The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOSEPH K. MADATHIL,
PRANAB K. RAYCHAUDHURI
and CHING W. TANG

Appeal 2006-1260
Application 09/956,411
Technology Center 1700

Decided: January 11, 2007

Before BRADLEY R. GARRIS, CHUNG K. PAK, and
THOMAS A. WALTZ, *Administrative Patent Judges*.

GARRIS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on the appeal which involves claims 2, 7, 8, 13, 15 and 17-22, the only claims pending in this application. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 134.

We AFFIRM.

INTRODUCTION

Claim 17 is illustrative:

17. A method of making an OLED device, comprising the steps of:

(a) providing a substrate;

(b) forming an anode of conductive material over the substrate;

(c) depositing an emissive layer having an electroluminescent material provided over the anode layer;

(d) forming a buffer layer, provided over the emissive layer and comprising a heavy alkaline [sic, alkali[1]] metal halide; and

(e) sputtering a metal or metal alloy layer provided over the buffer layer.

The Examiner relies on the following prior art references to show anticipation and obviousness:

Hung	US 5,677,572	Oct. 14, 1997
Nakaya	EP 0 876 086 A2	Nov. 4, 1998
Chen	US 6,020,078	Feb. 1, 2000
Aziz	US 6,614,175 B2	Sep. 2, 2003

[1] Appellants disclose that the claimed "heavy alkaline metal halide" used to form the buffer layer is selected from the elements listed in Group IA of the periodic table that are heavier than lithium (Specification 9). These Group IA elements are conventionally referred to as alkali metals, not alkaline metals. However, Appellants refer to these Group IA containing compounds as heavy alkaline metal halides throughout the specification and the claims. By convention, the appropriate term would be heavy alkali metal halides. Thus, we shall refer to these compounds as heavy alkali metal halides in this opinion. This usage (i.e., alkali rather than alkaline) conforms with the usage in the reference to Hung.

The rejections as presented by the Examiner are as follows:

1. Claims 7, 8, 13, 15, 17 and 20-22 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Aziz.

2. Claims 2, 7, 13, 15, 17 and 20-22 stand rejected under 35 U.S.C § 103(a) as unpatentable over Hung.

3. Claims 18 and 19 stand rejected under 35 U.S.C § 103(a) as unpatentable over Hung, as applied to independent claim 17, in view of Nakaya.

4. Claim 8 stands rejected under 35 U.S.C § 103(a) as unpatentable over Hung in view of Chen.

We note that only the features of sole independent claim 17 have been argued in the Brief with respect to the rejections under 35 U.S.C. § 102(e) over Aziz and under 35 U.S.C § 103(a) over Hung alone. None of the dependent claims in these rejections has been separately argued in accordance with 37 C.F.R. § 41.37(c)(1)(vii)(September 13, 2004). As a consequence, in our disposition of these rejections, we select claim 17 as representative of the rejected claims. For the anticipatory rejection over Aziz, claims 7, 8, 13, 15, and 20-22 will stand or fall with claim 17. For the obviousness rejection over Hung alone, claims 2, 7, 13, 15, and 20-22 will stand or fall with claim 17. *See In re Young*, 927 F.2d 588, 590, 18 USPQ2d 1089, 1091 (Fed. Cir. 1991). With respect to the § 103(a) rejection based on Hung and Nakaya, we select claim 18 as representative of the rejected claims since Appellants do not specifically argue patentability of the limitations of the rejected claims.

We refer to the Brief and the Answer for a complete discussion of the opposing viewpoints expressed by the Appellants and by the Examiner concerning the above noted rejections.

OPINION

For the reasons set forth below, we cannot sustain the rejection of claims 7, 8, 13, 15, 17 and 20-22 under 35 U.S.C. § 102(e) over Aziz. For the reasons set forth in the answer and below, we sustain the rejections of claims 2, 7, 13, 15, 17 and 20-22 under 35 U.S.C. § 103(a) over Hung, of claims 18 and 19 under 35 U.S.C. § 103(a) over Hung and Nakaya, and of claim 8 under 35 U.S.C. § 103(a) over Hung and Chen.

