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**Datasheet for the decision
of 18 January 2018**

Case Number: T 2254/12 - 3.4.03

Application Number: 03766716.9

Publication Number: 1553640

IPC: H01L33/00

Language of the proceedings: EN

Title of invention:

SEMICONDUCTOR LIGHT-EMITTING DEVICE, METHOD FOR MANUFACTURING
SAME AND LIGHT-EMITTING APPARATUS USING SAME

Applicant:

Nichia Corporation

Headword:

Relevant legal provisions:

EPC Art. 123(2)
RPBA Art. 13(1)

Keyword:

Amendments - main request and first auxiliary request - added
subject-matter (yes)
Late-filed requests - second to fourth auxiliary requests -
admitted (no)

Decisions cited:

Catchword:



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Case Number: T 2254/12 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 18 January 2018

Appellant: Nichia Corporation
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Anan-shi Tokushima 774-8601 (JP)

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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 19 March 2012
refusing European patent application No.
03766716.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman G. Eliasson
Members: T. M. Häusser
W. Van der Eijk

Summary of Facts and Submissions

- I. The appeal concerns the decision of the examining division refusing the European patent application No. 03766716.9 for added subject-matter in relation to the former main request and the former first auxiliary request (Article 123(2) EPC). The former second auxiliary request was not admitted into the proceedings by the examining division (Rule 137(3) EPC).
- II. At the oral proceedings before the board the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or the first auxiliary request, both filed with the grounds of appeal, or on the basis of one of the second to fourth auxiliary requests filed with letter dated 18 December 2017.
- III. The wording of the independent claims of the main request and the first to fourth auxiliary requests is as follows (board's labelling "(a)", "(b)", "(c)", ... "(j)", "(d)'", "(e)'"):

Main request:

- "1. A nitride semiconductor light-emitting device comprising
- (a) a substrate
 - (b) a structured portion which is disposed on the substrate and includes an n-type semiconductor layer, a p-type semiconductor layer, an active layer between the n-type semiconductor and the p-type semiconductor layer,
 - (c) a p-electrode disposed on a upper surface side of the structured portion,
 - (d) an insulating film which is light-transmissive

and an n-electrode disposed on a surface side over an upper surface of the structured portion and in contact with the n-type semiconductor layer,

(e) wherein the n-type semiconductor layer is disposed on a lower surface side of the structured portion and the p-type semiconductor layer is disposed on an upper surface side of the structured portion,

(f) wherein the structured portion has an inclined side surface at which the surface of the n-type semiconductor layer is exposed,

(g) wherein the p-electrode is light-transmissive and in ohmic contact with the p-type semiconductor layer,

(h) wherein a reflection metal layer covers the p-electrode on the upper surface side of the structured portion where the insulating film intervenes between the p-electrode and the reflection metal layer."

First auxiliary request:

Claim 1 of the first auxiliary request differs from claim 1 of the main request in that:

- "and capable of emitting light" is appended at the end of feature (b), and
- "light-transmissive" is replaced by "capable of extracting light therethrough" in feature (d).

Second auxiliary request:

Claim 1 of the second auxiliary request differs from claim 1 of the main request in that the following feature is appended at the end of the claim:

(i) ", wherein the upper surface side of the structured portion defines a mounting surface which opposes a mounting base when the light-emitting device is

disposed on the mounting base, and wherein the substrate is removed so as to expose a bottom surface of the n-type semiconductor layer and to emit light from the structured portion outward".

Third auxiliary request:

Claim 1 of the third auxiliary request differs from claim 1 of the main request in that the expression "A light-emitting apparatus compositing" is inserted at the beginning of the claim, the conjunction "and" is appended at the end of features (c) and (g), and the following feature is appended at the end of the claim:

(j) ", and a light-transforming member for transforming part of light emitted from the light-emitting device into light having a different wavelength, wherein the light-transforming member is formed into a light-transforming layer which is deposited onto and adhered on a surface of the light-emitting device".

Fourth auxiliary request:

Claim 1 of the fourth auxiliary request differs from claim 1 of the main request in that:

- the expression "a buffer layer," is inserted in feature (b) behind the expression "disposed on the substrate and includes" and the expression "the structured portion having an inclined periphery," is appended at the end of feature (b),
- the expression "light-transmissive and" is deleted in feature (g), and
- features (d) and (e) are replaced by the following features (d)' and (e)', respectively:

(d)' "an insulating film, and an n-electrode disposed on the surface of the n-type semiconductor layer exposed at the inclined periphery of the structured portion,"

(e)' "wherein the n-type semiconductor layer extends continuously to the lower surface of the substrate through the side surfaces of the substrate and the p-type semiconductor layer is disposed on an upper surface side of the structured portion,".

