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Datasheet for the decision of 22 July 2014

Case Number: T 2486/10 - 3.2.07

Application Number: 03076081.3

Publication Number: 1357200

IPC: C23C14/24, C23C14/12

Language of the proceedings: EN

Title of invention:
Thermal PVD apparatus with detachable vapor source(s)

Patent Proprietor:
Global OLED Technology LLC

Opponent:
Applied Materials GmbH & Co. KG

Headword:

Relevant legal provisions:
EPC Art. 56
EPC R. 115(2)
RPBA Art. 13(1), 15(3)

Keyword:
Oral proceedings held in the absence of appellant I
Inventive step - all requests (no)
Late-filed request - admitted (no)

Decisions cited:
T 1704/06

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Catchword:

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Case Number: T 2486/10 - 3.2.07

D E C I S I O N
of Technical Board of Appeal 3.2.07
of 22 July 2014

Appellant II: (Patent Proprietor)	Global OLED Technology LLC 13873 Park Center Road, Suite 330 Herndon, VA 20171 (US)
Representative:	Wibbelmann, Jobst Wuesthoff & Wuesthoff Patent- und Rechtsanwälte Schweigerstrasse 2 81541 München (DE)
Appellant I: (Opponent)	Applied Materials GmbH & Co. KG Siemensstrasse 100 63755 Alzenau (DE)
Representative:	Zimmermann & Partner Postfach 330 920 80069 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 19 October 2010 concerning maintenance of the European Patent No. 1357200 in amended form.**

Composition of the Board:

Chairman	H. Meinders
Members:	H. Hahn
	C. Brandt

Summary of Facts and Submissions

I. The European patent 1 357 200 was maintained in amended form on the basis of claims 1-7 of the second auxiliary request.

The opponent (appellant I) and the patent proprietor (appellant II) each filed an appeal against this interlocutory decision. As an auxiliary request both parties requested oral proceedings.

II. The following documents of the opposition proceedings are cited in the present decision:

D1 = DE-C-101 28 019
D2 = DE-A-102 24 908
D3 = US-A-4 401 052
D4 = WO-A-00/28103
D5 = EP-A-0 962 260
D6 = WO-A-99/25894

III. An opposition had been filed against the patent in its entirety under Article 100(a) EPC, for lack of novelty and inventive step, and under Article 100(b) EPC, that the patent does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by the person skilled in the art. Furthermore, the validity of the priority of the patent was contested.

The Opposition Division held that the priority of the contested patent is validly claimed and that D1 and D2 therefore do not represent prior art being relevant for the patent in suit. Furthermore, claims 1 to 7 of the main request for the Contracting State DE dated 9 January 2009 were considered to meet the requirements of Articles 123(2) and (3) EPC. The Opposition Division

held that the patent in suit complies with Article 83 EPC. It further held that the subject-matter of claim 1 of the main request for the Contracting States FR and GB (i.e. of the patent as granted) lacks novelty over D3 and that the same conclusion is valid for claim 1 for the Contracting State DE. The Opposition Division then considered that claims 1-7 of the then first auxiliary request meet the requirements of Articles 123(2) and (3) EPC and of novelty but lacked inventive step over a combination of the teachings of the closest prior art D3 with D4. It further considered that claims 1-7 of the second auxiliary request meet the requirements of Articles 123(2) and (3) EPC and of novelty and that the subject-matter of claim 1 involves inventive step with respect to D3 to D6 since it cannot be achieved by a combination of any of these documents. Consequently, the patent was maintained in that amended form.

IV. With a communication annexed ("annex") to summons for oral proceedings the Board presented its preliminary and non-binding opinion with respect to:
- claims 1-8 of the patent as granted for the Contracting States FR and GB and claims 1-7 for the Contracting State DE of the main request as filed with letter of 9 January 2009;
- claims 1-8 for the Contracting States FR and GB and claims 1-7 for the Contracting State DE, of the first auxiliary request filed together with the statement of grounds of appeal;
- claims 1-7 of the patent as maintained by the Opposition Division (second auxiliary request).

The Board stated amongst others that the appeal of appellant II appeared to be admissible and that the

amendments made in all the claims 1 appeared to comply with Articles 123(2) and (3) EPC.

With respect to the issue of Article 83 EPC and claim 1 of the second auxiliary request it appeared that the skilled person has sufficient information for carrying out its subject-matter.

Concerning novelty it appeared that the subject-matter of the claims 1 of the main request for the Contracting States FR and GB as well as the Contracting State DE lacked novelty over the disclosure of D3 while the subject-matter of the claims 1 of the first and second auxiliary request seemed to be novel.

