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**Datasheet for the decision  
of 2 April 2019**

**Case Number:** T 1875/14 - 3.4.03

**Application Number:** 10181251.9

**Publication Number:** 2262006

**IPC:** H01L33/50, H01L33/58

**Language of the proceedings:** EN

**Title of invention:**

Composite white light source and method for fabricating

**Applicant:**

Cree, Inc.

**Headword:**

**Relevant legal provisions:**

EPC 1973 Art. 54, 56

RPBA Art. 12(4), 13(1)

**Keyword:**

Novelty - (no)

Inventive step - (no)

Auxiliary request - request identical to request not admitted  
in first instance proceedings - admitted (no)

Late-filed auxiliary request - change of subject-matter -  
admitted (no)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 1875/14 - 3.4.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.4.03**  
**of 2 April 2019**

**Appellant:** Cree, Inc.  
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**Representative:** Boulton Wade Tennant LLP  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted on 22 April 2014  
refusing European patent application No.  
10181251.9 pursuant to Article 97(2) EPC.

**Composition of the Board:**

**Chairman** G. Eliasson  
**Members:** M. Stenger  
T. Bokor

## Summary of Facts and Submissions

I. The appeal concerns the decision of the Examining Division to refuse European patent application no. 10181251, which is a divisional application based on European patent application no. 04714213.

II. At the end of the oral proceedings before the Board, the applicant requested that a patent be granted according to a main request and 8 auxiliary requests. The main request and the first to seventh auxiliary requests were filed with the grounds for appeal. The eighth auxiliary request was filed with letter dated 1 March 2019.

III. The following documents are referred to in this decision:

D1 / D1a: WO 03/010832 A / EP 1418628 A

D5: US 6245259 A

D6: US 2003/025449 A1

D8: EP 1191608 A

D9: WO 97/50132 A1

Whenever D1 is referred to, the cited passages relate to the corresponding parts of D1a for intelligibility reasons.

D9 shares a priority document with and thus belongs to the same patent family as D5, which was cited in the search report of the present application. D9 was introduced into the proceedings by the Board.

IV. Claim 1 of the main request has the following wording (labelling (a), (b) ... added by the Board):

An emitter (10), comprising:

- (a) a submount (14);
- (b) a light source (12) on said submount (14) which emits a first spectrum of light; and
- (c) a hemispheric lens (16,36) on said submount (14) comprising a uniform distribution of wavelength conversion material (22) throughout,
- (d) said lens separately molded from said light source and positioned in proximity to said light source such that light emitted from said light source passes through similar thicknesses of said lens and similar amounts of said wavelength conversion material,
- (e) said wavelength conversion material absorbing at least some of said light source light passing through said lens and emitting a second spectrum of light;
- (f) wherein said first spectrum of light and said second spectrum of light are combined within said lens, said emitter emitting a combination of said first and second spectrums of light in a uniform third spectrum of light.

- V. Claim 1 of the first auxiliary request differs from claim 1 of the main request in that feature (a) is absent and that features (b) and (c) do not define that the light source / the lens is arranged *on said submount*. Further, this claim comprises, between features (e) and (f), the additional feature that the emitter comprises (labelling added by the Board):
- (g) a filler material (1) between said light source and said hemispheric lens (16, 36);

- VI. Claim 1 of the second auxiliary request differs from claim 1 of the main request in that feature (a) is not present and in that features (b) and (c) are replaced

by the following feature (b') and (c'), respectively (labelling added by the Board):

(b') *a light source (12) which emits a first spectrum of light; and*

(c') *a hemispheric lens (16,36) having a dome-shaped inside surface (53), said lens comprising a uniform distribution of wavelength conversion material (22) throughout,*

VII. Claim 1 of the third auxiliary request differs from claim 1 of the second auxiliary request in that it comprises, between features (e) and (f), additionally feature (g).

