5-7 and 8 rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Lee et al. (US 2010/0047943).

This rejection is traversed, as claims 5-7 and 8 add limitations to claim 1, deemed allowable, and hence are necessarily themselves allowable. Furthermore, it is noted that the specific ranges of slope angle, said to be shown in Lee, in fact are not designated as such, and hence the examiner's position in that regard is mere speculation.

New Claim 21

Claim 21, which is dependent from claim 1, adds thereto:

wherein the light emitting cells each includes first and second semiconductor layers and active region therebetween, and length of the active region is smaller in the region where the wiring unit is disposed than in other regions where the wiring unit is not disposed.

Support is apparent from a comparison of Figs. 4 and 5 (L1 < L2), and with reference to corresponding written description. The Lee reference suggests no similar effect, and cannot, because Lee fails to teach lateral surface slopes gentler in regions in which the wiring unit is disposed than in regions in which the writing unit is not disposed.

Summary

Thus, all grounds of rejection having been aptly addressed, Applicants respectfully request that the rejections of claims 1-10 under pre-AIA 35 U.S.C. §102(b) and pre-AIA 35 U.S.C. §103(a) be withdrawn, and that claims 1-5, and 7-10 and 21 be allowed.

Conclusion

In view of the above amendments and remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 50-0417, under Order No. 090104-0460 from which the undersigned is authorized to draw.

Respectfully submitted,

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