Document D3 appeared to represent the closest prior art document for the claimed PVD apparatus *per se* of claim 1 of all requests. It seemed that the claims 1 of the main and the first auxiliary request lack inventive step over a combination of the teaching of D3 as closest prior art and the common general knowledge of the skilled person.

Finally, the Board remarked that inventive step of claim 1 of the second auxiliary request might also need to be discussed taking account of points 5.2.1 to 5.2.4 of the reasons of the impugned decision.

V. With letter dated 28 May 2014 appellant I indicated that it will not attend the scheduled oral proceedings. Furthermore, it stated that the request for the revocation of the patent is maintained. Additionally, it stated that it no longer objects to the admissibility of appellant II's appeal and that it no longer objects to the unity of the claims of the various requests. Finally, it requested that the patent

proprietor shall not be allowed to introduce further requests into the proceedings in strict application of Articles 12 and 13 RPBA.

This letter did **not** contain any further arguments concerning the objections raised in the above mentioned Board's annex.

VI. Appellant II did **not** submit anything as a response to the Board's communication.

VII. Oral proceedings before the Board were held on 22 July 2014. As announced, appellant I did not attend so that the oral proceedings were continued in its absence in accordance with Rule 115(2) EPC and Article 15(3) RPBA. The issue of Article 54 EPC was discussed with respect to the claims 1 of the main and first auxiliary requests. This discussion was followed by one on inventive step of the subject-matter of the claims 1 of the main and the first auxiliary requests with document D3 as the closest prior art in combination with the common general knowledge of the person skilled in the art. After the Board's deliberation for the issue of inventive step of claim 1 of the second auxiliary request appellant II filed a third auxiliary request which was based on the main request and its two versions of claim 1 for the different Contracting States but being directed to the "Use of a PVD apparatus for ...". Finally, the admittance into the proceedings of this new third auxiliary request was discussed with respect to Article 13(1) RPBA.

Appellant I requested in the written proceedings that the decision under appeal be set aside and that the patent be revoked. With letter of 28 May 2014 it further requested that the patent proprietor should not

be allowed to introduce further requests in the proceedings (Articles 12 and 13 RPBA).

Appellant II requested that the appeal of appellant I be dismissed, that the decision under appeal be set aside and the patent be maintained on the basis of the main request with claims 1-8 of the patent as granted for the Contracting States FR and GB and with claims 1-7 for the Contracting State DE as filed with letter of 9 January 2009, alternatively on the basis of the first auxiliary request with claims 1-8 for the Contracting States FR and GB and claims 1-7 for the Contracting State DE, both as filed together with the statement of grounds of appeal, or on claims 1-7 of the patent as maintained by the Opposition Division according to the second auxiliary request.

At the end of the oral proceedings the Board announced its decision.

VIII. Claim 1 of the **main request** for the designated Contracting States **FR and GB** (corresponding to claim 1 of the patent as granted) reads:

"1. A thermal physical vapor deposition apparatus for vaporizing solid organic materials and applying vaporized organic materials as an organic layer onto structure in a chamber at reduced pressure in forming a part of an organic light-emitting device (OLED), comprising:

a) an elongated vapor distributor disposed in the chamber and spaced from the structure, the vapor distributor defining an elongated cavity having a plurality of vapor efflux apertures formed along an elongated direction of the distributor for delivering

vaporized organic materials in the space between the distributor and the structure for depositing an organic layer onto the structure;
b) one or more detachable organic material vapor sources which are disposed outside of the chamber and can be attached, and when operative, to deliver vaporized organic materials into the cavity of the vapor distributor; and
c) a vapor transport device dedicated to each of the one or more organic material vapor sources and sealingly extending into the cavity, the vapor transport device including means for detaching or for sealingly attaching an organic material vapor source."

Claim 1 of the **main request** for the Contracting State **DE** reads as follows (amendments as compared to claim 1 of the patent as granted are in bold; emphasis added by the Board):

"1. A thermal physical vapor deposition apparatus for vaporizing solid organic materials and applying vaporized organic materials as organic layer onto structure in a chamber at reduced pressure in forming a part of an organic light-emitting device (OLED), comprising:

a) an elongated vapor distributor disposed in the chamber and spaced from the structure, the vapor distributor defining an elongated cavity having a plurality of vapor efflux apertures formed along an elongated direction of the distributor for delivering vaporized organic materials in the space between the distributor and the structure for depositing an organic layer onto the structure;
b) one or more detachable organic material vapor sources which are disposed outside of the chamber and

can be attached, and when operative, to deliver vaporized organic materials into the cavity of the vapor distributor;
c) a vapor transport device dedicated to each of the one or more organic material vapor sources and sealingly extending into the cavity, the vapor transport device including means for detaching or for sealingly attaching an organic material vapor source; **and**
d) a valve disposed in the vapor transport device which is effective in a closed position prior to detaching a vapor source and which is effective in an open position upon attaching the vapor source so that the reduced pressure in the chamber is maintained whenever one or more organic material vapor sources are detached from or attached to the vapor transport device."