ANTICIPATORY REJECTION OVER AZIZ

The Examiner rejected claim 17 and certain non-argued dependent claims under 35 U.S.C. § 102(e) as being anticipated by Aziz. According to the Examiner:

> Aziz et al. discloses forming organic light emitting devices comprising in the following order: a substrate, anode, hole transport region, mixed organic region, electron transport region, electron injection layer (27) and cathode (see Figure 2 and col. 11, lines 39-59). The mixed organic region is equivalent to applicant's [sic, applicants'] emissive layer. The electron injection layer (27) reads upon the instant buffer layer comprising a heavy alkaline [sic, alkali[2]] metal halide as Aziz discloses the electron injection layer comprises potassium chloride (see col. 11, line 56). [One of three disclosed] . . . preferred method[s] of forming the

[2] *See* footnote 1, *supra*.

> cathode is sputtering (see col. 21, lines 50-52).
> [Answer 3.]

Appellants argue that Aziz does not direct "a skilled artisan . . . to a process which forms a heavy alkaline [sic, alkali] metal [halide] layer before depositing a cathode using sputtering as the deposition method" (Br. 3). Appellants further argue that "[e]ven if the choice of deposition method were to be limited to those identified in Aziz as being 'preferred,' a skilled artisan still would have to select one of three very different deposition methods" (*id.*), and "[t]hen the artisan would have had to combine the use of sputtering as the cathode deposition method with a step of forming a buffer layer of a heavy alkaline [sic, alkali] metal [halide] layer before depositing the cathode" (*id.*). Appellants additionally argue that "[t]he general disclosure of Aziz . . . certainly does not direct the skilled artisan to this combination, and there also is no disclosure in the examples of a buffer layer of a heavy alkaline [sic, alkali] metal [halide] layer and the use of sputtering" (*id.*).

The Examiner responds that "Aziz . . . discloses sputtering as a preferred method for cathode deposition . . . with reasonable specificity for an anticipation rejection" (Answer para. bridging 6 and 7) and "heavy alkaline [sic, alkali] halide potassium chloride (KC1) with reasonable specificity to anticipate claim 17" (Answer 7). We do not agree with the Examiner's contentions. Here, we find that a considerable amount of picking, choosing, and combining within the disclosure of Aziz would be necessary in order to arrive to Appellants' claimed method. *See In re Arkley*, 455 F.2d 586, 589, 172 USPQ 524, 526 (CCPA 1972). As noted by Appellants, a person with ordinary skill in the art must "pick and choose"

sputtering as the deposition method from three different deposition methods (Br. 3). Moreover, to form an electron injection layer containing KCl corresponding to the claimed buffer layer, KCl must be selected from the large number of compounds listed in column 11, lines 52-60, of Aziz. Thus, we concur with Appellants that Aziz does not teach "the use of sputtering as the cathode deposition method with a step of forming a buffer layer of a heavy alkaline [sic, alkali] metal [halide] layer before depositing the cathode" with sufficient specificity to constitute anticipation within the meaning of § 102 (*id.*). Such picking and choosing may be entirely proper in a § 103 rejection, but it has no place in a § 102 rejection. *Arkley*, 455 F.2d at 589, 172 USPQ at 526.

Accordingly, we cannot sustain the rejection of independent claim 17 or non-argued dependent claims 7, 8, 13, 15, and 20-22 under 35 U.S.C. § 102(e) over Aziz.

OBVIOUSNESS REJECTION OVER HUNG

The Examiner rejected claim 17 and certain non-argued dependent claims under 35 U.S.C. § 103(a) as being unpatentable over Hung. According to the Examiner:

> Hung . . . discloses making organic optoelectronic devices comprising in order a glass substrate (21), indium tin oxide anode (23), and an emissive layer (25) comprised of Alq covered by a bi-layer comprising a non-conductive layer (27a) which may include potassium fluoride, rubidium fluoride, or cesium fluoride per the instant heavy alkaline [sic, alkali[3]] metal [halide] buffer layer (see figure 2, col. 2, lines 49-57 and col. 3, lines 14-21). . . .

[3] *See* footnote 1, *supra*.

> The electrode (13) is formed by a conventional means such as sputtering[, disclosed as one of four processes that can be used] (see col. 3, lines 11-13) per instant claim 17. [Answer 4.]