VIII. Claim 1 of the fourth auxiliary request differs from claim 1 of the main request in that features (a), (b) and (c) are replaced by features (a'), (b'') and (c''), respectively, as follows (labelling added by the Board):

(a') *a flat submount (14);*

(b'') *a light source (12) on said flat submount (14) which emits a first spectrum of light; and*

(c'') *a hemispheric lens (16,36) on said flat submount (14) comprising a uniform distribution of wavelength conversion material (22) throughout,*

IX. Claim 1 of the fifth auxiliary request differs from claim 1 of the fourth auxiliary request in that feature (c'') is replaced by feature (c''') as follows (labelling added by the Board):

(c''') *a hemispheric lens (16,36) on said flat submount (54) and having a dome-shaped inside surface*

*(53), said lens comprising a uniform distribution of wavelength conversion material (22) throughout,*

- X. Claim 1 of the sixth auxiliary request differs from claim 1 of the third auxiliary request in that feature (c') is replaced by feature (c''') as follows (labelling added by the Board):  
(c''') *a dome-shaped lens (56) having a dome-shaped inside surface (53), said lens comprising a uniform distribution of wavelength conversion material (22) throughout,*
- XI. Claim 1 of the seventh auxiliary request differs from claim 1 of the fifth auxiliary request in that it comprises, between features (e) and (f), additionally feature (g).
- XII. Claim 1 of the eighth auxiliary request differs from claim 1 of the main request in substance in that features (a) and (c) are replaced by features (a'') and (c''''') and in that it comprises at its end the additional feature (h), as follows (labelling added by the Board):  
(a'') *a submount (114) comprising at least a first (101), second (115), and third (117) surface, wherein said third surface is between said first and second surfaces;*  
(c''''') *a lens (116) on said third surface of said submount (14) comprising a top surface (105) and a bottom layer (118) with a uniform distribution of wavelength conversion material (22) throughout said bottom layer,*

(h) *wherein said first and second surfaces of said submount are oriented to redirect light emitted from said conversion material toward said top surface of said lens.*

XIII. The arguments of the applicant, as far as they are relevant to the present decision, can be summarised as follows:

(a) Lens with a uniform distribution of wavelength conversion or fluorescent material throughout / features (c), (c'), (c''), (c''') and (c''''')

D1 distinguished, for example in [6], between a fluorescent member 3 on the one hand and an optical member 4 on the other hand. The fluorescent member 3 did not have any beam-shaping properties, which was the reason that all embodiments of D1 comprised an optical member 4. Therefore, the fluorescent member 3 was no *lens* in the sense of the application.

Further, D1 did not mention a uniform distribution of the wavelength conversion material.

The application thus differed from D1 in that it defined a *lens comprising a uniform distribution of wavelength conversion material throughout.*

This applied equally to lenses of hemispheric shape, to lenses of hemispheric shape with a dome-shaped inner surface and to dome-shaped lenses.

(b) Filler material between light source and lens / feature (g)



The light-emitting devices disclosed in D1 all required a space between the light-emitting element 2 and the fluorescent member 3 in order to avoid deterioration of the fluorescent member by the heat generated by the light-emitting element (see [34] and [53]).

Although a filler between the light-emitting element 2 and the fluorescent member 3 in the devices shown in D1 would maintain the relative positions of the element 2 and the member 3 and thus keep the light-emitting element 2 away from the fluorescent member 3, it would also increase the heat conduction between element 2 and member 3 and thus go against the teaching of that document. For this reason, the skilled person would, starting from D1, not consider to use a filler between the light-emitting element 2 and the fluorescent member 3.

- (c) Dome-shaped (inside surface of the) lens / features (c'), (c''') and (c''''')

Only figures 5 and 6 of the application disclosed a dome-shaped (inside surface of the) lens, while figures 3, 4, 7 and 8 did not relate to embodiments of the invention including this feature.

Figures 18 and 19 of D1 only showed a shell 3 of fluorescent material complemented by an optical member 4, but not a (hemispheric) lens with a dome-shaped inner surface and a uniform distribution of wavelength conversion material throughout (the lens).

The position of the light source at the center of the dome-shaped inner surface of the lens had the technical effect that the light rays from the light source entered the lens at an angle close to

normal, thereby minimising reflection and providing a good optical quality.

