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Datasheet for the decision of 19 September 2013

Case Number: T 1601/11 - 3.3.09

Application Number: 08152670.9

Publication Number: 1970978

IPC: H01L 51/54

Language of the proceedings: EN

Title of invention:
Anthracene derivatives and organic light-emitting device including the same

Applicant:
Samsung Display Co., Ltd.

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), 84

Keyword:
"Amendments - added subject matter (yes, main and first auxiliary request)"
"Clarity of claims (no, main and first auxiliary request)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1601/11 - 3.3.09

D E C I S I O N
of the Technical Board of Appeal 3.3.09
of 19 September 2013

Appellant: (Applicant)
Samsung Display Co., Ltd.
95, Samsung 2 Ro
Giheung-Gu
Yongin-City, Gyeonggi-Do, 446-711 (KR)

Representative:
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 16 February 2011 refusing European patent application No. 08152670.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

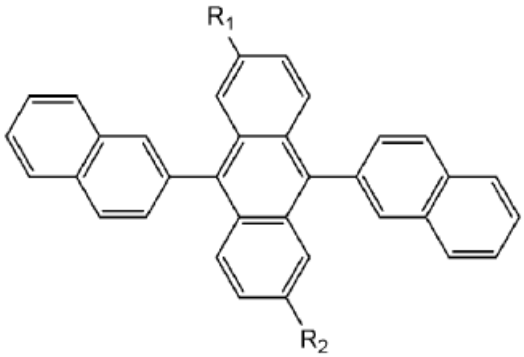
Chairman: M. O. Müller
Members: N. Perakis
K. Garnett

Summary of Facts and Submissions

I. European patent application No. 08152670.9, filed on 13 March 2008 in the name of Samsung SDI Co., Ltd., and claiming priority from KR 20070025072 (14 March 2007), was refused by a decision of the examining division which was announced orally on 11 January 2011 and issued in writing on 16 February 2011.

II. The examining division's decision was based on the claims of a main and first to third auxiliary requests.

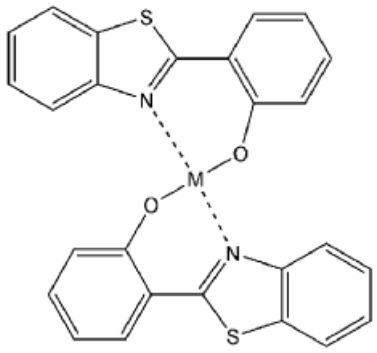
Claim 1 of the main request and first auxiliary request referred to an organic light-emitting device comprising a first electrode, a second electrode, and one or more organic layers interposed between the first electrode and the second electrode, wherein at least one of the organic layers comprises one or more anthracene derivatives represented by a formula 1:



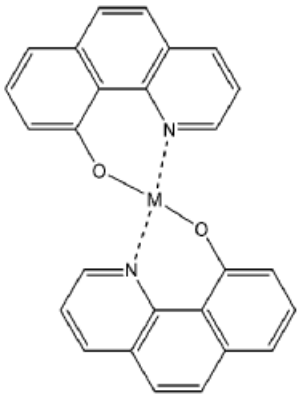
wherein R_1 and R_2 are each independently a hydrogen atom, a substituted or unsubstituted C1-C30 alkyl group, a substituted or unsubstituted C1-C30 alkoxy group, a substituted or unsubstituted C6-C30 aryl group, a substituted or unsubstituted C6-C30 aryloxy group, a substituted or unsubstituted C4-C30 heteroaryl

group, a substituted or unsubstituted C6-C30 condensed polycyclic group, a hydroxyl group, halogen, a cyano group, or a substituted or unsubstituted amino group; wherein the at least one organic layer comprising the anthracene derivative represented by formula 1 further comprises an ionic metal complex, wherein the ionic metal complex is a compound represented by formulae 13 or 14:

Formula 13



Formula 14



wherein M is a metal of an oxidation state (II) and wherein the at least one organic layer is an electron transport layer or an electron injection layer.

