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Case Number: T 0284/16 - 3.3.09

Application Number: 06713261.3

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Language of the proceedings: EN

Title of invention:
FILM FORMING COMPOSITION AND ORGANIC ELECTROLUMINESCENT DEVICE

Patent Proprietor:
Pioneer Corporation
Mitsubishi Chemical Corporation

Opponent:
Merck Patent GmbH

Headword:

Relevant legal provisions:
EPC Art. 100(a), 100(c), 54, 56, 54(3)

Keyword:

Decisions cited:
G 0001/03

Catchword:

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Case Number: T 0284/16 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 3 December 2019

Appellant: (Opponent)	Merck Patent GmbH Postfach Frankfurter Strasse 250 64293 Darmstadt (DE)
Respondent: (Patent Proprietor 1)	Pioneer Corporation 28-8, Honkomagome 2-chome Bunkyo-ku Tokyo 113-0021 (JP)
Respondent: (Patent Proprietor 2)	Mitsubishi Chemical Corporation 1-1, Marunouchi 1-chome Chiyoda-ku Tokyo 100-8251 (JP)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 17 December 2015 rejecting the opposition filed against European patent No. 1850368 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	D. Rogers
Members:	M. Ansorge
	N. Perakis

Summary of Facts and Submissions

I. This decision concerns the appeal filed by the opponent against the decision of the opposition division to reject the opposition against European patent No. 1 850 368.

II. With its notice of opposition, the opponent has requested revocation of the patent in its entirety on the basis of Article 100(a) EPC (lack of novelty and lack of inventive step), Article 100(b) EPC and Article 100(c) EPC.

III. The documents submitted during the opposition proceedings included:

D1: WO 2005/083814 A1
D1p: DE 10 2004 007 777 A1
D2: JP 2003-213002 A (English translation)
D3: US 2002/0197392 A1
D4: Emine Tekin, Berend-Jan de Gans and Ulrich S. Schubert, "Ink-jet printing of polymers - from single dots to thin film libraries", J. Mater. Chem., 2004, 14, pages 2627 - 2632
D6: WO 02/077060 A1
D10: experimental report of Yohei Tanaka (English translation) filed by the proprietor by letter of 15 September 2014.

IV. The opposition division's decision was based on the claims as granted (main request).

Claim 1 as granted reads as follows:

"1. A film-forming composition, which is a composition used to form a film of a hole-injecting/transporting

layer of an organic electroluminescent device, wherein the film-forming composition contains a hole-injecting/transporting material and/or an electron-accepting compound and a liquid in which the material and/or the compound have been dissolved;
the liquid contains a first solvent whose molecule has an aromatic ring and/or an aliphatic ring and an oxygen atom and which has either a boiling point of at least 200°C or a vapor pressure of 133.3 Pa (1 torr) at 25°C or lower; and the amount of the first solvent contained in the composition is 3 wt% or more, characterized in that the liquid further contains a second solvent, which has an aromatic ring and/or an aliphatic ring and an oxygen atom in its molecule and has a boiling point of lower than 200°C and a vapor pressure of higher than 133.3 Pa (1 torr) at 25°C; and a ratio W_2/W_1, where W_2 is the weight proportion of the second solvent and W_1 is the weight proportion of the first solvent, is 1 to 20."

Claims 2 to 22 are dependent product claims, and claim 23 is a use claim concerning the use of the film-forming composition of claim 1.

V. The opposition division rejected the opposition because it considered that:

- the subject-matter of claim 1 fulfilled the requirements of Article 123(2) EPC

- the claimed subject-matter was novel in view of D1 (cited under Article 54(3) EPC)

- the claimed subject-matter involved an inventive step considering either D2 or D3 as the closest prior art

VI. In its statement setting out the grounds of appeal, the opponent ("the appellant") requested that the decision of the opposition division be set aside and that the patent be revoked in its entirety.

VII. In its reply dated 1 September 2016, the proprietor ("the respondent") requested that the appeal be dismissed (main request), alternatively, that the patent be maintained on the basis of one of auxiliary requests 1 to 8, all filed with this reply. Only auxiliary requests 1 to 6 are relevant for the present decision.