- (d) Filler material and dome-shaped (inside surface of the) lens in combination / features (g) and (c'), (c'') or (c''') in combination

A filler material maintained the light source and the lens in their positions with respect to each other and thereby maintained the good optical quality achieved by the position of the light source at the center of the dome-shaped inner surface. Moreover, the presence of a filler material even *enhanced* that quality by further reducing reflections due to less different refractive indices.

There was thus a particularly advantageous effect when using a filler in combination with a dome-shaped inner surface and the presence of a filler material.

- (e) Flat submount, filler material and dome-shaped inside surface of the lens / features (a'), (b'), (c'') and (g) in combination

The use of a flat submount in combination with a dome-shaped inner surface helped to elevate the position of the light source to the center of the dome-shaped inner surface. It thus further enhanced the optical quality achieved by the position of the light source.

The filler material maintained the positions of the light source and the dome-shaped inner surface with respect to each other and thus contributed to maintaining a high optical quality. Thus, a particularly advantageous effect was obtained when

using a filler material in combination with the other two features.

(f) Admission of the eighth auxiliary request

The claims of the eighth auxiliary requests were admittedly directed at a different subject-matter as compared with that pursued in the first instance as well as with that of the main request and the first seven auxiliary requests.

However, the applicant was prompted to file the new claims by the introduction of new document D9 by the Board as well as by the new interpretation of the Board of D1 that the fluorescent member 3 was to be regarded as a lens within the meaning of the application.

Further, the dome-shaped lens of the sixth auxiliary request was already of a non-hemispheric form. Thus, the omission of the feature that the lens was *hemispheric* was not completely new.

### **Reasons for the Decision**

1. The appeal is admissible.
  
2. The closest state of the art  
Document D1 (as mentioned above, the cited passages refer to D1a) concerns a light-emitting device 10 with an LED 2 mounted face down on a substrate/submount 1 and a fluorescent member 3 arranged such that light from the LED is made incident on the fluorescent member 3 (see abstract). Thereby, the fluorescent material in member 3 is excited and re-emits light with a wavelength that is different from the wavelength of the incident light. This light, mixed with non-absorbed light from the LED, passes through an optical member 4

for alignment of the light towards the outside of the device. The LED 2 and the fluorescent member 3 are not in contact with each other to reduce the heat received by the fluorescent member from the LED.

3. Main request

3.1 Claim 1, features undisputedly disclosed in D1

It was not disputed by the applicant that, in the wording of claim 1, D1 (see in particular figures 16 and 17 as well as [28] and [48]) discloses

An emitter (10), comprising:

- (a) a submount (1);
- (b) a light source (2) on said submount (1) which emits a first spectrum of light; and
- (c, part) a hemispheric element (3) on said submount (1) comprising wavelength conversion material (YAG, see [28]),
- (d) said element (3) separately molded from said light source (2) and positioned in proximity to said light source such that light emitted from said light source passes through similar thicknesses of said element (3) and similar amounts of said wavelength conversion material (see [6] and [48] in combination),
- (e) said wavelength conversion material (YAG) absorbing at least some of said light source light passing through said element (3) and emitting a second spectrum of light (see [28]: *the semiconductor emits blue light and the fluorescent material YAG is excited by blue light to emit yellow light*);
- (f) wherein said first spectrum of light and said second spectrum of light are combined within said element (3), said emitter emitting a combination of

said first and second spectrums of light in a uniform third spectrum of light (see [31]: *...blue light from the blue LED and yellow light converted from the blue light are mixed with each other to form, for example, white light...*).

3.2 Disputed features / see point XIII.(a) above

The applicant disputed, however, that the fluorescent element 3 of D1 *comprised a uniform distribution of wavelength conversion material throughout* and was a *lens* in the sense of the application according to parts of feature (c).

3.2.1 Uniform distribution of the wavelength conversion material throughout

The Board accepts the arguments of the applicant insofar as D1 does not *explicitly* disclose a uniform distribution of wavelength conversion material throughout hemispheric member 3.

However, it is dictated by the laws of physics and was generally known to the skilled person at the priority date of the present application that, in order to obtain uniform light emission characteristics in an emitter using luminescent conversion particles, the light emitted from the light source has to pass through similar amounts of conversion particles. Otherwise, different rates of the light emitted from the light source would be converted.

