

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 25 March 2022**

Case Number: T 2622/17 - 3.4.03

Application Number: 10158416.7

Publication Number: 2197053

IPC: C09K11/77, H01L33/50, H01L33/56

Language of the proceedings: EN

Title of invention:
Light emitting device and display

Patent Proprietor:
Nichia Corporation

Opponent:
Everlight Electronics Co., Ltd.

Relevant legal provisions:
EPC 1973 Art. 76(1), 100(c)

Keyword:
Amendments - added subject-matter (yes)

Decisions cited:
G 0001/06



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 2622/17 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 25 March 2022

Respondent: Nichia Corporation
(Patent Proprietor) 491-100, Oka
Kaminaka-cho
Anan-shi Tokushima 774-8601 (JP)

Representative: Betten & Resch
Patent- und Rechtsanwälte PartGmbB
Maximiliansplatz 14
80333 München (DE)

Appellant: Everlight Electronics Co., Ltd.
(Opponent) No. 6-8, Zhonghua Rd.,
Shulin Dist.,
New Taipei City (TW)

Representative: Himmelsbach, Mathias
Frohwitter
Patent- und Rechtsanwälte
Possartstraße 20
81679 München (DE)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
3 November 2017 concerning maintenance of the
European Patent No. 2197053 in amended form.**

Composition of the Board:

Chairman T. Häusser
Members: M. Ley
C. Heath

Summary of Facts and Submissions

- I. The opponent's appeal concerns the interlocutory decision of the opposition division to maintain European patent No. 2 197 053 in amended form pursuant to Article 101(3) (a) EPC.
- II. The patent was opposed on the grounds of Article 100(c) EPC 1973 and Article 100(a) EPC 1973 in conjunction with Articles 52(1) and 54(3) EPC and Articles 54(1), (2) and 56 EPC 1973.
- III. In the contested decision, the opposition division held that the ground for opposition under Article 100(c) EPC 1973 prejudiced the maintenance of the patent as granted, that claim 1 according to the first auxiliary request then on file lacked novelty and that the second auxiliary request then on file met the requirements of the EPC.
- IV. The appellant (opponent) requests that the decision be set aside and the patent be revoked.
- V. The respondent (proprietor) requests that the appeal be dismissed, i.e. that the opposed patent be maintained in the version maintained by the opposition division.

The proprietor had initially filed an appeal against the impugned decision and requested that the decision be set aside and the opposition be rejected (main request), or that the patent be maintained in amended form on the basis of a set of claims according to auxiliary request A filed with letter dated 23 February 2022, or that the opponent's appeal be dismissed (auxiliary request B), or that a patent be

maintained in amended form on the basis of a set of claims according to auxiliary request C filed with said letter. The proprietor withdrew its appeal during the oral proceedings before the board.

VI. The following documents are cited:

E1 EP 2 197 053 A2
E2 EP 2 197 053 B1
E3 EP 0 936 682 A1
E4 EP 1 017 112 A2
Prop1 Phosphor Handbook, edited under the auspices
 of the Phosphor Research Society, pages 706 to
 709, ISBN 0-8493-7560-6, 1998

Document E1 is the published European patent application, the opposed patent is based upon, and E2 is the publication of the opposed patent itself.

E1 is a divisional patent application within the meaning of Article 76 EPC 1973 of the European patent application E4 (hereinafter: the parent application). E4 is itself a divisional European patent application within the meaning of Article 76 EPC 1973 of the European patent application E3 (hereinafter: the grandparent application).

VII. Using the opposition division's numbering, claim 1 in the version as maintained by the opposition division has the following wording:

1 *A light-emitting device comprising:*
2 *an light-emitting diode (LED) chip*
2.1 *which emits a visible light and*
2.2 *has a gallium nitride based semiconductor; and*

- 3 *a transparent material,*
- 3.1 *which is a coating material*
- 3.1.1 *that coats said LED chip,*
- 3.1.2 *containing a phosphor*
- 3.1.2.1 *being capable of absorbing a part of a first*
 light of blue color emitted from the LED chip
 and
- 3.1.2.2 *emitting a second light having a longer main*
 emission wavelength than that of the absorbed
 first light,
- 3.2 *wherein said phosphor is a garnet*
 fluorescent material activated with cerium
 containing at least one element selected from
 Y and Gd and at least one element selected
 from Al and Ga;
- 4 *wherein said second light emitted from said*
 phosphor and said first light passed through
 said phosphor are capable of overlapping with
 each other to make white light; and
- 5 *wherein a concentration of said phosphor*
 increases from the surface of said coating
 material toward said LED chip.

