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Datasheet for the decision of 22 February 2018

Case Number: T 2338/12 - 3.4.03

Application Number: 10150999.0

Publication Number: 2209149

IPC: H01L51/52

Language of the proceedings: EN

Title of invention:
Organic light emitting display apparatus

Applicant:
Samsung Display Co., Ltd.

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (no)

Decisions cited:

Catchword:

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Case Number: T 2338/12 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 22 February 2018

Appellant: (Applicant)	Samsung Display Co., Ltd. 17113, 1, Samsung-ro Giheung-Gu Yongin-si Gyeonggi-do (KR)
Representative:	Gulde & Partner Patent- und Rechtsanwaltskanzlei mbB Wallstraße 58/59 10179 Berlin (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 9 May 2012 refusing European patent application No. 10150999.0 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Eliasson
Members:	M. Papastefanou
	T. Bokor

Summary of Facts and Submissions

I. The appeal is against the decision of the Examining Division refusing the European patent application No. 10 150 999.0 on the grounds that claim 1 of both the main and the auxiliary request before it did not involve an inventive step within the meaning of Article 56 EPC.

II. The Appellant (Applicant) requested that the decision of the Examining Division be set aside and that a patent be granted on the basis of the (sole) request filed with the statement of grounds of appeal. As an auxiliary measure, the Appellant requested the holding of oral proceedings. The claims filed with the grounds of appeal correspond to those of the Auxiliary request refused by the appealed decision.

III. The following documents, cited during the first instance proceedings, are considered to be relevant for this decision:

D1: US 2005/0239294 A1
D3: US 2008/0296600 A1

In addition, the following documents were filed with the grounds of appeal:

D5: "Methoden der Angewandten Physik" by Prof. Dr. D. Bimberg, Technical University of Berlin
D6: pages 68-69 of the Book "Principles of Optics" by Born and Wolf, Pergamon Press, 6th Edition, 1985

IV. In a communication pursuant to Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA), which was annexed to the summons to oral proceedings,

the Board communicated its preliminary, non-binding opinion, according to which claim 1 of the sole request did not meet the requirements of Articles 123(2) EPC and did not involve an inventive step within the meaning of Article 56 EPC.

V. After receiving this communication and the summons to oral proceedings, the Appellant withdrew its request for oral proceedings and requested a decision "on the merits of the file".

VI. Following the Appellant's reaction, the Board cancelled the oral proceedings.

VII. Claim 1 has the following wording:

A method for manufacturing an organic light-emitting display apparatus comprising:
a substrate (101, 201);
a display portion (120, 220) located on the substrate (101, 201),
an organic light-emitting device arranged in the display portion (120, 220);
a non-display portion (140) being a peripheral region of the display portion (120, 220) located on the substrate (101, 201); and
an encapsulation layer (150, 250) formed on the display portion (120, 220) and comprising at least a first encapsulation layer (151) composed of an inorganic material and at least a second encapsulation layer (152) composed of an organic material, the first and second encapsulation layers (151, 152) being alternately stacked on the display portion (120, 220), wherein at least a portion of an end portion of the encapsulation layer (150, 250), which contacts the non-display portion (140) of the substrate (101, 201),

comprises only the first encapsulation layer (151), further comprising a light function layer (230) arranged between the display portion (120, 220) and the encapsulation layer (250), the light function layer (230) being adapted to reflect ultraviolet light, characterized in that
the second encapsulation layer (152) is formed by depositing liquefied or gasified monomer and curing the deposited monomer by irradiating ultraviolet light having a wavelength between 150 nm and 380 nm, wherein the light function layer (230) is disposed as a single layer having a uniform thickness between the display portion (120, 220) and the encapsulation portion (150, 250), wherein the thickness of the light function layer (250) ranges between 120nm and 130nm.

Reasons for the Decision

1. With the withdrawal of its request for oral proceedings, the Appellant requested a decision "on the merits of the file". The Board interprets this as a request for a decision based on the written procedure so far.

2. Inventive step (Article 56 EPC)

2.1 The Appellant did not contest the selection of D1 as closest prior art and the analysis of its disclosure in the appealed decision. The Board does not see any reason to differ.

D1 discloses, hence, a method for manufacturing an organic light-emitting display (OLED) apparatus (see Figures 14A, 14B and 15 of D1) comprising a substrate (6), a display portion (area of OLED 90) located on the substrate (6), an OLED (90) arranged in the display

portion and a non-display portion being a peripheral region of the display portion located on the substrate (see Figures 14A and 15). The OLED comprises further an encapsulation layer (stack of layers 9A/9B) formed on the display portion and comprising at least a first encapsulation layer (9B) composed of an inorganic material (paragraph [0088]) and at least a second encapsulation layer (9A) composed of an organic material (paragraphs [0088], [0089]), the first and second encapsulation layers (9B, 9A) being alternately stacked on the display portion (Figure 14B), wherein at least a portion of an end portion of the encapsulation layer (end seal 9D,) which contacts the non-display portion of the substrate, comprises only the first encapsulation layer (edge seal 9D is formed of inorganic layers 9B, see [0089]). The second encapsulation layer of the OLED in D1 is formed by depositing liquefied monomer and curing the deposited monomer by irradiating ultraviolet light (see paragraphs [0056],[0057] and [0066]).

