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**Datasheet for the decision
of 24 April 2018**

Case Number: T 1475/15 - 3.3.10

Application Number: 07785354.7

Publication Number: 2062960

IPC: C09K11/59

Language of the proceedings: EN

Title of invention:

SILICATE-BASE LUMINESCENT MATERIALS HAVING MULTIPLE EMISSION
PEAKS, PROCESSES FOR PREPARING THE SAME AND LIGHT EMITTING
DEVICES USING THE SAME

Patent Proprietor:

Dalian Luminglight Co., Ltd.

Opponent:

Engelhardt, Volker

Headword:

Relevant legal provisions:

EPC Art. 100(b)

Keyword:

Grounds for opposition - insufficiency of disclosure (yes)

Decisions cited:

T 0409/91, T 0435/91, T 0292/85

Catchword:



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Case Number: T 1475/15 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 24 April 2018

Appellant: Engelhardt, Volker
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Respondent: Dalian Luminglight Co., Ltd.
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 1 June 2015
rejecting the opposition filed against European
patent No. 2062960 pursuant to Article 101(2)
EPC.**

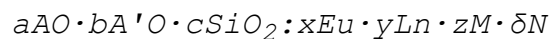
Composition of the Board:

Chairman P. Gryczka
Members: R. Pérez Carlón
T. Bokor

Summary of Facts and Submissions

- I. The appellant (opponent) lodged an appeal against the decision of the opposition division rejecting the opposition against European patent No. 2 062 960.
- II. Notice of opposition had been filed on the grounds of added subject-matter (Article 100(c) EPC), insufficiency of disclosure (Article 100(b) EPC), and lack of novelty and inventive step (Article 100(a) EPC).
- III. The opposition division concluded *inter alia* that the claimed invention was sufficiently disclosed to be carried out by a person skilled in the art. The patent in suit contained examples having various emission peaks, and no evidence had been provided that the luminescent materials would not fulfil all the remaining requirements of claim 1.
- IV. Claim 1 of the patent specification contains a printing error. Claim 1 of the main request of the respondent (patent proprietor) submitted with a letter dated 19 April 2018 corresponds to claim 1 on the basis of which the examining division had granted the patent. This claim reads:

*"A luminescent material, in particular a luminescent material used in light emitting devices including LED, **characterized in that** the luminescent material mainly comprises a silicate and an activating agent ion, and has a main chemical composition expressed by the following formula:*



wherein, A is selected from the group consisting of Sr, Ca, Ba and combinations thereof; A' is selected from the group consisting of Mg, Zn, and combinations thereof; Ln is ion(s) of at least one element selected from the group consisting of Nd, Dy, Ho, Tm, La, Ce, Er, Pr, Bi, Sm, Sn, Y, Lu, Ga, Sb, Tb, Mn and Pb; M is selected from the group consisting of Cl⁻, F⁻, Br⁻, I⁻, and combinations thereof; N is selected from the group consisting of Li⁺, Na⁺, K⁺, Ag⁺, and combinations thereof; a, b, c, x, y and δ are molar coefficients, $1.0 \leq a \leq 5.0$; $0 \leq b \leq 2.0$; $0.5 \leq c \leq 2.5$; $0.001 \leq x \leq 0.2$; $0 \leq y \leq 0.5$; $0 < z < 0.5$; $0 < \delta < 0.2$; and wherein $1 \leq (a+b)/c \leq 4$; and **in that** under the excitation of a light emitting element as an excitation light source that has an emission spectrum in UV light to blue light region of from 240 to 475 nm, the luminescent material absorbs at least a portion of light from the excitation light source and thereby generates an emission spectrum having at least two peaks in a range of from 370 to 760 nm, with the emissions combining to give white light."

Claim 1 of the first auxiliary request corresponds to claim 1 of the main request.