IV. The appellant argued essentially as follows:

(a) Main request and first auxiliary request - amendments

Embodiments 1 to 6 provided a basis for claim 1 of the main request.

With respect to embodiment 1 the light propagating in parallel to the semiconductor layer might be reflected totally between the layered portion and the insulating layer, the rest of the light being extracted through the insulating layer. This resulted in the insulating layer being light-transmissive.

Embodiment 2 related to emission through the upper surface or through the substrate, whereas with regard to embodiment 3 the p-pad electrode was described as light-transmissive and the substrate was covered on the lower side for reflection. Embodiment 4 related to a rectangular layered portion.

With respect to embodiment 5 the claimed "p-electrode" corresponded to the combination of the over-surface electrode 231 and the p pad electrode 232 shown in

Figure 13, whereas the claimed "insulating film" corresponded to the insulating layer 271 also shown in that Figure. That embodiment concerned emission through the semiconductor or the substrate. In either case the device comprised the reflection metal of the connection electrode and the light-transmissive p-electrode with the light-transmissive insulating layer therebetween. To decide whether light was emitted through the substrate or the structured portion did not depend on what the p-electrode and the insulating layer were made of, but how large the coverage of the metal connecting electrode was. Also in embodiment 6 the claimed "p-electrode" corresponded to the combination of the over-surface electrode 231 and the p pad electrode 232 and the claimed "insulating film" corresponded to the insulating layer 271, as could be seen in Figures 19A and 19B. In both embodiments 5 and 6 the reflection metal of the connecting electrode covered the p-electrode with the insulating layer therebetween, where both p-electrode and insulating layer usually functioned as light-transmissive. The paragraph on page 61, lines 8 to 21, taught that the reflection layer could consist of a highly reflective metal used for the electrode and a dielectric multilayer used for the insulating layer 271.

The paragraph bridging pages 14 and 15 disclosed three alternatives, all of which involved a reflecting metal layer. The insulating layer might have adjusted refractive index or be a multilayer film. In any case, the metal layer reflected the rest of the light which went through the insulating layer.

The passage on page 93, lines 17 to 25, of the description of the application generally taught a structure wherein a light transmissive p-electrode, an insulating

layer and a reflection layer were laminated in this order.

Moreover, original claim 8, which was dependent on original claim 1, defined p ohmic electrodes and was referred to in original claims 9 to 11. In these claims a metal layer was defined covering the layered portion with an insulating layer therebetween. A light-transmissive insulating layer covering the periphery of the structured portion was furthermore defined in original claim 42.

Hence the combination of the features of claim 1 of the main request was fully based on the original disclosure. For the same reasons the combination of features of the first auxiliary request was also based on the original disclosure.

(b) Second to fourth auxiliary requests - admission

The second and third auxiliary requests were related to new combinations of features. The additional features in claim 1 of the second auxiliary request made it clear that light was not emitted at the mounting side of the light-emitting device, whereas the additional features of claim 1 of the third auxiliary request allowed the wavelength of the emitted light to be transformed by a light-transforming member. These requests had to be admitted into the proceedings and considered in more detail regarding their allowability.

The fourth auxiliary request was not filed earlier because the appellant was certain that the main request would be allowable. It concerned a new attempt to overcome the objections under Article 123(2) EPC. In particular, the basis for amended feature (e)' could be

found in the description of the application on page 12, lines 5-8.

Reasons for the Decision

1. Main request - amendments
 - 1.1 The claims of the main request correspond to a large extent to the first auxiliary request underlying the decision under appeal. The examining division held that the features of claim 1 of the former first auxiliary request relating to the light-transmissivity of the insulating film and the p-electrode (cf. features (d) and (g) of claim 1 of the main request) did not have a basis in the application as filed (see points 1.3, 1.4, and 2.3 of the Reasons).
 - 1.2 It has to be determined whether the subject-matter of claim 1 of the main request has a basis in the application as filed, i. e. whether the combination of the features of that claim is directly and unambiguously derivable from the original application documents.