2.2 It remains also uncontested that the only difference between claim 1 and the disclosure of D1 is that a light function layer being adapted to reflect ultraviolet (UV) light is deposited as a single layer having a uniform thickness between the display portion and the encapsulation portion, wherein the thickness of the light function layer ranges between 120 nm and 130 nm (appealed decision point 2.2.1).

2.3 The Appellant did not contest the definition of the technical problem to be solved, either. The Board agrees also with the Examining Division in that the technical problem the skilled person is faced with is how to improve the method of manufacturing the OLED apparatus of D1 in order to provide a long-life OLED

display apparatus (see appealed decision point 2.2.1).

2.4 The Appellant agrees also with the Examining Division's analysis of the disclosure of D3, according to which a light function layer (reflective layer 20, 124) is disposed as a single layer between the display portion and the encapsulation layer (paragraphs [0024]-[0027], [0033] and Figures 4D, 5E).

2.5 The conclusion of the Examining Division that the skilled person would integrate the teaching of D3 into the method of D1 in an obvious manner, providing thus a light function layer disposed as a single layer between the display portion and the encapsulation layer was not disputed by the Appellant and the Board does not see any reason to disagree, either.

2.6 The only contested point of the appealed decision was the conclusion of the Examining Division that it would be obvious for the skilled person to provide this light function layer in a single layer with a thickness ranging between 120 nm and 130 nm. The main points of dispute remain the technical effect of this particular value range for the thickness of the light function layer and the definition of the corresponding objective technical problem to be solved.

2.7 According to the Appellant, this feature (i. e. thickness of the single light function layer between 120 nm and 130 nm) was providing the technical effect of the light function layer having considerable reflectivity for UV light which impacted on the the layer in angles other than 90° while keeping an acceptable light extraction efficiency of the display portion. The technical problem to be solved would thus

be how to provide an OLED apparatus with improved properties.

2.7.1 Contesting the Examining Division's conclusion that such a technical effect was not derivable from the application as originally filed, the Appellant argued that, although there was no mention of impact angles for the UV light in the application, the skilled person would recognise this technical effect based on the state of the art and common general knowledge. The skilled person, who would combine documents D1 and D3, would be aware of the whole disclosure of D3, which contained Formula 1 in paragraph [0045]. This formula, which represented the reflectivity of a multilayer system, would lead the skilled person to documents D5 and D6.

In D5 there was the explicit statement that the stack of thin (light function) layers had to be made thicker for oblique incidence of light (page 9). This was also implied in Formula 1 in D3, which indicated that by increasing the number of layers (i. e. the thickness) of the multilayer structure of the light function layer its overall refractive index (i. e. its reflectivity) would increase.

Hence, the identified technical effect was derivable for the skilled person who was aware of the state of the art and was using common general knowledge. This implied also that the definition of the corresponding technical problem to be solved was admissible and that, since this problem was never considered neither in D1 nor in D3, claim 1 would not be obvious.

2.8 The Board notes at first, that both Formula 1 in paragraph [0045] of D3 and documents D5 and D6 refer to

multilayer structures of the light function layer and not to a light function layer disposed as a single layer as it is in claim 1. They are, thus, unrelated to the claimed feature and its alleged technical effect.

2.8.1 Secondly, the Board notes that there is no indication in any of the documents referred to by the Appellant that a layer with a thickness between 120 nm and 130 nm produces the technical effect of the light function layer having considerable reflectivity when the UV light impacts the layer in angles other than 90°.

Document D5 merely indicates that in order to achieve the same reflectance when the UV light impacts the stack of layers in oblique angles, the layers must be thicker than if the impact angle were 90°. There is no mention or suggestion of any values for the thickness of the layers at all in D5. This is also true for document D6 as well as paragraph [0045] and Formula 1 in D3. There is no indication that the alleged technical effect is actually produced by the claimed thickness range (120 nm - 130 nm) as the Appellant argued. There is, therefore, no support for this technical effect in the application as originally filed, nor in the state of the art nor in the common general knowledge of the skilled person.

2.9 The Board notes further that in the application there is no particular reason disclosed or suggested for the selection of the specific range of 120 nm to 130 nm for the thickness of the light function layer. In paragraph [0048] of the description there is an explanation why the thickness of the light function layer should be more than 20 nm (so that UV light would not penetrate the layer) and less than 200 nm (so that the light extraction efficiency and the colour purity of the

display portion are not negatively affected). Neither in this paragraph nor in paragraph [0027], where the claimed range is mentioned, nor in any other part of the application is there any explanation for the selection of the particular thickness value range between 120 nm and 130 nm. The Board is, hence, led to the conclusion that the claimed range is an arbitrary selection not addressing any particular technical problem.

2.10 It is generally known in optics that the behaviour of incident light on a thin film depends mainly on the angle of incidence (impact) of the light, the refractive index of the film (i. e. its material) and the thickness of the film. In the method of manufacturing an OLED described in D3 the wavelength of the UV light used is between 200 nm and 400 nm (paragraph [0047]), which is practically the same as in the application (200 nm to 380 nm, paragraph [0027]). Given the fact that the material(s) used for the light function layer in D3 (paragraph [0049]) and the claimed invention (paragraph [0047] of the description) are the same, the skilled person implementing a light function layer according to D3 in the method according to D1 would arrive at a light function layer according to claim 1 based only on his common general knowledge.

2.11 The subject matter of claim 1, therefore, does not involve an inventive step within the meaning of Article 56 EPC in light of the combination of documents D1 and D3 and skilled person's common general knowledge.

3. Since the only request on file is not allowable, the appeal must fail.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated