

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BOE Technology Group Co., LTD.
Petitioner

v.

Optronic Sciences LLC
PO

Inter Partes Review No.: IPR2024-01131

U.S. Patent No. 7,226,801

**PETITIONER'S REPLY TO
PO'S RESPONSE TO
PETITION FOR INTER PARTES REVIEW OF U.S. PATENT 7,226,801**

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1004	Curriculum Vitae of Dr. Dean Neikirk
1005	U.S. Patent No. 7,538,488 (“Kwak”)
1006	Chinese Patent Publication CN 1538212A (“Zhang”)
1007	U.S. Patent No. 6,406,636 (“Vaganov”)
1008	U.S. Patent Publication 2003/0076452 (“Kim”)
1009	U.S. Patent No. 7,446,336 (“Yamazaki”)
1010	U.S. Patent Publication 2003/0209726 (“Shigeno”)
1011	U.S. Patent No. 7,786,496 (“Yamazaki 496”)
1012	U.S. Patent No. 6,147,722 (“Shimada 722”)
1013	U.S. Patent No. 5,907,376 (“Shimada 376”)
1014	U.S. Patent No. 6,734,935 (“Kim 935”)
1015	U.S. Patent No. 7,538,039 (“Sasagawa”)
1016	U.S. Patent No. 6,011,608 (“Tanaka”)
1017	U.S. Patent No. 7,342,619 (“Arakawa”)
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Patent Owner's Response (Paper 25, "POR") fails to rebut the Petition's (Paper 1, "Pet.") showing that claims 1-6 and 8-14 are unpatentable.

I. OVERVIEW OF THE PRIOR ART

A. PO Misconstrues the Identified Prior Art

1. Kwak

Patent Owner ("PO") rejects Kwak over unclaimed and non-existent limitations. Kwak does not disclose "an LCD design that results in a thicker, multi-layer LCD than the [sic] what the '801 patent teaches" because neither the '801 patent or Kwak require any specific thickness. POR at 7. PO incorrectly asserts—without any supporting citation—that the '801 patent teaches "improving the seal of an LCD *while limiting both the width and thickness.*" POR at 7 (emphasis added), 8 (same). Thus, the thickness of layers has no place in this analysis and should be given no weight.

PO is correct that Kwak "contemplates that increasing contact area may increase adhesive strength," but is incorrect to limit those teaches to only adjusting the depth of the opening. Kwak is also not "silent about the angles of its via holes." POR at 8. Rather Kwak's diagrams depict consistent angled openings in the organic layer. Kwak also teaches other "consideration[s] of design specifications" and parameters that would inherently impact the angle chosen for use in implementation. See EX1005, 10:34-36, 11:47-53.

2. Zhang

Zhang teaches improvements on conventional LCD panels, not “teaching away” from their use. POR at 9-10. Zhang teaches an improvement to the sealant region in both conventional LCD panels and conventional reflective LCD panels. EX1006 at 4. Figures 1A and 1B depict conventional LCD panels and Figures 2A and 2B depict conventional reflective LCD panels. These are not “embodiments” of the invention as PO contends, but rather examples of what existed in the prior art at the time. *See* POR at 62 (referring to these figures as “distinct embodiments”); *see also id.* (referring to a “separate ‘conventional’ embodiment”). Zhang found a way to improve the bonding strength of **both** types of LCD panels. *See* EX1006 at 6 (identifying issues in both conventional LCD panels “100” and conventional reflective LCD panels “200A and 200B”). PO is simply wrong that “Zhang improves sealing strength by using an inorganic material.” POR 11. Zhang teaches increasing the surface contact area to increase bonding strength. EX1006 at 9; POR at 11 (citing the same). The use of inorganic material would not be an improvement at least because those materials were already being used in the conventional prior art panels. Zhang does not teach away from or counsel against the use of the organic photoresist layers found in reflective LCD panels or the application of the invention of Zhang in the same. *See* POR at 61. A POSITA would have understood Zhang’s teachings to be an improvement to both types of

conventional LCD panels and thus would have understood the teachings of Zhang, including those depicted in Figures 3A-E and other figures, to be applicable to LCD panels comprising the organic photoresist layer found in reflective LCD panels.