Thus, if it is indicated in a document that a uniform light emission can be obtained by making the light from the light source travel the same path length through the conversion element whichever direction they are

emitted, a distribution of the conversion particles in the conversion element which is uniform in relation to these *directions* is implicitly required. This is the case in document D1 (see [15] and [48]). Further, figures 16 and 17 of D1 indicate that the fluorescent material is dispersed in the fluorescent member 3 in a uniform manner that does not depend on the *distance to the center* of the member (see [33]).

The Board additionally notes that if particles were to be dispersed in another material, this would *normally* be done in a uniform or homogeneous manner (see, e.g., D5, column 3, lines 19 to 31). Thus, if an inhomogeneous distribution was desired in a particular case for whatever reason, the skilled person would expect that aspect to be *explicitly* mentioned. However, D1 does not mention any inhomogeneous distribution of the conversion material.

It follows from the above that D1 *implicitly* discloses a hemispheric member 3 on said submount comprising a *uniform distribution of wavelength conversion material throughout*, contrary to the arguments of the applicant.

### 3.2.2 Lens

The Board accepts the arguments of the applicant insofar that D1 does not *explicitly* mention that the fluorescent member possesses any beam-shaping properties.

However, the refractive index of fluorescent member 3 of D1 is about the same as the refractive index of optical member 4 and thus suitable for beam-shaping (see [32]: *... a silicone resin having substantially the same refractive index as the acrylic resin used as the optical member 4 ... a material having a refractive*

*index close to that of the optical member 4 ...*).  
Further, the shape of the fluorescent member 3 in figures 16 and 17 of D1 is semi-spherical (see [48]) and thus identical to the shape of the hemispheric lens defined in claim 1 of the main request.

For these reasons, the fluorescent element 3 shown in figures 16 and 17 of D1 must have similar beam-shaping properties as the hemispheric lens defined in claim 1 of the main request.

In addition, the Board accepts that all embodiments of D1 include an optical member 4 as argued by the applicant. However, this does not change the optical properties of the fluorescent member 3 as such. Further, the Board notes that claim 1 of the main request does not exclude the use of additional optical members.

Therefore, fluorescent member 3 of D1 must be considered to be a *lens* in the sense of the application.

### 3.3 Conclusion

It follows from the above that D1 implicitly discloses *a hemispheric lens on the submount comprising a uniform distribution of wavelength material throughout* according to feature (c).

The Board thus concludes that the subject-matter of claim 1 of the main request is not new according to Article 54 EPC 1973 in view of the embodiment shown in figures 16 and 17 of D1.

This corresponds to the conclusion of the Examining Division (see point 2.1 of the contested decision).

4. Auxiliary request 1 / feature (g) / see point XIII.(b) above

The subject-matter of claim 1 of auxiliary request 1 as compared to claim 1 of the main request comprises the additional feature (g); further, it does not include a submount (and thus *inter alia* lacks feature (a)).

Additional feature (g) is not disclosed in D1. The subject-matter of claim 1 of auxiliary request 1 thus differs from D1 by this feature, *i.e.* by the provision of a filler material between the light source and the hemispheric lens.

- 4.1 Provision of a filler material in LED light emitters in general

Filler materials or potting / sealing compounds were widely used in the area of semiconductors (including LEDs) well before the priority date of the present application for the purposes of protecting semiconductor components and improving the mechanical stability (by fixing the positions of different components) of semiconductor devices.

More particularly in the field of LEDs, it was commonly known at the priority date of the application that the use of a filler material had the additional advantage that due to similar refractive indices, internal light reflections were minimised as compared to the presence of an air gap (as example, see the *optical coupling medium 19* of D6 in [14] and [24]; see also the *bonding layer 6* of D8 in [37] and [38]).



At the same time, the skilled person was aware that using a filler material as opposed to an air gap increased the thermal conduction as dictated by the laws of physics.

It must be concluded that the various advantages (improved protection, better mechanical stability, less optical reflections) and disadvantages (increased thermal conduction) implied by the use of a filler material in LED light emitters were commonly known at the priority date of the present application.

Thereby, in the field of LED light emitters, the skilled person would normally have considered the provision of a filler material between the light source and the fluorescent material according to feature (g) as an option to choose or not according to the circumstances, taking into account these commonly known advantages and disadvantages.