Claim 1 of **auxiliary request 1** differs from claim 1 of the main request (claim 1 as granted; see point IV, above) in that it contains the following disclaimer:

"with the proviso that the film-forming composition is not a composition as defined in WO 2005/083814 A1, Example 1, Solutions 4, 5 and 6".

Claim 1 of **auxiliary request 2** differs from claim 1 of the main request in that it contains the following disclaimer:

"with the proviso that the film-forming composition is not a composition consisting of 11 g/l, 20 g/l, 30 g/l or 40 g/l of a copolymer prepared from 50 mol-% of the ethylene glycol ester of 2',3',6',7'-tetra(2-methylbutyloxy)spirobifluorene-2,7-bisboronic acid, 30 mol-% of 2,7-dibromo-9-(2',5'-dimethylphenyl)-9-[3",4"-bis(2-methylbutyloxy)phenyl]fluorene, 10 mol-% of N,N'-bis(4-bromophenyl)-N,N'-bis(4-tert-butylphenyl)benzidine and 10 mol-% of 2,3,6,7-tetra-(2-methylbutyloxy)-2,7-(4-bromostyryl)-9,9'-

spirobifluorene and having an Mw of 220 kg/mol, an Mn of 70 kg/mol, an Mp of 180 kg/mol and a viscosity of 6.6 mPa·s, when measured at 500 s 1 in a solution of 14 g/l in anisol/o-xylene, in a solvent consisting of (i) 40 vol% anisole, 10 vol% veratrol and 50 vol% decalin, (ii) 30 vol% anisole, 10 vol% veratrol and 60 vol% decalin, or (iii) 34 vol% anisole, 6 vol% veratrol and 60 vol% decalin".

Claim 1 of **auxiliary request 3** is a use claim which reads as follows:

"Use of a film-forming composition for forming a hole-injecting/transporting layer of an organic electroluminescent device, wherein the film-forming composition contains a hole-injecting/transporting material and/or an electron-accepting compound and a liquid in which the material and/or the compound have been dissolved;
the liquid contains a first solvent whose molecule has an aromatic ring and/or an aliphatic ring and an oxygen atom and which has either a boiling point of at least 200°C or a vapor pressure of 133.3 Pa (1 torr) at 25°C or lower; and
the amount of the first solvent contained in the composition is 3 wt% or more, characterized in that the liquid further contains a second solvent, which has an aromatic ring and/or an aliphatic ring and an oxygen atom in its molecule and has a boiling point of lower than 200°C and a vapor pressure of higher than 133.3 Pa (1 torr) at 25°C; and a ratio W_2/W_1, where W_2 is the weight proportion of the second solvent and W_1 is the weight proportion of the first solvent, is 1 to 20, wherein the hole-injecting/transporting layer is formed by an inkjet method or a spraying method."

Claim 1 of **auxiliary request 4** differs from claim 1 of auxiliary request 3 in that it no longer contains the features "and/or electron-accepting compound" and "wherein the hole-injecting/transporting layer is formed by an inkjet method or a spraying method".

Claim 1 of **auxiliary request 5** differs from claim 1 of auxiliary request 3 in that it no longer contains the feature "and/or electron-accepting compound".

Claim 1 of **auxiliary request 6** derives from claim 1 of the main request and reads as follows:

"1. A film-forming composition, which is a composition used to form a film of a hole-injecting/transporting layer of an organic electroluminescent device, wherein the film-forming composition contains a hole-injecting/transporting material, ~~and/or~~ an electron-accepting compound and a liquid in which the material and~~/or~~ the compound have been dissolved;
the liquid contains a first solvent whose molecule has an aromatic ring and/or an aliphatic ring and an oxygen atom and which has either a boiling point of at least 200°C or a vapor pressure of 133.3 Pa (1 torr) at 25°C or lower; and
the amount of the first solvent contained in the composition is 3 wt% or more, characterized in that the liquid further contains a second solvent, which has an aromatic ring and/or an aliphatic ring and an oxygen atom in its molecule and has a boiling point of lower than 200°C and a vapor pressure of higher than 133.3 Pa (1 torr) at 25°C; and a ratio W_2/W_1, where W_2 is the weight proportion of the second solvent and W_1 is the weight proportion of the first solvent, is 1 to 20."