It is noted that two different alternatives of light emission are mentioned in the description of the application in relation to the devices of the invention, namely emission through the transparent substrate and emission in the opposite direction on the p-electrode side. Since according to feature (h) of claim 1 of the main request a reflection metal layer covers the p-electrode on the upper surface side of the structured portion (with an insulating film intervening between the p-electrode and the reflection metal layer), that claim is directed to the alternative of light emission

through the substrate. The reflection metal layer is intended to enhance the emission through the substrate.

- 1.3 The board turns first to the originally filed claims and to the corresponding parts of the description of the application.
- 1.3.1 The appellant referred in particular to original claims 1, 8-11 and 42 and to the paragraph bridging original pages 14 and 15.
- 1.3.2 In original independent claim 1 a nitride semiconductor light-emitting device is defined which comprises
- a substrate,
 - a layered portion emitting light disposed on the substrate, wherein the layered portion
 - includes an n-type semiconductor layer, an active layer, and a p-type semiconductor layer, and
 - has an inclined periphery at which the surface of the n-type semiconductor layer is exposed, and
 - an n electrode disposed on the surface of the n-type semiconductor layer.

The nitride semiconductor light-emitting device according to claim 1 of the main request is related to the aspect of the invention which is claimed in original claim 1. In particular, features (a), (b), and (f) of claim 1 of the main request are based on original claim 1.

- 1.3.3 Original claims 6 to 8, which depend on original claim 1, define the additional features of a plurality of layered portions (original claim 6), a common electrode connecting the respective n-electrodes to each other (original claim 7), and p ohmic electrodes connected to each other and in contact with the respective p-type

semiconductor layers (original claim 8). From the claim dependence (in original claims 7 and 8 reference is only made to the preceding claims 6 and 7, respectively) it follows that the p ohmic electrodes connected to each other (original claim 8) are only disclosed in combination with the additional features of claims 6 and 7. Moreover, as the additional features of original claims 6 to 8 are all related to the presence of a plurality of layered portions the skilled person would regard these features as interacting and complementing each other.

A *single* p-electrode, as follows from feature (c) of claim 1 of the main request, is therefore not derivable from these originally filed claims in combination with the other features of claim 1 of the main request.

- 1.3.4 Furthermore, original dependent claims 9 and 10 define the additional features of a reflection layer covering the layered portion (original claim 9), where the reflection layer is a metal layer covering the layered portion with an insulating layer therebetween (original claim 10). When the reference in original claim 9 to original claims 6 to 8 is considered, it follows from the above considerations that the additional features of claims 9 and 10 are only disclosed in combination with a *plurality* of p ohmic electrodes connected to each other (original claim 8) and in that context in fact only in combination with the additional features of claims 6 and 7.

The reflection metal layer defined in feature (h) of claim 1 of the main request is thus not derivable from the originally filed claims in combination with the feature of a single p-electrode, which follows from feature (c).

1.3.5 Concerning the claimed light-transmissivity of the insulating film and the p-electrode, it is noted that in original claim 42, as pointed out by the appellant, a "light-transmissive insulating layer" is mentioned. However, that claim depends on original independent claim 29, which is not related to the same aspect of the invention as original independent claim 1. Moreover, according to original claim 42 the light-transmissive insulating layer covers the *periphery* of the structured portion and is itself covered by a *filling member* rather than a metal reflection layer as in original claim 10. Hence, the insulating layers of original claims 10 and 41 have different functions.

A "transparent electrode" is mentioned as the additional feature of original claim 17, which is dependent on original claim 1. However, it is not mentioned that this electrode is a p-electrode and the claim does not refer to any of the claims 6 to 10, either. Hence, the transparent electrode is not disclosed in combination with a reflection metal layer.

Therefore a light-transmissive insulating layer and a light-transmissive p-electrode, as defined in features (d) and (g) of claim 1 of the main request, is not derivable from the originally filed claims in combination with the other features of claim 1 of the main request.

1.3.6 The paragraph bridging pages 14 and 15 of the original description of the application is in the part of the description preceding the brief description of the figures, where the features of the original claims are recited almost verbatim and the corresponding advantages of these features are described. In particular,

the first part of the sentence on page 14, lines 21-24, recites the additional features of original claim 10, whereas the sentence on page 14, lines 9-12, recites the additional features of original claim 9. Moreover, the third paragraph on page 11 corresponds to original claim 1 and the passage on page 12, line 14 to page 13, line 5 corresponds to original claims 6-8. Hence, as far as the claimed features are concerned, the teaching contained in the indicated passages does not go beyond what is contained in the corresponding original claims.