IX. Claim 1 of the **first auxiliary request** for the Contracting States **FR and GB** reads as follows (amendments as compared to claim 1 of the main request are in bold with deletions in strikethrough; emphasis added by the Board):

"1. A thermal physical vapor deposition apparatus for vaporizing solid organic materials and applying vaporized organic materials as organic layer onto structure in a chamber at reduced pressure in forming a part of an organic light-emitting device (OLED), comprising:
a) an elongated vapor distributor disposed in the chamber and spaced from the structure, the vapor distributor defining an elongated cavity having a plurality of vapor efflux apertures formed along an elongated direction of the distributor for delivering vaporized organic materials in the space between the

distributor and the structure for depositing an organic layer onto the structure;
b) one or more detachable organic material vapor sources which are disposed outside of the chamber **and**, can be attached **and physically removed from the apparatus**, and when operative, to deliver vaporized organic materials into the cavity of the vapor distributor; and
c) a vapor transport device dedicated to each of the one or more organic material vapor sources and sealingly extending into the cavity, the vapor transport device including means for detaching or for sealingly attaching an organic material vapor source."

Claim 1 of the **first auxiliary request** for the Contracting State **DE** reads as follows (amendments as compared to claim 1 of the main request are in bold with deletions in strikethrough; emphasis added by the Rapporteur):

"1. A thermal physical vapor deposition apparatus for vaporizing solid organic materials and applying vaporized organic materials as organic layer onto structure in a chamber at reduced pressure in forming a part of an organic light-emitting device (OLED), comprising:
a) an elongated vapor distributor disposed in the chamber and spaced from the structure, the vapor distributor defining an elongated cavity having a plurality of vapor efflux apertures formed along an elongated direction of the distributor for delivering vaporized organic materials in the space between the distributor and the structure for depositing an organic layer onto the structure;
b) one or more detachable organic material vapor sources which are disposed outside of the chamber **and**,

can be attached **and physically removed from the apparatus**, and when operative, to deliver vaporized organic materials into the cavity of the vapor distributor;
c) a vapor transport device dedicated to each of the one or more organic material vapor sources and sealingly extending into the cavity, the vapor transport device including means for detaching or for sealingly attaching an organic material vapor source; and
d) a valve disposed in the vapor transport device which is effective in a closed position prior to detaching a vapor source and which is effective in an open position upon attaching the vapor source so that the reduced pressure in the chamber is maintained whenever one or more organic material vapor sources are detached from or attached to the vapor transport device."

X. Claim 1 of the **second auxiliary request** (corresponding to the patent as maintained) reads as follows (amendments as compared to claim 1 of the patent as granted are in bold; emphasis added by the Board):

"1. A thermal physical vapor deposition apparatus for vaporizing solid organic materials and applying vaporized organic materials as an organic layer onto structure in a chamber at reduced pressure in forming a part of an organic light-emitting device (OLED), comprising:

a) an elongated vapor distributor disposed in the chamber and spaced from the structure, the vapor distributor defining an elongated cavity having a plurality of vapor efflux apertures formed along an elongated direction of the distributor for delivering vaporized organic materials in the space between the

distributor and the structure for depositing an organic layer onto the structure;
b) one or more detachable organic material vapor sources which are disposed outside of the chamber and can be attached, and when operative, to deliver vaporized organic materials into the cavity of the vapor distributor; and
c) a vapor transport device dedicated to each of the one or more organic material vapor sources and sealingly extending into the cavity, the vapor transport device including means for detaching or for sealingly attaching an organic material vapor source,
wherein the means for detaching or for sealingly attaching an organic material vapor source from or to the vapor transport device includes:
i) a source support plate positioned across an outer bottom surface of the vapor source; and
ii) at least one source-retaining compression spring disposed between the support plate and a stationary support surface."

XI. The claims 1 of the third auxiliary request for the different Contracting States differ from those of the main request in that the "apparatus" claim was transformed into a "use" claim by the wording "**A** thermal physical vapor deposition apparatus ..." being amended to read "**Use of a ...**".

XII. Appellant I in the written proceedings submitted there was lack of inventive step for the features added to claim 1 of the second auxiliary request, in view of the two further documents (US-A-5 135 817 and JP-A-59-038379). In a further submission these features were seen as generally known. The main and first auxiliary requests were criticised for not being specific, for the apparatus, on the question what the

suitability "for vaporizing solid organic materials" had as effect on the apparatus itself.