Claims 2 to 23 of auxiliary request 6 correspond to claims 2 to 23 of the main request.

VIII. In preparation for the oral proceedings, the board issued a communication giving a preliminary opinion.

IX. On 3 December 2019, oral proceedings took place before the board. Both parties maintained their requests as submitted in writing.

X. The arguments of the appellant put forward in writing and during the oral proceedings, in so far as they are relevant for the present decision, are as follows:

- Claim 1 of the main request, which, amongst others, was based on the combination of claims 1 and 3 as filed, no longer contained the feature of claim 3 as filed with regard to the second solvent "but is not classified into the same type as the first solvent". The deletion of this feature extended the subject-matter of claim 1 of the main request beyond the content of the application as filed. Thus, it did not meet the requirements of Article 123(2) EPC.

- The subject-matter of claim 1 of the main request was not novel in view of example 1 of D1 (Article 54(3) EPC).

- The disclaimer formulation in claim 1 of auxiliary request 1 was unclear, and the disclaimer formulation in claim 1 of auxiliary request 2 did not remove sufficient subject-matter in view of D1.

- The subject-matter of claim 1 of auxiliary requests 3, 4 and 5 was also not novel in view of example 1 of D1.

- The subject-matter of claim 1 of auxiliary request 6 did not involve an inventive step in view of D3 considered to represent the closest prior art in combination with D4.

XI. The arguments of the respondent submitted in writing and during the oral proceedings, in so far as they are relevant for the present decision, are as follows:

- The subject-matter of claim 1 of the main request met the requirements of Article 123(2) EPC. The characterisation of the second solvent by its boiling point and vapor pressure on the basis of paragraph [0037] of the application as filed rendered redundant the feature "but is not classified into the same type as the first solvent". Thus, its omission from the subject-matter of claim 1 of the main request did not contravene the requirements of Article 123(2) EPC.

- The subject-matter of claim 1 of the main request was novel in view of example 1 of D1 since the appellant had neither provided evidence that the material disclosed in example 1 of D1 was a hole-injecting/transporting material nor that the composition was suited to form a film of a hole-injecting/transporting layer of an organic electroluminescent device.

- The subject-matter of claim 1 of auxiliary requests 1 and 2 fulfilled the requirements of Article 84 EPC and Article 123(2) EPC. The

disclaimers were clear and excluded the respective compositions of example 1 of D1 from the claimed subject-matter.

- The subject-matter of claim 1 of auxiliary requests 3, 4 and 5 was novel in view of example 1 of D1 since in this example the film-forming composition was not used for forming a hole-injecting/transporting layer but only for forming a luminescent layer.

- The subject-matter of claim 1 of auxiliary request 6 involved an inventive step in view of D3 considered to represent the closest prior art. The skilled person would not have taken D4 into consideration and, even if they would have done so, this document would not have provided any motivation to replace the solvent mixture of D3 with a solvent mixture required in claim 1 of auxiliary request 6.

Reasons for the Decision

MAIN REQUEST (CLAIMS AS GRANTED)

1. Article 100(c) EPC

1.1 Claim 1 of the main request relates to a film-forming composition containing:

- a hole-injecting/transporting material and/or an electron-accepting compound; and

- a specific solvent mixture containing a first and second solvent.

1.2 The subject-matter of claim 1 of the main request derives from the combination of claim 1 as filed with claim 3 as filed and with the disclosure in paragraph [0037] of the application as filed concerning the properties of the second solvent, namely, that it has a boiling point of lower than 200°C and a vapor pressure of higher than 133.3 Pa (1 torr) at 25°C. The appellant did not object to this combination.

1.3 The objection of the appellant concerns the fact that claim 1 of the main request no longer contains the feature "but is not classified into the same type as the first solvent" disclosed in claim 3 as filed concerning the second solvent.