The Examiner concludes:

> It would have been obvious to one of ordinary skill in the art to have selected the method of sputtering for forming the cathode layer and have selected cesium fluoride, rubidium fluoride, or potassium fluoride as the non-conducting layer (per the buffer layer), because Hung . . . discloses sputtering as a suitable method and cesium fluoride, rubidium fluoride or potassium fluoride as non-conducting layer materials for an electroluminescent device. [*Id.*]

Appellants' arguments concerning Hung mirror the arguments raised regarding the anticipatory rejection over Aziz with respect to the selection of sputtering as the deposition method (Br. 5) and of depositing a heavy alkali metal halide non-conductive buffer layer before sputter depositing the cathode (*id.*). That is, Appellants are of the position that Hung would not have suggested to a skilled artisan a process which forms a heavy alkali metal halide, buffer layer and then deposits a cathode using sputtering as the deposition method.

We note that, unlike a rejection under § 102 where a disclosure must be sufficiently specific to direct one skilled in the art to the claimed invention without any need for picking and choosing, such picking and choosing is entirely proper in a § 103 rejection where an applicant is afforded an opportunity to rebut with objective evidence any inference of obviousness. *Arkley*, 455 F.2d at 589, 172 USPQ at 526.

We are unpersuaded by Appellants' argument that Hung would not have led a person with ordinary skill in the art to select a heavy alkali metal halide compound to form the buffer layer and to use sputtering to form the cathode. First, Hung teaches the advantages of using alkali metal fluorides (i.e., halides) for the non-conductive (buffer) layer in column 2, lines 11-14. While expressing a preference for lithium fluoride (col. 2, ll. 16-18), Hung clearly discloses other alkali metal fluorides (i.e., heavy alkali metal halides), including potassium fluoride, cesium fluoride and rubidium fluoride as desirable materials for the non-conductive (buffer) layer (col. 2, ll. 49-57; compare appealed dependent claim 2). Secondly, Hung teaches that "[e]lectrode 13 can be deposited by many conventional means, such as evaporation, sputtering, laser ablation and chemical vapor deposition" (col. 3, ll. 11-13). Thus, a prima facie case exists for concluding that Hung's disclosure would have suggested to one of ordinary skill in the art to select a heavy alkali metal halide, such as potassium fluoride, rubidium fluoride or cesium fluoride, to form the non-conductive buffer layer and to select sputtering as a method to deposit the cathode over the non-conductive buffer layer.

Appellants argue that "Hung . . . specifies deposition by thermal evaporation in all of the examples relating to OLED fabrication" (Br. para. bridging 6 and 7) and that "all of the examples of Hung . . . form the [buffer] layer . . . from a material that is outside appellant's [sic, Appellants'] claims" (Br. 6).

In response to Appellants' arguments, the Examiner contends that a "teaching outside of appellant's [sic, Appellants'] claims does not negate the teachings of a buffer layer and sputtered cathode layer that are with[in]

appellant's [sic, Appellants'] claims" (Answer 8). Regarding Hung's examples, "[t]he examiner notes that non-preferred embodiments can be indicative of obviousness . . . and a reference is not limited to working examples" (*id.*; emphasis deleted). The Examiner's position is well taken.

Contrary to the Appellants' belief, the mere fact that Hung embraces a number of embodiments which do not fall within the scope of appealed claim 17 does not forestall an obviousness conclusion with respect to those embodiments that do fall within the scope of appealed claim 17. Although the number of combinations in Hung may be extensive, an artisan with ordinary skill would have considered each of these embodiments as being obvious and effective in view of Hung's disclosure. *Merck & Co. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807, 10 USPQ2d 1843, 1846 (Fed. Cir. 1989).

Appellants also argue that "a skilled artisan would understand Hung's reference to sputtering to be a technique useful in the *semiconductor fabrication portion of Hung's invention, and not for OLED fabrication*. As noted, Hung . . . specifies deposition by thermal evaporation in all of the examples relating to OLED fabrication" (Br. para. bridging 6 and 7).

The Examiner responds that "Hung does not expressly lead one to believe that sputtering is not suitable for forming the cathode [for OLED fabrication]" (Answer 8). According to the Examiner: "Hung . . . states at col. 3, lines 11-13 that electrode (13) is formed by conventional means such as sputtering. Hung . . . further teaches an organic electroluminescent device is an application of the electrode structure (see col. 2, lines 28-29 and lines 15-23)" (*id.*).