This finding is supported by the passage on page 19, lines 22 to 25 of D9 (*Die Ausnehmung 9 kann sowohl mit einem transparenten Kunststoff, mit einem anorganischen Glas oder mit Gas gefüllt als auch mit einem Vakuum versehen sein.*).

The Board notes that the provision of a filler material is presented as being entirely optional in the application as well (page 13, second paragraph). The Board further notes that the application does not mention any particular advantages obtained by using a filler material as opposed to not using a filler material, including the advantages mentioned by the applicant during oral proceedings.

4.2 Provision of a filler material in a device according to D1

The Board is aware that D1 is concerned about deterioration of the fluorescent member 3 by heat received from the light-emitting element / LED 2 (see for example paragraph 7), as submitted by the applicant.

To avoid such a deterioration, D1 requires that the light emitting element 2 and the fluorescent member are not in *contact* with each other (column 2, lines 43 to 56; column 11, lines 48 to 55).

That is, D1 requires that there is a space between the LED 2 and the fluorescent member 3. However, D1 does not require that this space is filled with air or contains a vacuum. Instead, the provision of a space between the LED 2 and the fluorescent member 3 in D1 does not exclude the presence of a filler material in that space.

The Board notes that according to the terminology employed in the application, the provision of a space between the lens and the light source (claims 7 and 8 of auxiliary request 1) does not exclude the use of a filler between these two elements, either (claim 1 of auxiliary request 1, on which claims 7 and 8 depend). The Board further notes that the application also mentions a possible deterioration of the wavelength conversion element without (page 19, last paragraph) excluding the use of a filler material as a consequence thereof.

Document D1 can thus not be seen as teaching away from the use of a filler material according to feature (g), contrary to the arguments of the applicant. The skilled person might, however, consider using a filler material with a low thermal conductivity to limit the problems arising from the increased heat conduction.

Starting from D1, the skilled person would thus, as he would normally do in the field of semiconductors as argued above, consider to use a filler material between the LED 2 and the fluorescent member 3 to obtain the commonly known advantages of such a filler material as mentioned above.

#### 4.3 Conclusion

In view of the above, the Board comes to the conclusion that the subject-matter of claim 1 of the first auxiliary request is not inventive according to Article 56 EPC 1973 in view of D1 and the common general knowledge of the skilled person.

#### 5. Auxiliary request 2 / feature (c') / points XIII.(a) and (c) above

The subject-matter of claim 1 of auxiliary request 2 as compared to claim 1 of the main request comprises the additional feature that the lens has a *dome-shaped inside surface* as defined feature (c'). Further, no submount is mentioned. According to the submissions of the applicant, only the emitters shown in figures 5 and 6 of the application correspond to claimed embodiments.

In D1, the embodiment shown in figures 18 and 19 differs from the embodiment shown in figures 16 and 17 only by the shapes of the fluorescent element 3 and the submount / packaging substrate.

In particular, figures 18 and 19 show a hemispheric element 3 which *includes a dome-shaped inside surface*.

Similar to what was discussed with respect to the main request, the shape of fluorescent element 3 of figures 18 and 19 of D1 is the same as the shape of lens 56 having a dome-shaped inside surface of figures 5 and 6 of the application, and the refractive index of the fluorescent element 3 is suitable for beam-shaping purposes (see [32] of D1).

Thus, the reasoning relating to the shape and refractive index of the fluorescent member 3 of D1 brought forward with respect to the main request above also applies here, whereby the element 3 shown in figures 18 and 19 of D1 has to be regarded as a *lens* in the sense of the application, contrary to the argument of the applicant.

The reasoning relating to the uniform distribution of the wavelength conversion material throughout brought forward with respect to the main request above equally applies to auxiliary request 2.

Therefore, D1, in the embodiment shown in figures 18 and 19, also discloses feature (c') of claim 1 of auxiliary request 2. The subject-matter of this claim is thus not new according to Article 54 EPC 1973, either.