1.4 The board considers that this feature became redundant after the introduction of the features of paragraph [0037] of the application as filed into claim 1. With regard to the definition of the first and second solvents, they both have a molecule with "an aromatic ring and/or an aliphatic ring and an oxygen atom", but they are clearly distinguished from each other by their different physical properties, i.e. a different boiling point and a different vapor pressure. So there is no overlap between the definition of the first and second solvents.

The deleted feature "but is not classified into the same type as the first solvent" does not specify based on which difference the solvents are distinguished. It merely means that the first and second solvents are not the same. In view of the insertion of the physical properties into claim 1 (which define in a more precise manner the difference between the first and second solvents), the more general distinction in claim 3 as filed became redundant.

1.5 The board does not agree with the appellant that a comparison of the examples for the first and second solvents leads to the conclusion that a further structural distinction needs to be present among the solvents. Most of the examples given for the second solvent relate to a different class of solvents having a different chemical structure compared to the examples of the first solvent. But even when both solvents are aromatic esters, they are not the same. Paragraph [0036] of the application as filed discloses two aromatic esters to be used as the second solvent which differ from the aromatic esters to be used as the first solvent by their physical properties.

1.6 The appellant referred to cyclooctanol, which although cited in paragraph [0036] of the application as filed as an example of the second solvent, has a boiling point of above 200°C, which is a property of the first solvent, thus, allegedly supporting its added matter objection. The board considers that this is merely a matter of an incomplete adaptation of the description, which does not lead to added matter.

In view of the above, the subject-matter of claim 1 of the main request meets the requirements of Article 123(2) EPC. Thus, the ground of opposition under Article 100(c) EPC does not prejudice the maintenance of the opposed patent.

2. Novelty

2.1 The appellant raised a novelty objection in view of D1 (in particular example 1) which is prior art pursuant to Article 54(3) EPC for those embodiments validly claiming the priority of its priority document (D1p).

Example 1 of D1 validly claims the priority of D1p and can therefore be used in the assessment of novelty (Article 54(3) EPC).

2.2 Example 1 of D1 discloses solutions of the polymer "POLY 1" which is a polymer according to example P17 of document D6 ("**polymer P17**") in mixtures containing anisole, veratrole and decalin (solutions 4 to 6; page 21, lines 3-8).

The specific solutions 4, 5 and 6 consist of:

(a) about 11 g/l of polymer P17; and

(b) the following solvent mixtures (table 4):

- 40 vol% anisole, 10 vol% veratrole and 50 vol% decalin (solution 4);

- 30 vol% anisole, 10 vol% veratrole and 60 vol% decalin (solution 5); or

- 34 vol% anisole, 6 vol% veratrole and 60 vol% decalin (solution 6).

Veratrole falls within the definition of the first solvent of claim 1 of the main request and anisole within the definition of the second solvent. The ratio anisole/veratrole fulfils the ratio W2/W1 of claim 1 as well. Therefore, solutions 4, 5 and 6 of example 1 of D1 fall within the structural definition of the film forming composition of claim 1.

Furthermore, example 1 of D1 discloses that solutions 4, 5 and 6 are gradually concentrated by evaporation so that the initial concentration of

polymer P17 of about 11 g/L gradually becomes ~20 g/L, ~30 g/L and ~40 g/L (table 5) and solution 6 was used to make a film. Thus, D1 also discloses that the disclosed solutions are film-forming solutions.

2.3 Thus, the novelty issue boils down to whether D1 directly and unambiguously discloses that the film-forming solutions 4, 5 and 6 are suitable to be used to form a film of a hole-injecting/transporting layer of an organic electroluminescent device and whether these solutions contain a hole-injecting/transporting material and/or an electron-accepting compound.

D1 discloses that solution 6 was tested for use in inkjet printing and electroluminescence. Thus, D1 discloses that the film-forming composition is suitable for forming a film of a hole-injecting/transporting layer of an organic electroluminescent device.