XIII. Appellant II argued, insofar as relevant for the present decision, essentially as follows:

D3 is concerned with the continuous large scale production of solar cell systems (see column 1, lines 50 ff.). The PVD apparatus of D3 uses different materials and compositions and is not suitable for forming parts of OLED's. The OLED technology is expensive because it is a large area technology and includes several layers of different materials. The vaporized organic material decomposes on the way to the substrate and the vaporization temperature is different to that of inorganic materials as used in solar cells. D3 mentions temperatures of 1250-1450 °K for the vaporization of cadmium sulphide (see tables II and III) which is much higher than the temperatures necessary for organic materials.

The definition of the technical problem as held by the Board in point 9.1.1. of its communication already includes a pointer to the solution and is based on hind-sight. The problem to be solved is more general, namely the provision of an improved PVD apparatus with an improved deposition of an organic layer.

If the skilled person would start from D3 he would not know that he should modify the vapour source and there is no evidence on file that the vapour source could be made detachable/attachable.

It can be different if one realizes the problem, i.e. the cleaning/recharging of the vapor sources. The skilled person has also to realize that the PVD

apparatus of D3 has to be adapted to be suitable for forming OLED's. This results in a highly complex apparatus.

The additional features of claim 1 of the second auxiliary request allow that the detachable/attachable vapor sources can be more easily cleaned and replenished. The replenished vapor source is pressed by the source-retaining compression spring (which is disposed between the support plate and a stationary support surface) against the chamber when starting evacuating the same so that the vapor source is automatically attached to the apparatus. Therefore the problem can be defined as the provision of an improved PVD apparatus which can be more easily cleaned and be recharged faster.

There exists no evidence for such a fixing means and there exist in any case other means which do not provide these benefits and effects (see patent in suit, paragraphs [0034] and [0079]).

It should be admissible to file a new third auxiliary request based on the two claim versions of the main request but restricted to the use of the PVD apparatus. It was only realized during the discussion of inventive step at the oral proceedings that a further request might be necessary to properly deal with the issue of the suitability of the PVD apparatus for making OLED's. Since no new features have been introduced into the claims of the main request the case is not made more complex. The procedural economy is not negatively affected since no new case is created. There is no need to use D5 as the closest prior art since one could also start from D3. Therefore, the third auxiliary request should be admitted into the proceedings.

Reasons for the Decision

1. The statement of appellant I in its letter of 28 May 2014 - that it would not attend the oral proceedings (see point V above) - is considered by the Board as withdrawal of its auxiliary request for oral proceedings, as is constant jurisprudence (see Case Law of the Boards of Appeal, 7th edition 2013, III.C.2.3), appellant I relying on its written submissions only.

   Furthermore, although appellant I did not attend the oral proceedings, the principle of the right to be heard pursuant to Article 113(1) EPC is observed since it only affords the opportunity to be heard and, by absenting itself from the oral proceedings, a party gives up that opportunity (see the explanatory note to Article 15(3) RPBA cited in T 1704/06, not published in OJ EPO, see also the Case Law of the Boards of Appeal, 7th edition 2013, IV.E.4.2.3 c)).

2. *Admissibility of amendments (Article 123(2) EPC), Novelty (Article 54 EPC), Sufficiency of disclosure (Article 83 EPC)*

   Since the Board considers that the subject-matter of the claims 1 of the main request, the first and the second auxiliary requests in any case does not involve inventive step (see point 3 below) there is no need in this decision to deal with the question whether the amendments made therein comply with Articles 123(2) and (3) EPC, whether the subject-matter of the claims 1 of the main and the first auxiliary requests is actually novel over the PVD apparatus of D3 (Article 54 EPC); and whether the person skilled in the art is enabled to

carry out the invention of claim 1 of the second auxiliary request (Article 83 EPC).

3. Inventive step (Article 56 EPC)

Claim 1 of the first auxiliary request for the Contracting State DE

3.1 The Board comes to the conclusion that claim 1 of the most restricted first auxiliary request for the Contracting State DE which includes the features a) to d) (compared to the claims 1 of the main request which do not define the physical removability of the vapor sources and to claim 1 of the first auxiliary request for the Contracting States FR and GB which includes only features a) to c)) lacks inventive step over the teaching of D3 and the common general knowledge of the person skilled in the art, for the following reasons.

3.1.1 The subject-matter of claim 1 of the first auxiliary request for the Contracting State DE relates to a thermal PVD apparatus "**for** vaporizing solid **organic** materials and applying vaporized organic material as organic layer onto structure in a chamber at reduced pressure in forming part of an organic light-emitting device (OLED)", i.e. a PVD apparatus which is **suitable** for this purpose, and defines in feature b) "one or more detachable **organic material vapor sources** which are disposed outside of the chamber and can be attached and physically removed from the apparatus, and when operative, to deliver vaporized organic material into the cavity of the vapor distributor" (see point IX above).