Claim 1 of the second and fourth auxiliary requests limits the features of claim 1 of the main request by requiring that:

"... Ln is ion(s) of at least one element selected from the group consisting of Nd, Dy, Ho, Tm, La, Ce, Er, Pr, Sm, Lu, Ga, Bi, Sb, Tb, and Mn; M is selected from the group consisting of Cl⁻, F⁻, and combinations thereof; N is Li⁺ or Ag⁺ or a combination thereof, and wherein $1.0 \leq a \leq 4.0$; $0 \leq b \leq 2.0$; $0.7 \leq c \leq 2.2$; $0.001 \leq x \leq 0.1$; $0 \leq y \leq 0.25$; $0.001 \leq z < 0.2$;

$0.001 \leq \delta < 0.1$; and $1.5 \leq (a+b)/c \leq 3...$ "

Claim 1 of the third and fifth auxiliary requests limits the subject-matter of claim 1 of the second auxiliary request by requiring that:

"... the luminescent material is excited by light from an excitation light source that has an emission peak in a UV light to bluish violet light range of from 240 to 455 nm..."

V. The arguments of the appellant where relevant for the present decision were as follows:

Claim 1 required that the compounds expressed by the formula given there generated an emission spectrum having at least two peaks in a range of from 370 to 760 nm, with the emissions combining to give white light. However, at least examples 6, 33 and 35 of the patent in suit proved that not every compound of the general formula defined in claim 1 had such an emission spectrum. The skilled person, confronted with these examples, would be unable to find the necessary information which could turn these failures into success, with the consequence that the claimed invention was not sufficiently disclosed to be carried out by a person skilled in the art.

VI. The arguments of the respondent where relevant for the present decision were as follows:

The patent in suit, in paragraphs [0042] to [0044] and [0061] and in the examples, provided sufficient information to the skilled reader. The fact that examples 6, 33 and 35 did not represent embodiments of claim 1 and should be labelled as reference examples

was an issue of clarity and not of sufficiency of disclosure.

VII. Oral proceedings before the board of appeal took place on 24 April 2018.

VIII. The final requests of the parties were as follows:

- The appellant requested that the decision under appeal be set aside and that European patent No. 2 062 960 be revoked. It further requested non-admission of the second to fifth auxiliary requests into the proceedings.

- The respondent requested that the appeal be dismissed, i.e. that the patent be maintained unamended (main request), or alternatively that the decision under appeal be set aside and the patent maintained in an amended form on the basis of any of the first to fifth auxiliary requests, the first auxiliary request as filed with letter dated 5 April 2016, the second and third auxiliary requests as filed with letter dated 20 November 2017 and the fourth and fifth auxiliary requests as filed with letter dated 18 January 2018. In addition, it requested the correction of the published patent and the non-admission of certain documents cited by the appellant.

IX. At the end of the oral proceedings, the decision was announced.

Reasons for the Decision

1. The appeal is admissible.

Sufficiency of disclosure

2. Interpretation of claim 1 of the main request

The respondent argued that claim 1 related to a luminescent material having the general formula $aAO \cdot bA'O \cdot cSiO_2 : xEu \cdot yLn \cdot zM \cdot \delta N$, capable of generating an emission spectrum having at least two peaks in a range of from 370 to 760 nm. The emissions combining to give white light according to claim 1 are due solely to the luminophore according to this general formula.

In the respondent's favour, in examining the claimed invention the board will follow this interpretation of claim 1, which can be found in the respondent's submission dated 10 February 2017, page 3/6, last two paragraphs, and was confirmed at the oral proceedings before the board.

3. According to the case law of the boards of appeal, the requirements of sufficiency of disclosure are met only if the claimed invention can be performed by a person skilled in the art without undue burden over the whole area claimed, using common general knowledge and having regard to the information in the patent in suit (T 409/91, OJ 1994, 653, Reasons 3.5; T 435/91, OJ 1995, 188, Reasons 2.2.1).

When carrying out the invention, a reasonable amount of trial and error is permissible, provided that a skilled person finds adequate information leading necessarily and directly towards success through the evaluation of initial failures (Case Law of the Boards of Appeal, 8th edition 2016, II.C.5.6.1).