6. Auxiliary request 3 / features (c') and (g) in combination / point XIII.(d) above

As compared to claim 1 of the main request, claim 1 of the third auxiliary request comprises the additional features that the lens has a *dome-shaped inside surface* as defined in feature (c') and that a *filler material* is provided according to feature (g).

As shown with respect to auxiliary request 2, D1 discloses a dome-shaped inside surface of the lens according to feature (c') as well.

The subject-matter of claim 1 of auxiliary request 3 thus differs from D1 only by feature (g), like claim 1 of auxiliary request 1.

The Board accepts the arguments of the applicant insofar that a dome-shaped inside surface may achieve the technical effect of reducing optical reflections, provided that the light source is positioned centrally. This corresponds, however, to the teaching of D1 (column 16, lines 42 to 48: *...the reflection on this surface is suppressed...* ).

Further, as argued above with respect to auxiliary request 1, one of the commonly known effects of the presence of a filler material is to reduce optical reflections.

That is, in line with the arguments of the applicant, both the dome-shaped inside surface and the filler material contribute to the same technical effect of reducing optical reflections.

However, a filler material reduces optical reflection irrespective of whether the inside surface of the lens is dome-shaped or not and vice versa. Thus, although these two features contribute to the same technical effect, they do not do so in a combinatory manner achieving a particularly advantageous effect that arises only by means of their combination.

The same applies to the other commonly known effect obtained by the presence of the filler, namely, to maintain the light source and the lens in their

respective positions and to thus enhance mechanical stability. This effect is achieved irrespective of whether the lens has a flat base surface or a dome-shaped inside surface.

Thus, there is no particularly advantageous (or synergistic) effect achieved by the use of a filler according to feature (g) in combination with a dome-shaped inside surface of the fluorescent element according to feature (c'), contrary to the argument of the applicant.

The reasoning provided above with respect to claim 1 of auxiliary request 1, the subject-matter of which also differs from D1 by feature (g) thus applies for claim 1 of auxiliary request 3 as well.

The subject-matter of claim 1 of auxiliary request 3 is therefore not inventive according to Article 56 EPC 1973.

7. Auxiliary request 4 / features (b') and (c'') / admission

The fourth auxiliary request was not admitted by the Examining Division (point 10 of the contested decision). The Board has the discretion not to admit such requests according to Article 12(4) RPBA.

According to claim 1 of auxiliary request 4, a hemispheric lens, which must be considered to have (in the absence of any definition to the contrary) a *flat* base, is arranged on a *flat* submount according to feature (c''). Thereby, no space is left between the flat base and the flat submount for a light source, which, however, is mounted on the submount according to

feature (b'). Features (b') and (c'') thus prima facie contradict each other, whereby claim 1 of auxiliary request 1 clearly does not meet the requirements of Article 84 EPC.

The Board thus comes to the conclusion that auxiliary request 4 is not only not clearly allowable, but even clearly not allowable.

The Board notes that this finding corresponds to the conclusion of the Examining Division that the claims of auxiliary request 4 do not "converge towards patentable subject-matter".

The Board thus decided not to admit auxiliary request 4 into the proceedings according to Rule 12(4) RPBA.

8. Auxiliary request 5 / features (a'), (b'') and (c''')

Claim 1 of auxiliary request 5 comprises, with respect to claim 1 of the main request, the additional features that the submount is *flat* and that the hemispheric lens has a *dome-shaped inside surface* according to features (a'), (b'') and (c''').

However, as mentioned above with respect to auxiliary request 2, the device shown in figures 18 and 19 of D1 also includes a hemispheric lens with a *dome-shaped inside surface*. Further, according to these figures, the lens is mounted on a *flat* submount.

Thus, the subject-matter of claim 1 of auxiliary request 5 is not new according to Article 54 EPC 1973.

9. Auxiliary request 6 / feature (c''''')

The only difference between claim 1 of auxiliary request 6 and claim 1 of auxiliary request 3 is that the term *hemispheric lens having a dome-shaped inside* (feature (c')) is replaced by the term *dome-shaped lens* (feature c''').

A hemispheric lens, however, has to be considered to have a dome-shape outside surface. The difference between features (c') and (c''') is thus a purely linguistic one which does not change the subject-matter of this claim.