For the above feature "organic material vapor sources" it needs to be established whether or not these vapor

sources actually include any organic material, or whether the feature can simply be read as "sources suitable for providing organic material vapor" (see Case Law of the Boards of Appeal, 7th edition 2013, section II.A.6.3). The former means that the claim is for the apparatus with the organic material, the latter is for the apparatus to be merely suitable of comprising the material.

3.1.2 The patent in suit discloses that a plurality of detachable **organic material vapor sources** can be charged with solid organic materials selected to provide vapors to a vapor distributor disposed in the chamber" (see paragraph [0014]). In the context of the description of the figures it mentions with respect to figure 4 that this apparatus has a plurality of detachable **organic material vapor sources** disposed outside of a chamber while in the context of the figures 7-12 the terms "vapor source", "detachable vapor source", "vapor source sealingly attached", "vapor source removed or detached", and "detached container" are used (see paragraph [0015]). The description of figure 4 uses the term "detachable vapor sources" 500VS1-500VS4 and mentions that they contain vaporizable organic material or that they can be charged with vaporizable organic materials that produce organic material vapors (see paragraphs [0026] to [0046]). Also in the context of figures 5 to 13 the term "vapor source" is used and it is stated that they are charged or filled with a solid organic material (see paragraphs [0050] to [0084).

3.1.3 Therefore, taking account of the above and also considering paragraph [0014] of the patent in suit the definition "detachable **organic material vapor sources**" used in feature b) of claim 1 in its broadest

interpretation corresponds to the "detachable **vapor sources**" described in the context of the figures. This implies a physically detachable chamber or container merely suitable **for** containing a solid organic material. This means that it, **when operative**, **can** deliver vaporized organic materials into the cavity of the vapor distributor but not necessarily that it **contains** a solid organic material.

3.2 Document D3 discloses a PVD apparatus comprising an elongated vapor distributor (= manifold 23), disposed in the vacuum chamber (29) and spaced a distance D from the substrate (27). Said vapor distributor (23) defines an elongated cavity having a plurality of vapor efflux apertures (26) formed along an elongated (the width) direction of the distributor for delivering vaporized materials into the space D between the distributor and the substrate (27) to deposit a layer on the substrate. The two evaporation chambers (10, 11) of the PVD apparatus are disposed outside of the vacuum chamber (29) and contain materials (12, 13) to be vaporized by heating with the heating sources (16, 17) and then to be delivered into the cavity of the vapor distributor (23). The apparatus comprises a conduit, i.e. "a vapor transport device" for each of the two materials sealingly extending into the cavity of the vapor distributor (23). These conduits comprise valves (20, 21) which allow to connect the evaporation chamber(s) (10, 11) to the manifold (23) by opening the valve; said chamber(s) can then be withdrawn from the system by closing the valve(s) and the source material can be replenished without braking vacuum in the coating chamber (see column 1, lines 13 to 17; column 2, lines 33 to 65; column 3, lines 8 to 25; and figure 1).

Thus D3 already discloses the need for replenishing the material to be vaporized in the evaporation chambers (= vapor sources) without breaking of the vacuum in the deposition chamber. The apparatus of figures 1 and 2 is stated to have removable closures to permit loading of the material into the chambers of these vapor sources (see column 2, lines 41 and 42).

3.2.1 The materials (12, 13) to be charged into the "vapor sources" 10, 11 disclosed in D3 are in particular cadmium sulfide or zinc cadmium sulfide (see column 2, lines 36 and 37) but include also others such as zinc phosphide and silicon oxide (SiO) (see column 6, lines 16 to 22). These material are **not** organic materials but only **inorganic** materials.

3.2.2 However, this cannot make a difference since the PVD apparatus and the evaporation chambers according to D3 are - as correctly held by the Opposition Division in point 3.3.3 of its decision - in any case considered to be **suitable for vaporizing organic material** due to the generally lower temperatures required for the vaporization of organic materials. Consequently, when solid organic material would be filled into the "vapor sources" 10, 11, these "vapor sources" of D3 would correspond to the "organic material vapor sources" of claim 1 of the first auxiliary request. The material would be thermally evaporated and then organic material vapor would be delivered to the substrate in the vacuum chamber and and an organic layer would be deposited on the same in the apparatus of D3.

3.2.3 D3 is therefore considered to represent the most promising starting point towards the claimed PVD apparatus *per se* (see Case Law of the Boards of Appeal, 7th edition 2013, section I.D.3.2).