4. In the present case the issue is whether the skilled person, taking into account the teaching of the patent in suit and his common general knowledge, would find enough information to obtain embodiments within the ambit of claim 1, i.e compositions according to the general formula of claim 1 and fulfilling the functional definition "an emission spectrum having at least two peaks in a range of from 370 to 760 nm, with the emissions combining to give white light".
5. It is not disputed that the patent in suit provides at least one way to carry out the invention, represented by example 1, which discloses a luminescent material having the general formula required by claim 1 and producing three emission peaks in the range defined by said claim (438 nm, 502 nm and 617 nm), which combine to give white light, as shown in example 38 of the patent in suit. Examples 7 and 28 also relate to luminescent materials of the general formula $aAO \cdot bA'O \cdot cSiO_2 : xEu \cdot yLn \cdot zM \cdot \delta N$ having the properties required by claim 1.
6. The respondent acknowledged, however, both at the oral proceedings before the board and in its written submissions (page 4, last paragraph, to page 5, first paragraph, of the respondent's letter dated 10 February 2017), that not every luminescent material according to the general formula required by claim 1 had an emission spectrum having multiple peaks between 370 to 760 nm which combined to give white light, as was the case for examples 6, 33 and 35.
7. The respondent argued that the skilled person would find no difficulties in preparing the composition and subsequently checking whether its emission spectrum had the desired properties.

However, the board finds that due to the breadth of the general formula defined in claim 1, preparing compositions falling within it and testing whether or not they have the properties required by claim 1 constitutes an undue burden for the skilled person.

According to the respondent, the teaching in paragraphs [0042] to [0044] and [0061] of the patent in suit gives the skilled reader enough information to identify luminescent materials according to the general formula of claim 1 whose emissions combine to give white light.

Paragraphs [0042] to [0044] indicate that the amount of Ca if $(a+b)/c$ is less or equal than 2, and of Ba if said value is higher than 2, shifts the emission peaks (i.e. all of them) towards longer wavelengths. As the ability of the peaks to combine to give white light depends on their relative positions, the board fails to see how the skilled person would find in this teaching the instructions required to change a failure such as example 6, 33 or 35 of the patent in suit into success.

Paragraph [0061] of the patent indicates that finely controlling the amounts and proportions of substrates, activating agents, sensitising agents and additives enables the peak wavelength and intensities of the two or three emission peaks of the luminescent materials to be finely controlled. However, no specific instructions are given on how to exercise such control.

8. The respondent has not cited any evidence to show that, at the date of filing, a skilled person knew how to predict whether or not the emissions of a luminescent material would combine to give white light, nor is any such evidence immediately apparent. Thus, the state of

the art does not provide the missing teaching, either.

9. The skilled person, confronted with a compound such as that of example 6, 33 or 35 of the patent in suit, whose emission spectra do not have bands which combine to give white light, cannot readily find any indication that would allow him to turn such failure into success. Claim 1 is thus no more than an invitation to perform a research programme aimed at finding such luminescent materials.
10. The respondent argued that the fact that examples 6, 33 and 35 were not embodiments of claim 1 was an issue of clarity, so that this issue was not open to objections in opposition appeal proceedings with respect to the patent as granted.

However, the issue is not whether or not some examples of the patent in suit have been correctly labeled as reference examples or according to the claimed invention, but whether or not these examples prove that the skilled person would not be able to find the relevant information in order to identify all reliably working embodiments within the ambit of claim 1. This argument of the respondent is thus not convincing.

11. Lastly, the respondent relied on decision T 292/85, according to which an invention was regarded as sufficiently disclosed if at least one way was clearly indicated enabling the skilled person to carry out the invention.

The issue before the board in T 292/85 was whether the non-availability of some variants fulfilling the functional definition required by the invention, which could nevertheless be discovered after the filing of

the claimed invention, had an effect on its sufficiency, which the board denied.

In contrast, the issue underlying the present case is whether or not the skilled person is in a position to identify, among the compounds of the (broad) general formula of claim 1, those which fulfil the functional definition it requires. The present situation is thus not comparable to that at issue in T 292/85, but to that underlying the decisions summarised in Chapter II.C.4.4 of the Case Law of the Boards of Appeal, 8th edition 2016.

12. As the patent in suit does not contain the required information allowing a skilled person to select the luminescent materials of the general formula of claim 1 which have two or more emissions which combine to give white light, the board concludes that the subject-matter of claim 1 is not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, with the consequence that the opposition ground under Article 100(b) EPC precludes the maintenance of the patent as granted.

13. It is not disputed that the situation with respect to sufficiency of disclosure is the same for claim 1 of any of the auxiliary requests on file, and that the arguments set out above also apply *mutatis mutandis*, with the consequence that none of the requests on file is allowable.

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:



C. Rodríguez Rodríguez

P. Gryczka

Decision electronically authenticated