Claim 1 of the second and third auxiliary requests was identical to claim 1 of the main and first auxiliary request except that the ionic metal complex was restricted to that of formula 14.

In its decision, the examining division acknowledged, without providing reasons, that the subject-matter of all claims of the main request and the auxiliary requests complied with the provisions of Article 123(2) EPC. The application was nevertheless refused since the subject-matter of claim 1 of all requests was deemed to lack an inventive step.

III. On 15 April 2011, the applicant (hereinafter "the appellant") filed a notice of appeal against the above decision and paid the prescribed fee on the same day. A statement setting out the grounds of appeal was filed on 15 June 2011 together with a main and first to fourth auxiliary requests.

IV. In its first communication dated 18 June 2012, the board *inter alia* raised objections under Articles 123(2) and 84 EPC with regard to all claim requests.

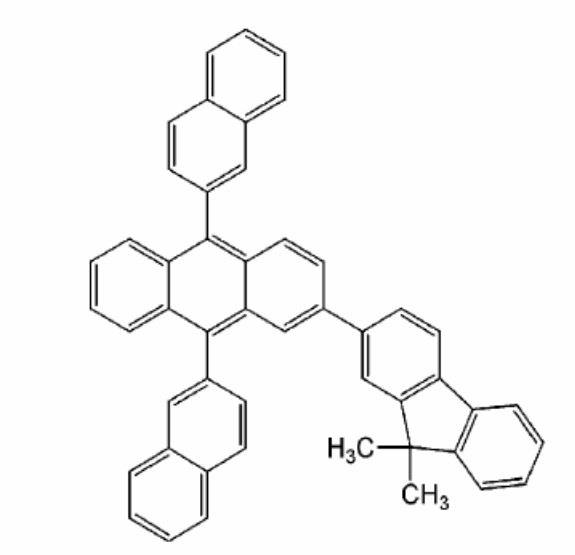
V. In response thereto, by letter of 18 October 2012, the appellant filed a new main and first auxiliary request to replace all previously filed requests.

The main request contains the following claims:

"1. An organic light-emitting device comprising:
a first electrode;
a second electrode; and

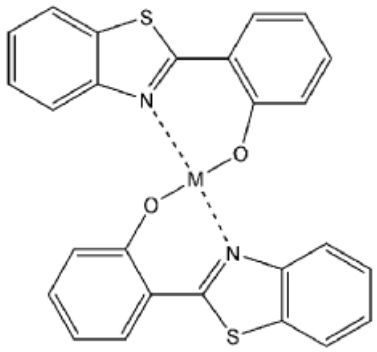
one or more organic layers interposed between the first electrode and the second electrode, wherein at least one of the organic layers comprises anthracene derivatives represented by Formula 2:

<Formula 2>

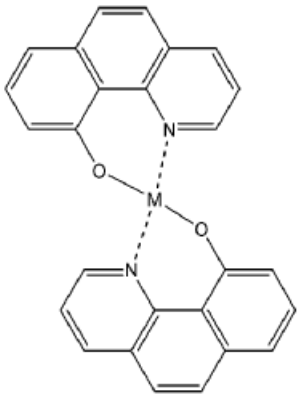


wherein the at least one organic layer comprising the anthracene derivative represented by Formula 2 further comprises an ionic metal complex, wherein the ionic metal complex is a compound represented by Formula 13, or 14 below:

<Formula 13>



<Formula 14>



wherein M is a metal of an oxidation state (II), and wherein the at least one organic layer is an electron transport layer or an electron injection layer."

"2. The organic light-emitting device of claim 1, wherein the weight ratio of the anthracene derivative and the ionic metal complex is 5:95 to 95:5."

The claims of the first auxiliary request differ from those of the main request in that in the sixth line of claim 1, the wording "anthracene derivatives represented by Formula 2" has been replaced by the wording "anthracene derivative represented by

Formula 2" and in that the ionic metal complex has been restricted to the compound represented by formula 14.