However, the respondent disagreed that polymer P17 was a hole-injecting/transporting material and argued that the appellant, who had the burden of proof, did not provide any evidence for that. It was not disputed that D6 (page 41, the table) disclosed that **polymer P17** is produced by *Suzuki*-polymerisation from the monomers M2 (50%), M7 (30%), M9 (10%) and M19 (10%). It was also not disputed that monomer **M9** was N,N'-bis(4-bromophenyl)-N,N'-bis(4-tert-butylphenyl)benzidine, i.e. an aromatic amine that contains tertiary aromatic amino groups. Paragraph [0048] of the patent in suit states that examples of polymeric compounds that have intramolecular hole-transporting sites include polymeric aromatic amines that contain tertiary aromatic amino groups. It was acknowledged that M9 of polymer P17 was such a unit.

2.4 The respondent contested that merely knowing that hole-transporting unit M9 was present in polymer P17 in an amount of 10% was not sufficient to prove that polymer P17 had the relevant hole-transporting property. This was allegedly so because, in view of the patent in suit, for a material to be suitable for hole injection or hole transportation, it should either be a homopolymer having exclusively those units or a copolymer having at least 50% of those units (see paragraph [0055]). The respondent thus concluded that the disclosed 10% of M9 was insufficient to provide the required property.

2.5 For the following reasons, the board cannot accept the respondent's view.

There was agreement among the parties that solutions 4, 5 and 6 of example 1 of D1 each disclose a specific solvent mixture falling within the scope of claim 1. There was also agreement among the parties that those solutions of example 1 contain polymer P17 which - as can be taken from D6 (see the table on page 41 and the formulae on page 37) - contains a constituent unit derived from monomer M9 having a triarylamine unit. Both parties further agreed that this unit M9 has hole-transporting properties. As can be seen in example 1 of D1, inkjet printing such a solution leads to the formation of a homogeneous film.

Monomer M9 is a constituent unit of polymer P17. Polymer P17 contains triarylamine units which are known to have hole-transporting properties. This is explicitly mentioned on page 10, lines 1 and 2, of D6 (which is in line with, e.g. paragraph [0048] of the patent). As can be taken from page 10, lines 10 to 13, of D6, these hole-transporting units may be present in

an amount of at least 1%, preferably at least 5%, in the polymer. In the board's view, there is no doubt that a content of 10% of these units (such as M9) in the polymer results in hole-transporting properties, at least to some extent.

The respondent's argument that using copolymers having hole-transporting units (as in polymer P17) requires a content of at least 50% to achieve hole-transporting properties is not convincing. Paragraph [0055] of the patent in suit merely mentions that at least 50% of these units is preferred if a copolymer is used. This does not mean that a content of below 50% disqualifies the polymer from being a hole-transporting material. In the absence of any specific threshold of hole-transporting properties, the hole-transporting material mentioned in claim 1 is to be interpreted in a broad manner, i.e. as encompassing a material having also low hole-transporting properties.

The respondent also referred to the opposition division's decision which found that the low content of 10% of hole-transporting unit M9 in polymer P17 makes it unsuited for use in a hole-injecting/transporting layer and that example 1 of D1 does not contain a hole-injecting/transporting material. In the respondent's view, in such a situation, it is the appellant's obligation to provide evidence that the opposition division's decision in this respect was wrong.

However, the opposition division did not give any explanation on why it came to the conclusion that polymer P17 is unsuitable for forming a hole-injecting/transporting layer and that it is not a hole-injecting/transporting material. Neither did the respondent give

any explanation as to why a content of 10% of hole-transporting unit M9 in polymer P17 makes it unsuitable for use in a hole-injecting/transporting layer and why polymer P17 is not a hole-injecting/transporting material.

Under the present circumstances, the board does not share the respondent's view that it is up to the appellant to prove that a content of 10% of M9 is sufficient to achieve the hole-transporting properties of polymer P17. D6 explicitly explains that structural elements having hole-transporting properties are, e.g. triaryl amine derivates, such as monomer M9. The logical consequence is that a polymer with such a unit has hole-transporting properties at least to some extent. In view of such evidence provided in D6, it is not a mere unfounded allegation that polymer P17 has hole-transporting properties and, thus, is a hole-transporting material. In this situation, the board is of the opinion that the burden of proof is on the respondent, who has to show that polymer P17 is unsuitable for the relevant use.

