

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KEVIN J. LINTHICUM, THOMAS GEHRKE, DARREN B. THOMSON,
ERIC P. CARLSON, PRADEEP RAJAGOPAL
and ROBERT F. DAVIS

Appeal No. 2006-1949
Application No. 10/193,823

ON BRIEF¹

Before THOMAS, RUGGIERO, and HOMERE, Administrative Patent Judges.

THOMAS, Administrative Patent Judge.

DECISION ON APPEAL

Appellants have appealed to the Board from the examiner's final rejection of claims 1 through 20.

Independent claim 1 is reproduced below:

1. A gallium nitride semiconductor structure, comprising:
a silicon carbide substrate;

¹ The above noted panel only recently received this appeal for decision.

a plurality of gallium nitride posts on the silicon carbide substrate, the posts each including a sidewall and a top, and defining a plurality of trenches therebetween;

a capping layer on the tops of the post; and

a lateral gallium nitride layer that extends laterally from the sidewalls of the posts into the trenches.

The following reference is relied on by the examiner:

Nam et al., "Lateral epitaxy of low density GaN layers via organometallic vapor phase epitaxy," App. Phys. Lett., Vol. 71, No. 18, 3 November 1997, pp. 2638-2640.

Claims 1 through 5, 9 through 11, 13 through 17, 19 and 20 stand rejected under 35 U.S.C. § 102 as being anticipated by Nam. This reference is also used by the examiner alone within 35 U.S.C. § 103, the examiner alleging that claims 6 through 8, 12 and 18 would have been obvious to one of ordinary skill in the art.

Rather than repeat the positions of the appellants and the examiner, reference is made to the brief and reply brief for appellants' positions, and to the answer for the examiner's positions.

OPINION

Because we consider that Nam teaches within 35 U.S.C. § 102 and suggest within 103 the only argued claims 1, 6 and 7 within the above noted rejections, we sustain the examiner's rejections of these claims.

We do not agree with the examiner's views that the claimed trenches, post and capping layer, for example, are the result of produce-by-process limitations. There are no process limitations recited in independent claim 1 on appeal which is clearly an apparatus or article of manufacture claim. To the extent the examiner has effectively read out limitations relating to these noted features, the examiner's approach to allege anticipation is misplaced.

Likewise, to the extent that there is any merit to the examiner's inherency arguments, the reference plainly teaches and therefore the disputed features would have been necessarily inherent to the artisan. The claimed post capping layer and trench, for example, are structural elements as recited that may be derived by any process.

Appellants' disclosed invention relates to processes of forming gallium nitride (GaN) layers on silicon carbide (SiC) substrates. The brief description of the drawings at page 5 of the specification as filed indicates that figures 1 through 6 are cross-sectional views of these structures during intermediate fabrication steps. In fact the nature of the subject matter actually recited in independent claim 1 on appeal appears to be an intermediary product such as shown in any of figures 2 through 4 before the lateral growth from the sidewalls of the posts has continued to the point of coalescing to thereby form a continuous gallium nitride semiconductive layer.

Corresponding teachings are found in Nam. We reproduce here a significant portion of the paragraph bridging columns 1 and 2 at page 2638 of Nam:

In the present study, the lateral overgrowth of GaN *strips* patterned in a SiO₂ mask deposited on GaN film/AlN buffer layer/6H-SiC(001) substrates in the manner shown in schematically in Fig. 1 was investigated. To achieve lateral overgrowth, the GaN was deposited on the underlying GaN layer through the windows in the SiO₂ mask. The deposited material grew vertically to the top of the mask and then both laterally over the mask and vertically until the lateral growth fronts from many different windows coalesced and formed a continuous layer.

The showing in figure 1 as argued by the examiner corresponds to the claimed subject matter taken with this explanation of the process of forming intermediate produces with respect thereto. This quoted portion in figure 1 shows the existence of what may be fairly characterized as a gallium nitride post on a silicon carbide substrate where each post includes a side wall and a top portion and also defining trenches that exist between sidewalls. The windows in the mask in figure 1 correspond to the trenches yielding the resulting material intermediate with respect to the claimed posts. The claimed capping layer includes the overgrown material of gallium nitride on top of the post as shown in figure 1. Clearly, figure 1 shows and the noted portion quoted above explains that the gallium nitride layer extends laterally from the sidewall area of the post into the trenches as claimed.

The artisan would well appreciate that the subject matter of independent claim 1 on appeal is some intermediate product before the coalescent stage of appellants' disclosed invention consistent with that which is taught and shown in Nam. Likewise, the final product in figures 5 and 6 of the disclosed invention is not necessarily claimed, but to the extent that it is, the reference plainly teaches that the resulting final deposition includes a coalesced continuous layer of gallium nitride. In view of the teachings and showings noted earlier in this opinion the reference does clearly indicate that the gallium nitride layer is formed with posts, trenches and lateral gallium nitride intermediate layers during the formation processes or otherwise stated, the growth process.

To the extent argued, the U.S.C. § 103 rejection is also sustained because the subject matter of argued dependent claims 6 and 7 is taught to the artisan when the first sentence of the first and second paragraphs at column 1 of page 2638 are considered. These portions clearly indicate that electronic devices such as light emitting diodes and laser diodes are manufactured in the claimed lateral gallium nitride layer in its entirety once it has been coalesced and formed in a continuous layer. These teachings are also summarized in the short paragraph bridging pages 2639-2640.

In view of the foregoing, the decision of the examiner rejecting various claims under 35 U.S.C. § 102 and 35 U.S.C. § 103 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv).

AFFIRMED

JAMES D. THOMAS)
Administrative Patent Judge)
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JOSEPH F. RUGGIERO)
Administrative Patent Judge)
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JEAN R. HOMERE)
Administrative Patent Judge)

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