VI. On 10 December 2012, the appellant was summoned to oral proceedings.

VII. In its subsequent second communication dated 21 December 2012, the board raised objections under Articles 123(2) and 84 EPC against the newly filed main and first auxiliary requests. The board in particular explained that the combination of the anthracene derivative of claim 1 of both requests with the ionic metal complex of this claim appeared not to be clearly and unambiguously derivable from the application as filed. As regards claim 1 of the main request, the board further observed that this claim lacked clarity since the plural term "anthracene derivatives represented by Formula 2" appeared to be in contradiction to the subsequent formula, which represented only one single type of molecule. It was finally set out that the weight ratio in claim 2 of both requests appeared to lack clarity.

VIII. In its letter of 29 August 2013, the appellant informed the board that it did not intend to attend the oral proceedings and requested that a decision be rendered on the merits of the case. The appellant's letter did not contain any arguments with regard to the board's observations made in its second communication.

IX. On 19 September 2013, oral proceedings were held before the board. As announced, the appellant was not present at the oral proceedings.

X. The arguments presented by the appellant in reply to the board's first communication, in as far as relevant to the objections in the second communication, can be summarised as follows:

The anthracene derivative of claim 1 was clearly and unambiguously derivable from claim 4 as filed. Thus, there could be no doubt that the application as filed disclosed this anthracene derivative as a compound suitable for use as anthracene derivative of formula 1 of claim 1 as filed. The combination of the anthracene derivative of claim 1 with the ionic metal complexes of formulae 13 or 14 was also clearly and unambiguously derivable from the application as filed. The limitation to ionic metal complexes to those of formulae 13 or 14 did not result in a situation which was comparable to a selection from two lists of a "certain" length (ie of some length). The total number of ionic metal complexes of claim 8 as filed was only three. Thus, the list of alternatives of claim 8 as filed did not qualify as having a "certain" length. There could therefore be no reasonable doubt that the skilled person would clearly and unambiguously derive the subject-matter of claim 1 from the application as filed considered as a whole.

The board's objection that the wording "one or more anthracene derivatives represented by Formula 2" in claim 1 was in contradiction to the single anthracene derivative of formula 2 was overcome by the deletion of the wording "one or more".

XI. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis

of the main, alternatively the first auxiliary request, both filed with letter dated 18 October 2012.

Reasons for the Decision

1. The appeal is admissible.

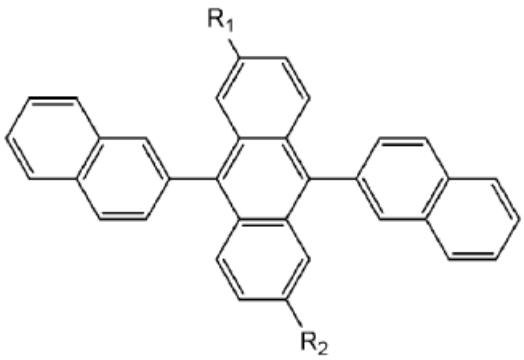
Main request

2. *Amendments - Article 123(2) EPC*

2.1 Claim 1 as filed reads as follows:

"An organic light-emitting device comprising:
a first electrode;
a second electrode; and
one or more organic layers interposed between the first electrode and the second electrode, wherein at least one of the organic layers comprises one or more anthracene derivatives represented by the Formula 1:

<Formula 1>

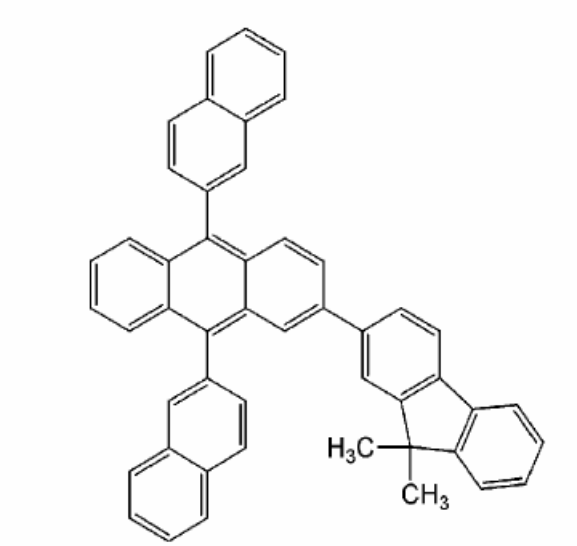


wherein R_1 and R_2 are each independently a hydrogen atom, a substituted or unsubstituted C1-C30 alkyl

group, a substituted or unsubstituted C1-C30 alkoxy group, a substituted or unsubstituted C6-C30 aryl group, a substituted or unsubstituted C6-C30 aryloxy group, a substituted or unsubstituted C4-C30 heteroaryl group, a substituted or unsubstituted C6-C30 condensed polycyclic group, a hydroxyl group, halogen, a cyano group, or a substituted or unsubstituted amino group."

2.2 Claim 1 of the main request (see point V above) differs from claim 1 as filed *inter alia* in that

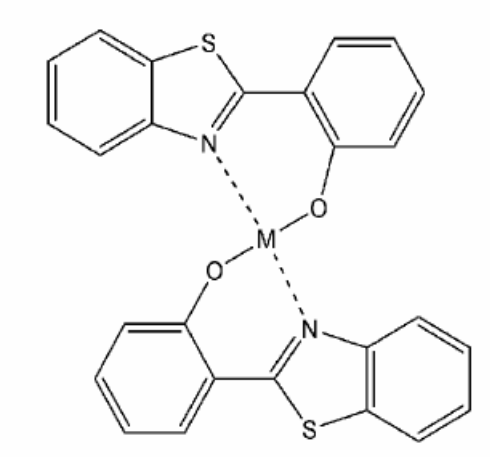
(a) the anthracene derivative is now restricted to the structure according to formula 2:



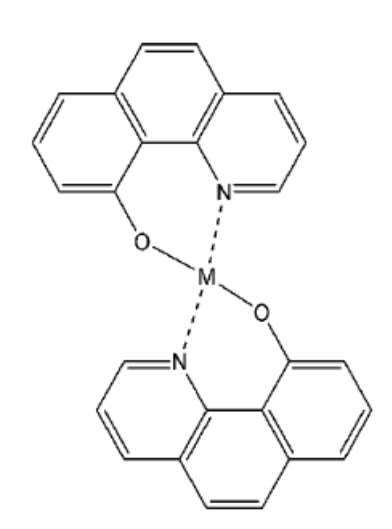
; and

(b) an ionic metal complex represented by

formula 13



or formula 14



is comprised in the at least one organic layer comprising the anthracene derivative.

2.3 The structure of formula 2 to which the anthracene derivative has now been restricted is disclosed on page 6, line 10, claims 4, 9 and 11 and examples 1 and 2 of the application as filed.

The specific metal complexes of formulae 13 and 14 are disclosed on page 10, line 12 to page 11, line 4 and claim 8 as filed.

2.4 Claim 1 requires the anthracene derivative according to formula 2 to be present in combination with the ionic metal complex according to formulae 13 or 14 (see point 2.2 above).

The requirements of Article 123(2) EPC are therefore only met if such a combination is clearly and unambiguously derivable from the application as filed.