2.6 In view of the above, the board concludes that polymer P17 is a hole-transporting material and that solutions 4, 5 and 6 are suited to be used for forming a film of a hole-injecting/transporting layer of an organic electroluminescent device. Accordingly, solutions 4, 5 and 6 of example 1 of D1 disclose film-forming compositions falling within the scope of claim 1 of the main request.

Thus, the subject-matter of claim 1 of the main request is not novel in view of example 1 of D1.

AUXILIARY REQUEST 1

3. The subject-matter of claim 1 of auxiliary request 1 comprises a disclaimer to delimit the film-forming composition from those of D1 (solutions 4, 5 and 6 of example 1), the (undisclosed) disclaimer reading as follows:

"with the proviso that the film-forming composition is not a composition as defined in WO 2005/083814 A1, Example 1, Solutions 4, 5 and 6".

For an undisclosed disclaimer to be allowable under Article 123(2) EPC, the criterion needs to be fulfilled that a claim containing a disclaimer must meet the requirements of clarity and conciseness of Article 84 EPC (see G 1/03, headnote 2, in particular 2.4).

3.1 In the present case, the disclaimer excludes example 1, solutions 4, 5 and 6 of D1. These solutions contain polymer "POLY 1" which, as mentioned above, is polymer P17 of D6. D1 discloses that the concentration of polymer P17 in solutions 4, 5 and 6 is "circa 11 g/L". Furthermore, these solutions are evaporated to polymer P17 concentrations of "~20 g/L", "~30 g/L" and "~40 g/L" (see table 5 of D1). However, the term "circa" as well as the sign "~" (which also stands for "circa") render the respective concentration values vague and ambiguous. As a consequence, the disclaimer is unclear, which also renders the whole claim unclear and does not satisfy the clarity criterion established by headnote 2.4 of G 1/03.

3.2 In this context, the respondent argued that "about 200°C", "circa 200°C" or "~200°C" are equivalent to "200°C". The board does not agree. The term "circa"

as well as the sign "~" are vague and ambiguous. In the board's view, it is not clear what concentration is actually meant by "circa 11 g/L" or "~20 g/L". The same applies to "~30 g/L" and "~40 g/L".

3.3 Thus, the disclaimer introduced into claim 1 of auxiliary request 1 is not allowable.

AUXILIARY REQUEST 2

4. The subject-matter of claim 1 of auxiliary request 2 comprises another disclaimer to delimit the film-forming composition from those of D1 (solutions 4, 5 and 6 of example 1). The (undisclosed) disclaimer reading as follows:

"with the proviso that the film-forming composition is not a composition consisting of 11 g/l, 20 g/l, 30 g/l or 40 g/l of a copolymer prepared from 50 mol-% of the ethylene glycol ester of 2',3',6',7'-tetra(2-methylbutyloxy)spirobifluorene-2,7-bisboronic acid, 30 mol-% of 2,7-dibromo-9-(2',5'-dimethylphenyl)-9-[3",4"-bis(2-methylbutyloxy)phenyl]fluorene, 10 mol-% of N,N'-bis(4-bromophenyl)-N,N'-bis(4-tert-butylphenyl)benzidine and 10 mol-% of 2,3,6,7-tetra-(2-methylbutyloxy)-2,7-(4-bromostyryl)-9,9'-spirobifluorene and having an Mw of 220 kg/mol, an Mn of 70 kg/mol, an Mp of 180 kg/mol and a viscosity of 6.6 mPa·s, when measured at 500 s 1 in a solution of 14 g/l in anisol/o-xylene, in a solvent consisting of (i) 40 vol% anisole, 10 vol% veratrol and 50 vol% decalin, (ii) 30 vol% anisole, 10 vol% veratrol and 60 vol% decalin, or (iii) 34 vol% anisole, 6 vol% veratrol and 60 vol% decalin".