Appellants have pointed to no disclosure of Hung that supports the argument under consideration. As noted by the Examiner, Hung has no express disclosure limiting the use of sputtering to depositing cathode layers for semiconductor (as opposed to OLED) fabrication. Thus, we agree with the Examiner that Hung is not limited as argued by Appellants.

Thus, a prima facie case exists for concluding that "[i]t would have been obvious to one of ordinary skill in the art to have selected the method of sputtering for forming the cathode layer and have selected cesium fluoride, rubidium fluoride, or potassium fluoride as the non-conducting layer (per the buffer layer)" for the reasons set forth by the Examiner (Answer 4).

Appellants have submitted an affidavit by Joseph K. Madathil under 37 C.F.R. § 1.132 for consideration (Br. 7). It is not entirely clear from the record how the affidavit relates to the rejection before us. It is not the function of the Board to ferret out particular evidence from the record, which might support Appellants' assertion of nonobviousness. *Compare In re Borkowski*, 505 F.2d 713, 719, 184 USPQ 29, 33 (CCPA 1974). Therefore, the § 1.132 affidavit will be considered only in the context of the Appellants' reliance on it as expressed in the Brief. According to Appellants' contention in the Brief, the affidavit shows that (1) Hung's preferred thicknesses (0.5 – 1.0 nm) for the buffer layer are "ineffective in reducing sputtering damage to the electron transport layer" (Br. 7) and (2) "LiF is relatively unsuitable as buffer layer to protect against sputter damage" (*id.*).

Regarding Hung's preferred thicknesses for the buffer layer, the Examiner notes that "Hung . . . actually discloses a larger thickness range,

0.3-5.0 nm, for the non-conducting . . . 'buffer layer' (see col. 3, lines 3-7)" (Answer 9). The Examiner also notes that "independent claim 17 does not require a specific thickness for the buffer layer" (*id.*).

Appellants disclose a buffer layer thickness "range of less than 10 nm but greater than 0 nm" and a preferred buffer layer thickness range "of less than 5 nm but greater than 0.5 nm" (Specification 10). Appellants disclose thickness ranges for the buffer layer encompass or substantially overlap the broad thickness range of from 0.3 to 5.0 and the preferred thickness range of 0.5 to 1.0 nm disclosed by Hung for the non-conducting buffer layer (col. 3, ll. 3-5). We also note that Appellants and Hung disclose the use of heavy alkali metal halides, such as potassium fluoride, rubidium fluoride and cesium fluoride, to form the non-conductive buffer layer (Specification para. bridging 9 and 10; col. 2, ll. 55-57). Since both Appellants and Hung disclose the same material and the same thickness, there is reason to believe that the non-conducting layer of Hung is effective to prevent at least some degree of sputter damage as disclosed by Appellants.

In a situation where, as here, the claimed and prior art products appear to be identical, the Patent and Trademark Office can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). Whether the rejection is based on "inherency" under 35 U.S.C. § 102, or on "prima facie obviousness" under 35 U.S.C. § 103, jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the inability of the Patent and Trademark Office to manufacture products or to obtain and compare prior art products. *Id*. On the record of this appeal, Appellants' § 1.132 affidavit contains no proof in

support of their argument that Hung's buffer layer thicknesses are "ineffective in reducing sputter damage" (Br. 7). It follows that this argument is unpersuasive.

Regarding the unsuitability of LiF "as buffer layer to protect against sputter damage" (*id.*), Hung discloses not only lithium fluoride but also expressly discloses the use of heavy alkali metal halides, potassium fluoride, rubidium fluoride or cesium fluoride, to form the non-conductive buffer layer in column 2, lines 49-57. (Answer 4). An obviousness conclusion is supported by the fact that Hung discloses a number of the same heavy alkali metal halides that Appellants disclose and claim as protecting against sputter damage. On the other hand, this conclusion is in no way undermined by the Brief and affidavit characterizations of LiF as unsuitable for protecting against sputter damage.

Thus, having considered all of the evidence proffered by the Examiner and Appellants, we find that the evidence of obviousness, on balance, outweighs the evidence of unobviousness. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). Hence, we agree with the Examiner that the subject matter defined by claim 17 would have been obvious to one of ordinary skill in the art in view of the applied prior art.

Accordingly, we affirm the Examiner's decision rejecting claim 17 and non-argued dependent claims 2, 7, 13, 15, and 20-22 under 35 U.S.C. § 103 over Hung.