3.3 Appellant II's arguments that the PVD apparatus of D3 would not be suitable for forming OLED's and that it would be up to appellant I to demonstrate this suitability. No corresponding evidence had been submitted. This **cannot** hold for the following reasons.

3.3.1 In the first place, it is appellant II who has to convince the Board that the patent in suit has been unduly restricted by the impugned decision. Since the Opposition Division held that the subject-matter of the claims 1 of the then main request lacks novelty over the PVD apparatus of D3, it considered that the apparatus of D3 is suitable for vaporizing organic material in forming OLED's. It is appellant II who has to show why the decision is wrong. This shifts the burden of proof onto appellant II who has not, however, submitted any evidence to prove what it alleges and thus to discharge it of this burden.

3.3.2 Furthermore, as derivable from table I of D3 the PVD apparatus is designed to deposit an inorganic film having a thickness of 10 µm or 4 µm, i.e. in the low micrometer range, on a large area substrate. Since the thickness of the deposited film is a function of the deposition time it is clear that by using the same PVD apparatus also thinner films in the sub-micrometer range can be deposited, thus also organic films in forming OLED's. The fact that D3 deposits the material on a continuously moving substrate is **not** considered to be relevant in this context since a moving substrate does not exclude the forming of an OLED. Furthermore, claim 1 of the first auxiliary request, due to its wording "comprising", does not exclude such an embodiment either.

3.3.3 Consequently, all further arguments of appellant II based on this alleged lack of suitability of the PVD apparatus of D3 for solid organic material for deposition cannot be accepted.

3.4 Claim 1 of the first auxiliary request for the Contracting State DE is thus distinguished from the PVD apparatus according to D3 only by the detachable organic material vapor sources which can be attached and **physically removed** from the apparatus.

3.5 From the Board's point of view the effect of this feature is a simplified cleaning/recharging of the vapor sources without breaking the vacuum in the deposition chamber (see patent in suit, paragraphs [0008] to [0010], [0072] and [0079]) and without causing any interruption of the deposition process.

This technical effect was accepted by appellant II.

3.6 In applying the problem-solution approach (see Case Law of the Boards of Appeal, 7th edition 2013, sections I.D.2 to I.D.6) the Board considers that the technical problem to be solved by the person skilled in the art, starting from the PVD apparatus of D3, is to improve the PVD apparatus in terms of simplified cleaning/ recharging of the vapor sources without breaking the vacuum in the deposition chamber and without interrupting the deposition process. Since this is entirely based on the objectively established effect of the difference (see above) there is no risk of hind-sight being involved. It also does not include pointers to the solution.

3.7 The claimed solution to this technical problem is obvious to the person skilled in the art. It is a well

known fact that in processes in which a material is consumed this material is provided in replenishable cartridges or containers which can substitute used-up cartridges/containers so that the process need not be interrupted during the time necessary to replenish the latter. Likewise a depleted vapor source can be easily changed and/or replaced within a short period of time by another already recharged vapor source so that the depleted vapor source can be easily refilled (and if necessary cleaned) remote from the deposition system while the replacement vapor source is immediately in use. Thus there is no need to wait in the running process until the depleted vapor source has cooled down to a specific temperature before recharging it.

Hence the subject-matter of claim 1 of the first auxiliary request for the Contracting State DE lacks inventive step starting from the apparatus of D3 and applying common general knowledge of the person skilled in the art.

3.8 Appellant II's arguments to the contrary cannot hold for the following reasons.

The solar cell technology of D3 is likewise a large area technology and the PVD apparatus shown in figures 1 and 2 would allow for the deposition of several layers of different material, like in forming OLED's, if the substrate would be moved several times through the vacuum chamber.

The fact that the temperatures for the vaporization of e.g. cadmium sulphide of 1250-1450 °K mentioned in D3 (see tables II and III) are higher than those necessary for organic materials actually shows that the PVD apparatus of D3 can be operated to vaporize organic

materials. If the organic materials would require higher temperatures than those mentioned, it would be different.

There is furthermore no hind-sight involved, since the motivation for the skilled person to modify the vapor sources comes from his intention to solve the aforementioned technical problem. Therefore the argument that the skilled person, when starting from D3, would not know that he should modify the vapour sources cannot hold either, since that is where the problem lies. The additional argument that there is no evidence on file that the vapour source could be made detachable/attachable is likewise not convincing since it belongs to the common general knowledge of the person skilled in the art that replenishable parts should be removably attached to the apparatus.

The arguments concerning the realization of the underlying problem, i.e. the necessity of cleaning/ recharging of the vapor sources, cannot hold either since D3 already mentions the problem of replenishing the vapor sources without interrupting the vacuum (see point 3.2 above).