In this case, the concentrations of the compolymer excluded by the disclaimer are "11 g/l", "20 g/l", "30 g/l" and "40 g/l", i.e. specific concrete values. However, the concentrations of solutions 4, 5 and 6 of example 1 of D1 are "circa 11 g/L" (page 21, lines 21 and 22, of D1) and "~20 g/L", "~30 g/L" and "~40 g/L" (table 5 of D1). As mentioned above, the term "circa" and the sign "~" have no clear and unambiguous meaning and, thus, the matter to be excluded in view of D1 does not correspond to that of the disclaimer in claim 1 of the auxiliary request 2.

Thus, the disclaimer in claim 1 of auxiliary request 2 does not sufficiently delimit the claimed subject-matter from example 1 of D1 and is not allowable.

AUXILIARY REQUEST 3

5. Claim 1 of auxiliary request 3 differs from claim 1 of the main request in that it is restricted to the use of a film-forming composition for forming a hole-injecting/transporting layer of an organic electroluminescent device. This claim includes the additional feature "wherein the hole-injecting/transporting layer is formed by an inkjet method or a spraying method". The feature "for forming a hole-injecting/transporting layer" becomes a limiting feature of claim 1.

5.1 For the same reasons as outlined for the main request, the subject-matter of claim 1 of auxiliary request 3 lacks novelty over D1. Example 1 of D1 discloses solution 6, which is a film-forming composition falling within the subject-matter of claim 1 of auxiliary request 3. Solution 6 is also used in D1 as a layer of an organic electroluminescent device.

5.2 The only contentious point among the parties was whether example 1 of D1 unambiguously disclosed the use of the film-forming composition for forming a hole-injecting/transporting layer.

5.3 The respondent contested that the single layer between the anode and the cathode described in example 1 of D1 is a hole-injecting/transporting layer as required in claim 1 of auxiliary request 3. This single layer was solely a luminescent layer and related to a different layer in the organic electroluminescent device. The respondent referred to sections [0027] and [0028] and Figures 1a to 1c of the patent in suit which in its view disclosed that a hole-injecting/transporting layer was present between the anode and the luminescent layer, but it was not a luminescent layer. Furthermore, it pointed out that an organic electroluminescent device required a hole-injecting/transporting layer and a luminescent layer between the anode and the cathode. The respondent held that claim 1 should be interpreted on the basis of the description.

5.4 The board does not agree. The expression "Use of a film-forming composition for forming **a** hole-injecting/transporting layer of an organic electroluminescent device, wherein the film-forming composition contains a hole-injecting/transporting material and/or an electron-accepting compound" (emphasis added) of claim 1 of auxiliary request 3 is clear on its own. Thus, there is no room for interpreting claim 1 based on the description to give it a narrower meaning. The use of claim 1 does not exclude the use of a film-forming composition for forming a hole-injecting/transporting layer which at the same time has luminescent properties. In example 1 of D1, such a

single layer is disclosed having hole-transporting properties and luminescent properties at the same time.

Thus, the subject-matter of claim 1 of auxiliary request 3 is not novel in view of example 1 of D1.

AUXILIARY REQUESTS 4 and 5

6. Claim 1 of auxiliary request 4 is a use claim which differs from claim 1 of auxiliary request 3 in that it does not comprise the features "and/or electron-accepting compound" and "wherein the hole-injecting/transporting layer is formed by an inkjet method or a spraying method".

Claim 1 of auxiliary request 5 is also a use claim which differs from claim 1 of auxiliary request 3 in that it does not comprise the feature "and/or electron-accepting compound".

The limitation in claim 1 of auxiliary requests 4 and 5 to a film-forming composition containing a hole-injecting/transporting material and a liquid in which the material is dissolved has no impact on the assessment of novelty in view of D1 since example 1 of D1 discloses a hole-injecting/transporting material and a required liquid. Accordingly, the same reasoning as given for auxiliary request 3 is equally applicable to auxiliary requests 4 and 5.

Thus, the subject-matter of claim 1 of auxiliary requests 4 and 5 is not novel in view of example 1 of D1 either.

AUXILIARY REQUEST 6

7. Claim 1 of auxiliary request 6 differs from claim 1 of the main request in that it requires that the film-forming composition contains as mandatory components a hole-injecting/transporting material, an electron-accepting compound, and a liquid in which the material and the compound have been dissolved.