1.3.7 In view of the above, the combination of the features of claim 1 of the main request, in particular the combination of features (c), (d), (g), and (h) with the other features of the claim, is not directly and unambiguously derivable from the originally filed claims or the corresponding parts of the description of the application.

1.4 Next, the board turns to the part of the description containing the detailed exposition of the embodiments.

1.4.1 The appellant referred in this context in particular to the detailed description of embodiments 1 to 6 and the corresponding figures and to certain other parts of the description.

1.4.2 Embodiments 1 to 6 relate to the aspect of the invention, which is the object of claim 1 of the main request. All of these embodiments disclose features (a), (b), (c), and (f) of that claim, albeit embodiments 5 and 6 disclose features (b), (c), and (f) only in the context of a *plurality* of structured portions (see below). It will be examined whether features (d), (g), and (h) have been disclosed with respect to any one of these embodiments.

For this purpose, apart from the detailed description of embodiments 1 to 6, the following statement on page 61, lines 8-21, which was pointed out by the appellant and follows the detailed description of embodiment 6, has to be considered:

"The nitride semiconductor light-emitting devices of the above-described embodiments may emit light through the substrate or through the semiconductor side. In either case, it is preferable that a reflection layer be provided on the side opposite to the light-emitting side. In the structures shown in Figs. 7, 8, 16A and 16B, the n electrode 24, electrode 26, or electrode 265 can be used as a reflection layer, as described above. In the other structures, it is preferable that a reflection layer be additionally provided. The reflection layer may be formed of a metal having a high reflectance, or a dielectric multilayer film. If a dielectric multilayer film is used, the insulating layer 271 in Fig. 13, for example, is given reflectivity in addition to insulation performance."

It is noted first that in this passage reference is made to the "above-described embodiments", i. e. to the six embodiments 1 to 6. Moreover, it is mentioned that the reflection layer is provided on the side opposite to the light-emitting side, i. e. either on the substrate side or on the semiconductor side. Finally, it is stated that the reflection layer is formed of a metal or of a dielectric multilayer film. It is evident that not all possible combinations of these alternatives are implicitly disclosed by the statement. Some combinations would even make no sense from a technical point of view, e. g. attaching the reflection layer to

the device of an embodiment on its light emission side. Rather, it has to be carefully examined with respect to each embodiment what the skilled person can directly and unambiguously derive from that passage.

- 1.4.3 With regard to the device of embodiment 1 it is mentioned in the description of the application (see page 40, lines 14-16) that light may be emitted through the substrate as implied by feature (h) of claim 1 of the main request (see point 1.2 above).

Moreover, it is described that the device according to embodiment 1 comprises a p electrode including an over-surface electrode 31 and a p pad electrode (page 39, lines 13-14 of the description of the application). The combination of these electrodes is regarded to correspond to the claimed "p-electrode". This correspondence was pointed out by the appellant explicitly in relation to embodiments 5 and 6. Feature (c) is therefore disclosed in relation to embodiment 1.

With respect to the passage cited under point 1.4.2 above it is noted that in relation to the alternative of a reflection layer formed of a metal having high reflectance there is no mention in the passage of an intervening insulating layer. Hence, if such a reflecting metal layer were to be arranged on the device of embodiment 1 in such a way as to cover the over-surface electrode 31 and p pad electrode, short circuits might well ensue. Even if the skilled person were to consider providing an intervening insulating layer, further arrangements would be needed for providing electrical connection to the p pad electrode through that insulating layer. Such arrangements would also be needed in case the skilled person were to consider providing a reflecting multilayer dielectric film on the over-

surface electrode 31 and p pad electrode. In view of these considerations it is not considered directly and unambiguously derivable from the cited passage to provide the device of embodiment 1 with a reflection layer in such a way as to cover the over-surface electrode 31 and p pad electrode on the upper surface side of the structured portion. In particular, it is not derivable to cover the over-surface electrode 31 and p pad electrode with a reflection metal layer with an insulating film intervening between these electrodes and the reflection metal layer.

Furthermore, there is no disclosure of the over-surface electrode 31 or the p pad electrode being light-transmissive. In the absence of a reflection layer covering the p electrodes such transmissivity would also serve no purpose when emission through the substrate is desired. On the contrary, it would be advantageous if these electrodes were themselves reflective in order to enhance the light emission through the substrate.

In view of the above, features (d), (g), and (h) of claim 1 of the main request have not been disclosed in the context of the detailed description of embodiment 1.