Claims 1 of the first auxiliary request for the Contracting State FR, GB and of the main request

3.9 Since claim 1 of the first auxiliary request for the Contracting State DE - including the features a) to d) - is more limited in scope than claim 1 of the first auxiliary request for the Contracting States FR and GB (which contains only the identical features a) to c) of the former) and more limited than the corresponding claims 1 for the Contracting States FR and GB and for the Contracting State DE of the main request (the

latter do not require that the vapour sources can be physically removed (compare points VIII and IX above)) the above conclusions with respect to claim 1 of the first auxiliary request for the Contracting State DE apply *a fortiori* to the claims 1 of the mentioned other requests.

The Board therefore concludes that their subject-matter does not comply with the requirements of Article 56 EPC either. The first auxiliary request for the Contracting States FR and GB and the main request are thus also not allowable.

Claim 1 of the second auxiliary request

3.10 Claim 1 of the second auxiliary request - interpreted identically with the claims 1 of the first auxiliary request and the claims 1 of the main request in that the attachable/detachable organic material vapor sources can be attached and physically removed from the apparatus - is additionally distinguished from the PVD apparatus according to D3 by the additional features that the means for detaching or sealingly attaching said vapor sources from or to the vapor transport device include:

a source support plate positioned across an outer bottom surface of the vapor source, and at least one source-retaining compression spring disposed between the support plate and a stationary support surface (see point X above).

3.11 The effect of these features is that the vapor source is pressed upwardly by the source retaining compression springs with respect to a work base so that in this compressed condition they provide a sealing engagement

while in the uncompressed state the vapor source can be detached (see patent in suit, paragraphs [0070] and [0071]; figures 11A and 11B).

The additional features of claim 1 of the second auxiliary request thus allow that the detachable/ attachable vapor sources can be more easily cleaned and replenished (see patent in suit, paragraphs [0072] and [0079]; figures 11C and 12C).

3.12 Therefore the objective technical problem starting from the most promising springboard D3 (see points 3.2 to 3.2.3 above) is defined as the provision of an improved PVD apparatus in which the vapor sources can be more easily cleaned and be recharged faster.

3.13 The Board considers that the solution to this problem is obvious to the person skilled in the art for the following reasons.

3.13.1 It belongs to the common general knowledge of the person skilled in the art to choose one of the known fixing means for fixing and sealingly attaching the physically removable vapor sources to the vapor transport device.

3.13.2 Principally there exist two general possibilities for doing this, namely by:

i) "fixation from above", i.e fixing means which include a support plate to support the vapor source across an outer bottom surface thereof and which means are fixed onto the vapor transport device; the fixing means retain the vapor source via said support plate upwards against the vapor transport device to provide a sealing engagement therewith. The fixing means can be

mechanical (e.g. the simple standard bolt and nut fixing as in figure 12A of the patent or the alternative embodiment disclosed in the patent in suit which uses source-retaining tension springs; see paragraphs [0034] and [0035] and figure 4). The same could be achieved by electrically driven spindles or pneumatic/hydraulic piston rods, pulling the vapor devices upward.

ii) "fixation from below",i.e. fixing means which include a support plate to support the vapor source across an outer bottom surface thereof and which means are disposed between said support plate and a stationary support surface; the fixing means elevate the vapor source via said support plate upwards and press it against the vapor transport device to provide a sealing engagement therewith. The elevation of the support plate of such a fixing means can be mechanically driven, e.g. the commonly used scissor-type laboratory jack which can be placed below the vapor transport device and which mechanism allows easy height adjustment of the supporting plate and which provides the required pressing force for the sealing engagement. Alternatively, the scissor lift mechanism can be replaced by a compression spring having the necessary compression force to provide said sealing engagement as suggested by the patent in suit, or by electrically driven spindles or hydraulically or pneumatically driven piston rods. The Board considers that the possibilities mentioned are all known to the person skilled in the art.

3.13.3 The Board considers further that the person skilled in the art by applying his common general knowledge will choose among these possibilities the most appropriate

one according to the requirements and needs while also considering the costs thereof.

It is considered that starting from the apparatus of D3 there is in any case an incentive to choose the "fixation from below", as it is the simpler option of these two possibilities since it only requires elevating the support plate from a stationary support surface until the vapor source carried by the said plate is pressed against the vapor transport device and results in the required sealing engagement of the vapor source with the vapor transport device. This consideration applies in particular to the PVD apparatus of D3 where the vapor sources 10, 11 are arranged below the vapor transport device including the valves 20, 21 and vacuum deposition chamber 29 (see figure 1).