2.5 As regards any such combination, the following is disclosed in the application as filed:

- page 6, line 10 and claim 4 as filed disclose the anthracene derivative of formula 2 of claim 1 as one member of a list of eleven anthracene derivatives without any indication that this specific anthracene derivative is present in combination with a metal complex, let alone a metal complex according to any of formulae 13 or 14 of claim 1;

- in claim 9 and example 1 of the application as filed, the anthracene derivative of formula 2 of claim 1 is combined with sodium quinolate, which is an ionic metal complex according to formula 15, rather than formulae 13 or 14 of claim 1;

- in claim 11 and example 2 of the application as filed, the anthracene derivative of formula 2 of

claim 1 is combined with a further anthracene derivative rather than an ionic metal complex;

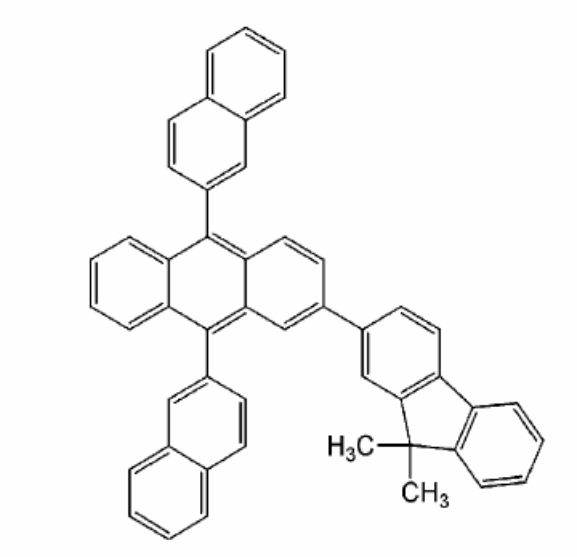
– on page 10, line 12 to page 11, line 4 and claim 8 as filed, the two ionic metal complexes of formulae 13 and 14 of claim 1 are disclosed as two out of three alternatives in combination with the anthracene derivative of the general formula 1 but not with the specific anthracene derivative of formula 2 of claim 1.

Furthermore, it is the ionic metal complex according to formula 15 (metal quinolate) rather than those according to formulae 13 or 14 of claim 1 which has the highest preference in the application as filed (page 11, lines 7 to 9: "More preferably, the ionic metal complex is a lithium quinolate (LiQ) metal complex, a sodium quinolate (NaQ) metal complex, or a cesium quinolate (CsQ) metal complex.").

So, the application as filed in fact points away from the combination of the anthracene derivative of formula 2 of claim 1 with the ionic metal complex of formulae 13 or 14 of claim 1. Therefore, claim 1 does not meet the requirements of Article 123(2) EPC.

3. *Article 84 EPC*

3.1 The plural term "anthracene derivatives represented by Formula 2" (emphasis added) in claim 1 is in contradiction to the subsequent formula:



which represents only one single type of molecule.

3.2 It is not clear whether the weight ratio given in claim 2 (see point V above) refers to the weight ratio calculated on the basis of the anthracene derivative and the ionic metal complex present in one and the same layer (which would imply that each anthracene-derivative and metal-complex-containing layer must have this ratio) or whether it refers to this weight ratio calculated on the basis of the anthracene derivative and ionic metal complex present in all anthracene-derivative and ionic-metal-complex-containing layers (which would allow individual anthracene-derivative and metal-complex-containing layers to have a weight ratio different from the one cited in claim 2).

3.3 The main request thus does not meet the requirements of Article 84 EPC.

First auxiliary request

4. *Amendments - Article 123(2) EPC*

4.1 Claim 1 of the first auxiliary request differs from claim 1 of the main request in that in the sixth line, the plural form "anthracene derivatives represented by Formula 2" (emphasis added by the board) has been replaced by the wording "anthracene derivative represented by Formula 2" and in that the ionic metal complex has been restricted to the compound represented by formula 14.

For the same reasons as given above with regard to the main request, the combination of the anthracene derivative according to formula 2 of claim 1 with the metal complex according to formula 14 of claim 1 is not clearly and unambiguously derivable from the application as filed. Therefore, for the same reasons as given with regard to the main request, the first auxiliary request does not meet the requirements of Article 123(2) EPC.

5. *Clarity*

5.1 Claim 2 of the first auxiliary request is identical to claim 2 of the main request. Consequently, for the same reasons as given above for claim 2 of the main request, claim 2 of the first auxiliary request lacks clarity.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Cañueto Carbajo M. O. Müller