VIII. The parties' relevant submissions in relation to extension of the subject-matter of the patent beyond the parent and grandparent application are contained in the Reasons below.

Reasons for the Decision

- 1. The appeal is admissible.
- 2. The invention concerns a light emitting device used in an LED display, a back light source, a traffic signal, a railway signal, an illuminating switch, an indicator,

etc. More particularly, it relates to a light emitting device comprising a gallium nitride based semiconductor light-emitting diode chip and a phosphor which absorbs blue light emitted by the light-emitting diode and emits light having a longer wavelength than the absorbed light. Thus, white light is emitted by the light emitting device. The phosphor is a garnet fluorescent material activated with cerium containing at least one element selected from Y and Gd and at least one element selected from Al and Ga, e.g. $(Y, Gd)_3(Al, Ga)_5O_{12}:Ce$.

3. The opposition division held that claim 1 met the requirements of Article 76(1) EPC 1973. In particular, it argued that feature 4 was supported by paragraphs [0024] and [0025] of E3 as well as by paragraph [0016] of E4. The opposition division also noted that in the embodiment of Figure 2 of E3, the chip 202 had its emitting surface completely covered by the coating material 201 containing the phosphor (paragraph [0042]); the coating was transparent and allowed part of the light emitted by the LED to pass through it, as well as through the ensemble of particles of phosphors dispersed therein.
4. The appellant argued that the feature 4 introduced subject-matter that extended beyond the content of the earlier applications as filed (i.e. the parent and grandparent applications E4 and E3) so that the requirements of Article 76(1) EPC 1973 were not met.

There was no disclosure for "first light passed through said phosphor" in E3 or E4, i.e. for the phosphor to be translucent so as to allow (blue) light emitted by the LED to pass through it. Claim 1 made a distinction between the transparent material and the phosphor. The

expression "through said phosphor" could therefore not be understood as "through the coating material" or "through the transparent material". Rather than passing through phosphor particles, the non-absorbed light could pass through the transparent material or through "apertures". A basis for feature 4 was not found in paragraphs [0013], [0041] and [0052], [0082] of E3 or in E4, either.

5. With respect to feature 4, the respondent argued that the term "phosphor" was not to be understood as a single phosphor particle, but as the combination of all phosphor particles distributed in the coating material. A part of the light emitted by the LED chip could pass "between the phosphor particles distributed in the coating material" and thus "through said phosphor", see paragraph [0013] of E3 and claim 1 of E4. The phosphor was thus capable of absorbing a part of the light emitted by the light emitting component and consequently another part of the light (the part which was not absorbed by the phosphor) passed through the phosphor. Otherwise, the generation of white light by additive mixture of light emitted by the LED chip and light emitted by the phosphor would not be possible.

The respondent emphasised that the term "phosphor" according to feature 4 did not relate to "individual phosphor particles", but rather to the "aggregate phosphor contained in the coating material", which provided the claimed technical functionality as defined by features 3.1.2, 3.1.2.1, 3.1.2.2 and 4. This interpretation was supported by the wording of feature 5, a phosphor concentration could be defined only for the aggregate phosphor contained in the coating material and not for individual phosphor particles.

The skilled person would understand that the phosphor contained in the coating material absorbed a part of the first light emitted from the LED chip and did not absorb the other part of the first light which passed "through the phosphor contained in the coating material" to be capable of overlapping with the second light emitted by the phosphor to make white light. This understanding was supported by Figure 2 and paragraph [0028] of the opposed patent, paragraph [0042] of E3 and paragraph [0025] of E4. The term "without being absorbed by the phosphor" in these passages related to the "aggregate phosphor contained in the coating material", which covered both possibilities, i.e. "light passed through the individual phosphor particles" and "light passing between the individual phosphor particles", i.e. through the transparent resin, as illustrated in Figure 23 on page 708 of document Prop1. In both cases, white light was generated. The term "phosphor" according to feature 4 should therefore to be understood as "phosphor layer", i.e. the transparent material together with the phosphor material.