When considering the costs and the simplicity of such a fixing means from below the skilled person will choose a simple mechanical laboratory jack including compression springs which - since there are less mechanical elements to be manufactured - is cheaper than a scissor type laboratory jack. Thereby the person skilled in the art arrives at the subject-matter claimed without inventive skills.

3.13.4 Consequently, claim 1 of the second auxiliary request lacks inventive step (Article 56 EPC). The second auxiliary request is therefore not allowable.

3.14 Appellant II's arguments to the contrary cannot hold for the following reasons.

One of them is that there exist other fixing means which provide the same benefits and effects as are

derivable from the patent in suit (see patent in suit, paragraphs [0034] and [0079]).

This argument implies that the choice of compression springs is not a "one-way street" solution and therefore inventive. As can be derived from point 3.13.3 above, the Board is of the opinion that the solutions mentioned there, are all not based on inventive step. Choosing one of a plurality of non-inventive solutions cannot make such a solution inventive.

A further argument was like the compression spring of the patent in suit allows that the replenished vapor source is held against the vapor transport device by vacuum so that the vapor source, when starting to evacuate the same, is automatically sealingly attached to the vapor transport device of the apparatus. This cannot hold since the same benefit would also be obtained in case that the mechanically, pneumatically or electrically driven laboratory jack would be used.

The final argument is that there is no evidence for such a compression spring based fixing means. This cannot hold in view of what the Board considers to be the immediate solution that comes to the mind of the skilled person as given in point 3.13.3 above. Moreover, appellant II at the oral proceedings has not contested that the mentioned mechanical laboratory jacks belong to the common general knowledge of the skilled person.

4. Admittance into the proceedings of the third auxiliary request (Article 13(1) RPBA)

4.1 After the discussion on inventive step of the second auxiliary request had been finished and before the deliberation of the Board appellant II stated that it would like to file a third auxiliary request of which the claims should be directed to the **use** of the PVD apparatuses that are claimed in the two sets of claims of the main request.

When asked by the Board why it intended to file this request at this very late stage of the proceedings appellant II answered that it was only at that point in the oral proceedings that it realized that the patent cannot be defended on the basis of the apparatus claims.

The third auxiliary request (see point XI above) was then filed after the Board's deliberation on the second auxiliary request, i.e. after the Board had given its negative opinion on that request.

4.2 In the oral proceedings no new matter came up, which had not already been addressed in the preceding written appeal proceedings. In the opinion of the Board as set out in its communication annexed to the summons to oral proceedings, the Board had *inter alia* clearly expressed its opinion that the apparatus of D3 was suitable for applying vaporized organic materials and that its vapor sources were suitable to contain and vaporize solid organic materials. It also was of the opinion that for the discussion of inventive step with respect to the first auxiliary requests the apparatus of D3 could well serve as closest prior art, just as this applied to the second auxiliary request. The need to have a further

auxiliary request, directed to the use of the apparatus, i.e. subject-matter for which the argument that D3 provided no basis, nor would be considered a proper starting point to discuss inventive step, was therefore evident on receipt of the Board's communication, and not only as late as the oral proceedings.

The argument of appellant II at the appeal proceedings that the PVD apparatus of D3 would not be suitable for making OLED's (without providing any evidence for this allegation) or that D5 should be considered as the closest prior art for the discussion of inventive step, cannot help in this respect to provide an excuse for the late filing of this request.

That the Board need not change its opinion, even with new arguments, is an eventuality the appellant has to reckon with.

4.3 From Article 13(1) RPBA it is clear that amendments to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the Board's discretion, which shall be exercised in view of *inter alia* the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.

In the present case appellant II could have filed this third auxiliary request earlier in the written proceedings, as a response to the Board's communication, or even at the start of the proceedings, because also the impugned decision assumed the apparatus of D3 to be suitable for vaporizing organic material. There is therefore no excuse for the late filing.

4.4 Secondly, the change of an apparatus claim (i.e. a product) to a use claim (i.e. a method of using the PVD apparatus for making OLED's) according to the third auxiliary request results in a change of category of the claims. This entirely changes the subject-matter of the proceedings. It results in a complete re-start of the inventive step discussion, now possibly starting from D5. However, since the originally filed claims were not specifically directed to the particular aspect of the organic material the search not necessarily covered this aspect either. This applies also for the opposition, since the patent as granted neither put particular emphasis on this aspect. The current state as well as the subject of the proceedings would be completely revised by this third auxiliary request.

4.5 Considering the above the Board decided in accordance with Article 13(1) RPBA not to admit the third auxiliary request into the proceedings.

Order

For these reasons it is decided that:

1. The appeal of appellant II is dismissed.

2. The decision under appeal is set aside.

3. The patent is revoked.

The Registrar: The Chairman:

G. Nachtigall H. Meinders

Decision electronically authenticated