8. The appellant did not raise any objection under Article 123(2) EPC or under Article 54 EPC. The board did not see any reason to raise these objections, either.

9. Inventive step

9.1 There was agreement among the parties that D3 represents the closest prior art and that the film-forming composition of example 2 of D3 is the embodiment which comes closest to the film-forming composition of claim 1 of auxiliary request 6.

Example 2 of D3 relates to a hole injection-transportation composition containing a hole injection-transportation material and a polar solvent mixture which comprises N-methylpyrrolidone and 1,3-dimethyl-imidazolinone.

There was also agreement among the parties that D3 does not disclose a solvent falling within the definition of the second solvent of claim 1, i.e. a solvent with a boiling point of lower than 200°C and a vapor pressure of higher than 1 torr at 25°C. As a direct consequence, the composition of example 2 of D3 does not disclose the feature of claim 1 of auxiliary request 6 "a ratio W_2/W_1, where W_2 is the weight proportion of the second

solvent and W_1 is the weight proportion of the first solvent, is 1 to 20".

9.2 The above technical differences do not result in a technical effect over the film-forming composition of D3.

The experimental report D10 (which reworks examples 1 and 3 and reference example 5 of the patent) does not contain any comparison between the claimed film-forming composition and that of example 2 of D3. In the absence of such comparative data, no effect resulting from the distinguishing features in view of D3 can be acknowledged.

9.3 Thus, the objective technical problem consists in the provision of an alternative film-forming composition which is suited to form a film of a hole-injecting/transporting layer of an organic electroluminescent device.

9.4 D3 alone does not contain any teaching which would have motivated the skilled person to use a solvent falling within the definition of the second solvent and satisfying the claimed ratio W_2/W_1.

9.5 The appellant argued that the skilled person departing from D3 would have considered D4, which allegedly would have motivated them to apply a solvent mixture of methyl benzoate and anisole instead of the solvent mixture of example 2 of D3.

The board does not agree. D4 concerns the inkjet printing of polymers and the problem of ring formation (called the "coffee-drop effect"), which is different from the problem mentioned in the patent in suit.

Furthermore, D4 uses polystyrene as a model material in the experiments which means that it does not relate to compositions for forming a film of a hole-injecting/ transporting layer of an organic electroluminescent device. Thus, D4 would not have been taken into consideration by the skilled person looking for an alternative film-forming composition used to form a film of a hole-injecting/transporting layer of an organic electroluminescent device.

9.6 Even if the skilled person would have taken D4 into consideration, they would not have found any motivation to replace the solvent mixture of example 2 of D3 by a solvent mixture of methyl benzoate and anisole. The solvent mixture of D3 comprises as an essential component at least one heterocyclic compound and in example 2 two very specific heterocyclic compounds, namely N-methylpyrrolidone and 1,3-dimethyl-imidazolinone. A heterocyclic solvent is a crucial element for solving the problem underlying D3. The board does not find any indication in D4 which would have motivated the skilled person to replace the specific heterocyclic solvents of example 2 of D3 with methyl benzoate and anisole, which belong to different classes of solvents. The board is of the opinion that this would have been in contradiction to the teaching and purpose of D3.

D4 - if at all - might have, at best, prompted the skilled person to use a mixture of methyl benzoate and ethyl acetate (which, however, does not fall within the solvent mixture of claim 1) if they were seeking advantageous film-forming properties (see page 2629, right column, lines 3 to 7, of D4). Finally, D4 fails to teach or hint at the ratio between the first and

second solvents as required in claim 1 of auxiliary request 6.

In view of the above, the claimed film-forming composition represents a non-obvious alternative in view of D3 as the closest prior art.

Thus, the subject-matter of claim 1 of auxiliary request 6 involves an inventive step. The same applies to dependent claims 2 to 22 and use claim 23 referring back to the film-forming composition of claim 1. In conclusion, auxiliary request 6 is allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent on the basis of the following claims and a description to be adapted thereto:

Claims 1 to 23 of auxiliary request 6 filed by letter of 1 September 2016.

The Registrar: The Chairman:

D. Magliano D. Rogers

Decision electronically authenticated