Thus, the same arguments as for auxiliary request 3 apply, and the subject-matter of claim 1 of auxiliary request 6 is not inventive according to Article 56 EPC 1973 compared to the embodiment shown in figures 18 and 19 of D1 and the common general knowledge of the skilled person.

10. Auxiliary request 7 / features (a'), (b''), (c''') and (g) / point XIII.(e) above

Claim 1 of the seventh auxiliary request comprises, as compared to claim 1 of the main request, a *flat* submount, a lens with a *dome-shaped inside surface* and a *filler material* according to features (a'), (b''), (c''') and (g).

The embodiment shown in figures 18 and 19 of D1 discloses features (a'), (b'') and (c''') as argued above with respect to auxiliary requests 2 and 5. Thus, the subject-matter of claim 1 of auxiliary request 7 differs from D1 by feature (g), in correspondence to claim 1 of auxiliary requests 1 and 3.



The Board accepts that a flat submount in combination with a dome-shaped inner surface of the lens has a synergistic effect in that this combination enables a positioning of the light source in the center of the of the lens, thereby effectively reducing optical reflections, as submitted by the applicant. However, D1 discloses both these features in figures 18 and 19 and even mentions the effect obtained (column 16, lines 42 to 48).

Further, as already argued with respect to auxiliary request 3, there is no particularly advantageous or synergistic effect achieved by the provision of a filler material according to feature (g) in combination with a dome-shaped inside surface of the lens according to feature (c'''). The same line of argumentation applies to the provision of a filler material according to feature (g) in combination with the use of a flat submount according to feature (a'), since the shape of the submount does not change the effects obtained by the use of the filler material.

Thus, there is no particular technical effect obtained by using a filler according to feature (g) *in combination* with a flat submount according to feature (a') and a dome-shaped inside surface of the fluorescent element according to feature (c''') going beyond the commonly known advantages and disadvantages obtained by using a filler, contrary to the arguments of the applicant.

Thus, for reasons corresponding to the ones brought forward with respect to auxiliary request 3, the subject-matter of claim 1 of auxiliary request 7 is not inventive according to Article 56 EPC 1973.

11. Auxiliary request 8 / admission / point XIII.(f) above

Auxiliary request 8 was filed after the grounds of appeal and even after oral proceedings were arranged. Its admission is thus at the discretion of the Board according to Articles 13(1) and (3) RPBA.

Claim 1 of auxiliary request 8 does not comprise the hemispheric (outer) shape of the lens anymore, which was present in all previously filed independent claims. The Board notes that the *dome-shaped lens* shown in figures 5 and 6 of the application also has a hemispheric outer shape, contrary to the arguments of the applicant. Thus, the application as originally filed does not disclose any lens whose outer shape is *not* hemispheric.

Instead, the particular surfaces of the submount according to features (a'''), (c''''') and (h) were never claimed before; they were incorporated into claim 1 on the basis of the description and figures 11 and 12 only.

Claim 1 of auxiliary request 8 thus represents a substantial change of subject-matter with respect to what was claimed before, including the first instance proceedings.

Contrary to the applicant's arguments, the Examining Division had already interpreted the fluorescent member 3 of D1 as a *lens* (point 2.1 of the contested decision). The same interpretation by the Board thus does not justify late filing of an auxiliary request.

Further, the Board acknowledges that a new document (D9) was introduced into the procedure. However, the introduction of D9 might have justified the late filing of an adapted request *taking specifically into account the content of D9*. It does not, however, justify the substantial shift of subject-matter according to auxiliary request 8.

As mentioned before, auxiliary request 8 was filed after the grounds of appeal and even after oral proceedings were arranged.

At such a late stage of the proceedings, dealing with substantially changed subject-matter (which would possibly even require an additional search to be carried out) must be considered to be procedurally too complex and not economic.

The Board thus decided not to admit auxiliary request 8 pursuant to Article 13(1) RPBA in accordance with case law (see Case Law of the Boards of Appeal, 8th edition 2016, IV.E.4.4.1).

12. In follows from the above that none of the admitted requests complies with the provisions of the EPC. Thus, the appeal must fail.

13.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



S. Sánchez Chiquero

G. Eliasson

Decision electronically authenticated