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**Datasheet for the decision
of 14 June 2019**

Case Number: T 0709/15 - 3.4.03

Application Number: 04252442.1

Publication Number: 1473784

IPC: H01L51/20

Language of the proceedings: EN

Title of invention:

Light source with organic layer and photoluminescent layer

Applicant:

BOE Technology Group Co., Ltd.

Headword:

Relevant legal provisions:

EPC 1973 Art. 54(1), 54(4), 87(1), 87(4)

EPC Art. 54(3)

Keyword:

Novelty - prior European application - (no)

Priority - validity of priority date (no)

Decisions cited:

Catchword:



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 0709/15 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 14 June 2019

Appellant: BOE Technology Group Co., Ltd.
(Applicant) No. 10, Jiuxianqiao Road
Chaoyang District
Beijing (CN)

Representative: Klunker IP
Patentanwälte PartG mbB
Destouchesstraße 68
80796 München (DE)

Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 17 November
2014 refusing European patent application No.
04252442.1 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman G. Eliasson
Members: M. Stenger
C. Heath

Summary of Facts and Submissions

- I. The appeal concerns the decision of the Examining Division to refuse European application No. 04252442. The contested decision comprises objections related to Article 84 EPC as well as to lack of novelty.

- II. With respect to lack of novelty, the Examining Division inter alia referred to document D5 (EP 1 434 284 A2), indicating that D5 was prior art pursuant to Article 54(3) EPC (point 3. of the contested decision, last paragraph).

- III. The applicant requested that the decision be set aside and that a patent be granted on the basis of a set of claims 1 to 7 filed with the grounds of appeal. Further, oral proceedings were requested before any confirmation of the decision of the Examining Division (grounds of appeal, last sentence).

- IV. In a communication preparing the oral proceedings before the Board, the Board expressed inter alia its preliminary opinion that D5 was prior art according to Article 54(3) EPC and disclosed all the features of claim 1 of the only request (point 5. of that communication).

- V. With letter dated 14 May 2019, the applicant withdrew its request for oral proceedings and requested a decision according to the state of the file.

VI. The wording of independent claim 1 is as follows:

A light source (200, 300, 400) comprising:

an organic light-emitting device (100) which emits light having a first spectrum;

the organic light-emitting device (100) comprising an organic light-emitting layer (110) disposed between a pair of electrodes (120, 130), and at least a hole-blocking layer (116) disposed between the organic light-emitting layer (110) and a cathode (120),

wherein said hole-blocking layer (116) comprises a hole-blocking material that has a highest occupied molecular orbital ("HOMO") energy level greater than that of an organic light-emitting material of said organic light-emitting layer (110)

and

wherein said hole-blocking material further has a lowest unoccupied molecular orbital ("LUMO") energy level between a work function of said cathode (120) and a LUMO energy level of said organic light-emitting material;

and

a phosphor layer (115) which absorbs a portion of the light emitted by the organic light-emitting device (100) and which emits light having a second spectrum, wherein the portion of light absorbed by the phosphor layer (115) is less than all of the

light emitted by the organic light-emitting device (100).

VII. The arguments of the applicant, as far as they are relevant for the present decision, may be summarized as follows:

Document D5 did not disclose an organic light-emitting device comprising the particular combination of organic light-emitting layer, electrodes, hole-blocking layer with specified HOMO and LUMO levels and phosphor layer as defined in claim 1 (first paragraph of page 2 of the grounds of appeal).

Reasons for the Decision

1. The appeal is admissible
2. Document D5

Document D5 (see abstract) relates to a white light-emitting organic luminescent device 10 which comprises a light emitting member 20 in which at least two different organic electroluminescent (EL) materials are arranged between two electrodes such that they emit light of different wavelength ranges, respectively, when a voltage is applied to the electrodes. A charge blocking layer 60 may also be arranged between the electrodes to obtain optimal combination of holes and electrons in the EL materials.

In addition, a photoluminescent (PL) material is provided such that it absorbs a portion of the light emitted by the light emitting member and emits colour-shifted light in a third, different wavelength range.

The light of the three different wavelength ranges is then combined such that the device as a whole emits white light.

Figure 1 of D5 shows the general architecture of the device 10 while figures 2 to 5 show details of particular embodiments of the light emitting member 20 shown in figure 1.