1.4.4 The devices of embodiments 2 and 4 differ from that of embodiment 1 merely in the shapes of the structured portion, the n electrode, the over-surface electrode and p pad electrode. However, this has no consequence for the considerations stated above in relation to embodiment 1. Therefore, for the same reasons features (d), (g), and (h) of claim 1 of the main request have not been disclosed in the context of the detailed description of embodiments 2 and 4, either.

1.4.5 The device of embodiment 3 is intended for light emission through the p-electrode side (see page 44, lines 21-24 of the description of the application). In order to increase the light-emission efficiency the side surfaces and the rear surface of substrate 1 are covered by the n electrode 24 or another electrode 26 for reflecting the light passing through the substrate 1. Covering the ohmic electrode 33a and the p pad electrode 34, which are considered to correspond to the claimed "p-electrode", by a reflection layer would make no sense from a technical point of view as it would prevent light emission in the desired direction.

Therefore, features (d) and (h) of claim 1 of the main request have not been disclosed in the context of the detailed description of embodiment 3.

1.4.6 The description of embodiment 5 commences with the following statement (see page 47, lines 12-18):

"A nitride semiconductor light-emitting device according to Embodiment 5 includes a plurality of layered portions 210 (18 layered portions in Figs. 11 and 12), as shown in Figs. 11 and 12, to have a large luminescent area. This structure can increase the occupancy of the luminescent region in the entire area of the device, and thus light can be uniformly emitted over entire area of the luminescent layer."

This is followed by the detailed description of the device according this embodiment shown in Figure 11, which comprises a plurality (namely 18) of layered portions 210 and corresponding over-surface electrodes 231 and p pad electrodes 232. Moreover, several modifications of embodiment 5 are described with respect to the

corresponding Figures 14, 15, 16A, 16B, and 24. All of these modifications comprise a plurality of layered portions. It is evident from the above that a central aspect of embodiment 5 is the provision of a *plurality* of layered light-emitting portions. However, the wording of claim 1 of the main request is broad enough to also relate to a device comprising merely a *single* layered light-emitting portion.

As for the other embodiments the board agrees with the appellant in that the combination of an over-surface electrode 231 and the corresponding p pad electrode 232 is considered to correspond to the claimed "p-electrode". The appellant argued further that the claimed "insulating film" corresponded to the insulating layer 271 and that the connecting electrodes of the devices of embodiment 5 constituted a reflection metal.

Indeed, it is described in concrete terms with regard to the modification shown in Figure 16A that an electrode layer 265 is provided which covers the plurality of layered portions for reflecting the light (see page 53, lines 6-13). However, there is no disclosure of a reflection metal layer in general terms but only the description of the concrete implementation of an electrode layer also providing the function of reflecting light. Moreover, the insulating layer 271 has openings over the p pad electrode 232 so that the electrode layer has electrical contact to the p pad electrodes 232 thus performing its function as an electrode layer. Therefore, the insulating layer 271 cannot be considered as *intervening* between the p-electrode 231/232 and the electrode layer 265. Furthermore, in the context of the device of Figure 16A there is no disclosure of the over-surface electrode 231 or the p pad electrode 232 being light-transmissive. This is not considered to be

implicitly disclosed, either. In fact, it would equally well enhance the light emission through the substrate if these electrodes were themselves reflective. The reflective electrode layer 265 would then still have the purpose of reflecting light at the inclined surfaces of the layered portions and at the parts of their upper surfaces not covered by the p electrodes. In any case, even in the context of an alternative implementation of embodiment 5 involving emission through the side opposite to the substrate side, it is only mentioned (see page 51, lines 23-25) that the *over-surface electrode* may be transparent (but not the p pad electrode), which corresponds to only part of the claimed "p-electrode". Corresponding considerations also apply to the other modifications described in relation to embodiment 5.

Hence, with respect to the detailed description of embodiment 5, features (g) and (h) of claim 1 of the main request have not been disclosed and features (b), (c), and (f) have only been disclosed in the context of a *plurality* of structured portions.

- 1.4.7 Embodiment 6 also relates to a device comprising a plurality of layered portions 310 and p connecting electrodes 361 connecting the p pad electrodes 332 of the layered portions to each other (page 56, lines 5-8; page 57, lines 12-14). Even though Figure 28, which shows a light-emitting device having a single layered portion, is mentioned in the discussion of embodiment 6, it is evident that the device of Figure 28 is not a device according to embodiment 6. It is merely used to provide a reference allowing to express the extraction efficiency of the device of embodiment 6 as a percentage, namely 86% (see page 27, lines 15-17; page 58,

lines 3-22). The considerations mentioned above in relation to embodiment 5 also apply to embodiment 6.