OBVIOUSNESS REJECTION OVER HUNG IN VIEW OF NAKAYA

Claims 18 and 19 stand rejected under 35 U.S.C § 103(a) as unpatentable over Hung, as applied to independent claim 17, in view of Nakaya.

The Examiner relies on Nakaya to teach "cathodes comprising Mg, Zr, and aluminum formed from multiple targets using DC voltage applied across the EL device in a dry argon atmosphere" (Answer 5). According to the Examiner:

> It would have been obvious to one of ordinary skill in the art to have used and manufactured a cathode according to the teachings of Nakaya . . . for the Hung et al. device, because Nakaya . . . teaches such a cathode provides a device with improved luminance, efficiency, long service life, and high quality of display (see col. 4, lines 26-28). [*Id.*]

Appellants argue that "Nakaya . . . does not overcome the failure of Hung to suggest a use of a heavy alkaline [sic, alkali] metal halide buffer layer when sputtering is used for cathode deposition" (Br. 7). In addition, Appellants argue that the Examiner provides "no motivation or suggestion to combine the two references" (Br. 8) and that "[t]he two references suggest structures so contrary that their combination would appear inoperative" (*id.*).

The Examiner responds that "Nakaya . . ., is relied upon to teach a specific type of sputtering and commonly used targets in the art of electroluminescent device manufacturing" (Answer 9).

Nakaya generally explains the sputtering method in the process of making an electrode on an OLED (Abstract). Contrary to Appellants' argument, the Examiner expressly states the motivation or suggestion to combine the references as "[providing] a device with improved luminance,

efficiency, long service life, and high quality of display (see col. 4, lines 26-28)" (Answer 5). Based on the record before us, the Examiner's motivation seems reasonable. Since Appellants' argument does not expressly address the Examiner's discussion of motivation or suggestion, we agree with the Examiner's above conclusion of obviousness for the reasons given by the Examiner.

Accordingly, we sustain the Examiner's rejection of claims 18 and 19 under 35 U.S.C § 103(a) as unpatentable over Hung in view of Nakaya.

OBVIOUSNESS REJECTION OVER HUNG IN VIEW OF CHEN

Claim 8 stands rejected under 35 U.S.C § 103(a) as unpatentable over Hung in view of Chen.

The Examiner relies on Chen to teach "an EL device comprising a . . . luminescent layer consisting of a host material (such as Alq) doped with one or more components of fluorescent dyes to achieve highly efficient EL devices" (*id.*). Thus, the Examiner concludes that "[i]t would have been obvious to one of ordinary skill in the art to have used a doped Alq luminescent material in the Hung . . . device, because Chen teach such a doped luminescent material provides the benefit of improved light emission efficiency" (*id.*).

Appellants argue that "[t]here is no motivation to combine Hung . . . and Chen et al. to produce a protective buffer layer or a sputtered cathode" (Br. 8).

The Examiner responds that Chen "is relied upon to teach the common addition of dopants in a light emitting layer of an organic

electroluminescent device (OLED) [and that] [s]uch an addition provides the benefit of improved light emission and efficiency" (Answer 9).

Again, based on the record before us, the Examiner's motivation seems reasonable. Further, Appellants' argument does not expressly address the Examiner's discussion of motivation or suggestion for combining the Hung and Chen references. Thus, we again agree with the Examiner's above conclusion of obviousness for the reasons given by the Examiner.

Accordingly, we sustain the Examiner's rejection of claim 8 under 35 U.S.C § 103(a) as unpatentable over Hung in view of Chen.

CONCLUSION

In summary,

1. we have reversed the rejection of claims 7, 8, 13, 15, 17 and 20-22 under 35 U.S.C. § 102(e) as being anticipated by Aziz;
2. we have affirmed the rejection of claims 2, 7, 13, 15, 17 and 20-22 under 35 U.S.C § 103(a) as unpatentable over Hung;
3. we have affirmed the rejection of claims 18 and 19 under 35 U.S.C § 103(a) as unpatentable over Hung, as applied to independent claim 17, in view of Nakaya; and
4. we have affirmed the rejection of claim 8 under 35 U.S.C § 103(a) as unpatentable over Hung in view of Chen.

Since all claims under appeal are subject to sustained rejections, the decision of the Examiner rejecting all appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(2006).

AFFIRMED

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