6. The board notes first that according to the Headnote of **G1/06**, in the case of a sequence of applications consisting of a root (originating) application followed by divisional applications, each divided from its predecessor, it is a necessary and sufficient condition for a divisional application of that sequence to comply with Article 76(1), second sentence, EPC 1973 that anything disclosed in that divisional application be directly and unambiguously derivable from what is disclosed in each of the preceding applications as filed.

In the present case, the opposed patent is based on European patent application E1, which is a divisional application of E4, E4 being in turn a divisional application of E3.

The board does not accept the respondent's argument that the term "through the phosphor" has a different or broader meaning (e.g. "through the aggregate phosphor contained in the coating material", "through the combination of all phosphor particles distributed in the coating material", "between the phosphor particles" or "through the transparent material containing the phosphor").

The board shares the appellant's view that the wording of claim 1 makes a clear distinction between the transparent/coating material and the phosphor, which is a garnet fluorescent material activated with cerium containing at least one element selected from Y and Gd and at least one element selected from Al and Ga. The LED chip emits visible light. One part of the first light in the blue spectral range is absorbed by said phosphor and the phosphor emits a second light having a larger wavelength than the absorbed light. The non-absorbed first light and the second light are emitted as white light.

Feature 4 thus requires that blue light emitted by the LED chip passes through the phosphor (i.e. a garnet fluorescent material activated with cerium having the claimed composition) without being absorbed and converted.

The board's reading of feature 4 is not in contradiction with feature 5, which merely defines a

specific inhomogeneous distribution of phosphor within the coating material.

Although claim 1 of E1 as originally filed includes feature 4, the parent application and the grandparent application as originally filed do not disclose first light (of blue colour) emitted by the LED chip which passes "through said phosphor". Feature 4 is not explicitly disclosed in E3 or E4 as originally filed and a skilled person would not directly and unambiguously derive these feature from the content thereof.

Paragraphs [0013], [0024], [0025], [0037], [0040], [0041], [0045], [0050], [0052] of E3 and paragraphs [0013], [0016], [0024], [0027], [0032], [0034] of E4 define the function of the phosphor to provide white light - as described before - without disclosing light of blue colour passing through the phosphor.

According to paragraphs [0042], [0043] of E3 or paragraph [0025] of E4 in combination with figure 2 of these applications, "fluorescent light emitted by the phosphor and LED light which is transmitted without being absorbed by the phosphor are mixed and output, so that the light emitting diode 200 also outputs light having a wavelength different from that of LED light emitted by the light emitting component 202". As also pointed out by the respondent, the expression "transmitted without being absorbed by the phosphor" leaves it open whether the light of blue colour passes through the phosphor particles without being absorbed or passes through the transparent coating material without impinging on any phosphor particle contained therein. In both cases, light of blue colour emitted by the LED chip leaves the light emitting device without

any wavelength conversion. From paragraph [0042] of E3 and paragraph [0025] of E4, contrary to the respondent's explanations, a skilled person cannot unambiguously derive one of the two possibilities, for example feature 4.

Regarding post-published document Prop1, it is questionable if it could be used to establish the original disclosure of the grandparent and parent applications at all. In addition, it mentions neither the type and composition of the "powder phosphor sample" used nor does it concern phosphor contained in a transparent coating irradiated by an LED chip.

Hence, there is no explicit indication in the parent or the grandparent applications of any light of blue colour incident on a phosphor and passing "through the phosphor" without being absorbed and hence converted. There is no explicit passage in these applications of said light passing between phosphor particles through the transparent coating, either.

Therefore, the Board is of the view that feature 4 cannot be directly and unambiguously derived from the content of documents E3 or E4.

Consequently, claim 1 does not meet the requirements of Article 76(1) EPC 1973.

7. Already in the board's communication pursuant to Article 15(1) RPBA 2020, the board expressed its doubts whether it might be possible to overcome the issue with feature 4 without contravening Article 123(3) EPC.

During the oral proceedings, the respondent stated that feature 4 was contained in claim 1 as granted as well

as in each one of its auxiliary requests filed during the appeal proceedings and that it did not find a way of overcoming the objection under Article 76(1) EPC 1973 raised against feature 4.

The patent must therefore be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



S. Sánchez Chiquero

T. Häusser

Decision electronically authenticated