Accordingly, with respect to the detailed description of embodiment 6, features (g) and (h) of claim 1 of the main request have not been disclosed, either, and features (b), (c), and (f) have only been disclosed in the context of a *plurality* of structured portions.

- 1.5 The last paragraph on page 93 of the description of the application, which was cited by the appellant, concerns a different embodiment, which does not comprise the claimed structured portion having an inclined side surface (see feature (f) of claim 1 of the main request). Rather, only *part* of the structured portion is inclined according to that embodiment (shown in Figure 58). Moreover, the passage does not disclose the claimed combination of a metal reflection layer, light-transmissive p-electrode, and light-transmissive insulating layer intervening between the p-electrode and the reflection metal (see features (d), (g), and (h) of claim 1 of the main request).

The subject-matter of claim 1 of the main request is therefore not directly and unambiguously derivable from this passage, either.

- 1.6 For the above reasons claim 1 of the main request contains subject-matter extending beyond the content of the application as filed, contrary to the requirements of Article 123(2) EPC.

2. First auxiliary request - amendments

Claim 1 of the first auxiliary request differs from claim 1 of the main request in that:

- "and capable of emitting light" is appended at the end of feature (b), and
- "light-transmissive" is replaced by "capable of extracting light therethrough" in feature (d).

The first amendment concerns a feature, whose basis in the original application documents is not contested. The expression "capable of extracting light there-through" is considered essentially synonymous to the replaced expression "light-transmissive". Hence, for the same reasons as those mentioned above in relation to claim 1 of the main request, claim 1 of the first auxiliary request also contains subject-matter extending beyond the content of the application as filed, contrary to the requirements of Article 123(2) EPC.

3. Second to fourth auxiliary requests - admission

3.1 The second to fourth auxiliary requests were filed one month before the date of the oral proceedings before the board. They constitute therefore an amendment to the appellant's case after it has filed its ground of appeal and may be admitted into the proceedings and considered at the board's discretion (Article 13(1) RPBA).

3.2 In accordance with established case law, late-filed auxiliary requests are inadmissible if - *prima facie* - they do not overcome the outstanding objections under the EPC or give rise to new objections (see Case Law of the Boards of Appeal of the EPO, 8th edition 2016, section IV.E.4.4.1 and 4.4.2).

3.3 Claim 1 of the second auxiliary request differs from claim 1 of the main request in that feature (i) is appended at the end of the claim. Claim 1 of the third

auxiliary request differs from claim 1 of the main request in that the expression "A light-emitting apparatus compositing" is inserted at the beginning of the claim and feature (j) is appended at the end of the claim.

Features (i) and (j) are unrelated to the critical features of claim 1 of the main request, which were not considered directly and unambiguously derivable from the application as filed (see point 1 above), and these critical features are still present in claim 1 of the second and third auxiliary requests. Hence, *prima facie* these auxiliary requests do not overcome the objections under Article 123(2) EPC concerning added subject-matter.

3.4 Claim 1 of the fourth auxiliary request differs *inter alia* from claim 1 of the main request in that feature (e) is replaced by feature (e)'. In this new feature it is specified that "the n-type semiconductor layer extends continuously to the lower surface of the substrate through the side surfaces of the substrate".

The appellant argued that the basis for amended feature (e)' could be found on page 12, lines 5-8 of the description of the application. However, the board notes that it is indicated in this passage that the *n electrode* extends to the lower surface of the substrate, but not - as claimed - the *n-type semiconductor layer*. In any case, the feature described on page 12, lines 5-8 relates to embodiment 3 and is incompatible with feature (h) of claim 1 of the fourth auxiliary request (see point 1.4.5 above). Hence, *prima facie* the fourth auxiliary request gives rise to new objections under Article 123(2) EPC concerning added subject-matter.

3.5 In view of the above, the second to fourth auxiliary requests are not admitted into the appeal proceedings (Article 13(1) RPBA).

4. Conclusion

Since the main request and the first auxiliary request are not allowable and the second to fourth auxiliary requests are not admitted into the proceedings, the appeal is to be dismissed (Article 111(1) EPC 1973).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



S. Sánchez Chiquero

G. Eliasson

Decision electronically authenticated