3. Disclosure of D5 compared to claim 1

In the wording of claim 1, D5 (see generally figures 1 and 5) discloses

A light source (*light-emitting device 10*, see [14]) comprising:

an organic light-emitting device (*light emitting member 20*, see [14]) which emits light having a first spectrum (*first and second wavelength ranges*, see [6]; *blue region* and *red region*, see [14]);

the organic light-emitting device (20) comprising an organic light-emitting layer (*EL layer 30*, see [14]) disposed between a pair of electrodes (*two electrode layers 22 and 38*, see [14]), and at least a hole-blocking layer (*hole blocking layer 60*, see [39]) disposed between the organic light-emitting layer (30) and a cathode (*cathode 22*; see figure 5),

wherein said hole-blocking layer (60) comprises a hole-blocking material (*BCP*, see [39]) that has a highest occupied molecular orbital ("HOMO") energy level (6,5 eV according to page 15, second paragraph of the application) greater than that of an organic light-emitting material (*PVK*, see [20] presenting generally

suitable blue-emitting EL materials; according to the first paragraph on page 16 of the application, PVK has a HOMO level of about 5,8 eV) of said organic light-emitting layer (30)

and

wherein said hole-blocking material (BCP) further has a lowest unoccupied molecular orbital ("LUMO") energy level (3 eV, according to page 15, second paragraph of the application) between a work function of said cathode (Al is suggested in a general manner for use as cathode material, see [17]; aluminium has a work function of about 4 eV) and a LUMO energy level of said organic light-emitting material (PVK has a LUMO level of about 2,2 eV, according to the first paragraph on page 16 of the application);

and

a phosphor layer (*layer 50 comprising at least a PL material, see [15] and figure 1*) which absorbs a portion of the light emitted by the organic light-emitting device (20, first sentence of [43]) and which emits light having a second spectrum (*green region of the visible spectrum, first sentence of [43]*), wherein the portion of light absorbed by the phosphor layer (50) is less than all of the light emitted by the organic light-emitting device (20, see the second sentence of [43]: *the unabsorbed portion of the blue light and the red light*).

Thus, D5 discloses all the features of claim 1 of the only request, contrary to the argument of the applicant.

The Board notes that this finding is in line with the conclusion of the Examining Division for claim 1 according to the request on which the contested decision is based.

4. D5, status as state of the art

Document D5 claims priority from US patent application No. 328263, filed 23 December 2002. Figures 1 and 5 of this US application are identical to figures 1 and 5 of D5. Further, [7], [24], [25], [27], [30], [53] and [57] of the US application correspond to [6], [14], [15], [17], [20], [39] and [43] of D5. No other passages were cited above when comparing D5 to claim 1.

Therefore, the priority claim of D5 is valid with respect to the combination of features comprised in claim 1 of the only request. The effective filing date of D5 in that respect is thus 23 December 2002. This is before the claimed priority date (29 April 2003) and the filing date (27 April 2004) of the present application.

Further, the present application and D5 have a plurality of designated contracting states in common. The requirements of Article 54(4) EPC 1973 are thus complied with.

It follows from the above that D5 has to be considered as state of the art according to Article 54(3) EPC.

Furthermore, as noted by the Examining Division, the applicant of D5 is identical to the applicant of the present application at its date of filing (in both cases: General Electric Company, Schenectady, NY 12345

(US)). Thus, US application No. 425901 filed 29 April 2003 is not the first application of this applicant for the subject-matter defined in claim 1 of the only request in the sense of Article 87(1) and (4) EPC 1973. Therefore, the priority claim of the present application is not valid for that subject-matter, as also noted by the Examining Division in relation to claim 1 as then on file (see page 4, ultimate and penultimate paragraphs of section 3 of the contested decision).

5. Conclusion

In view of the foregoing, document D5 is considered as forming part of the state of the art according to Article 54(3) EPC and disclosing all the features of claim 1 of the only request. The subject-matter of that claim is therefore not new according to Article 54(1) EPC 1973.

Hence, the only request does not fulfill the requirements of the EPC. Thus, the appeal must fail.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



M. Kiehl

G. Eliasson

Decision electronically authenticated