3. Vaganov

PO argues that Vaganov is directed to “wafer-to-wafer bonding,” which is a “different problem than LCDs.” POR at 12. PO goes on to state that the techniques taught by Vaganov “are only effective on single crystal structures” and “would not work in Kwak and Zhang.” But PO does not identify which techniques it references, and its own expert testified to the contrary. Dr. Bretschneider admitted that Vaganov teaches using photolithography, a technique known for years before the ’801 patent, for etching organic material. EX1025 at 27:16-28:18, 74:12-20; *see also id.* 82:12-83:13 (explaining that photolithography processes for creating predetermined angled openings in an organic layer were known prior to the ’801 patent), 84:17-85:6 (same), 87-16-88:3 (same). 89:14-20; 215:2-17.

4. Kim

PO objects to the use of Kim as relevant prior art based solely on the basis that “[n]othing in Kim concerns sealing or adhesion.” POR at 14-15. This fact alone does not render the reference irrelevant. (*See II.B*). Specifically, Kim teaches techniques for creating openings in an organic layer having sidewalls with

a predetermined angle. Thus, the reference is relevant for the limited uses identified in the Petition.

5. Yamaki

Yamazaki is not limited to creating tapered edges on the organic layer in the sealant region only in scenarios when ion implantation is used. *See* POR at 15-16. Yamazaki teaches only that the tapered edge may or may not be used when certain forms of doping are applied. *See* POR at 16 (citing EX1009 at 5:45-49. Yamazaki does not teach away from using the relevant techniques in other scenarios.

B. PO Arbitrarily Limits the Scope of Analogous Art

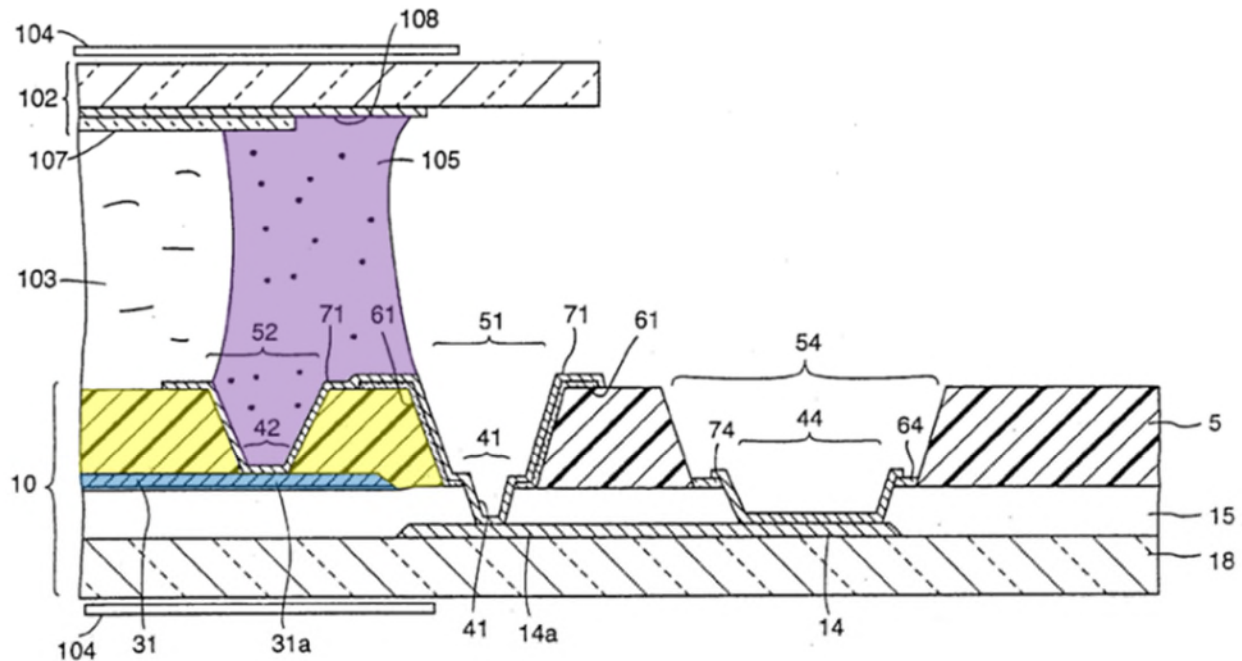
Throughout its response, PO improperly narrows the field of relevant and analogous art in an effort to exclude clearly relevant information from the state of the art and other prior art references. POR at 51 (“none of the Petition’s state of the art references are relevant”). For example, the POR argues that Yamazaki 496, Shimada 722, Shimada 376, and Kim 935 are directed to “reflecting light, not for sealing,” and thus their teachings may be ignored. *See* POR at 51. PO’s objections do not address or contest that these references disclose the elements for which they have been identified, namely teaching techniques relevant to creating a predetermined angle in an organic layer. Further, PO has already acknowledged that teachings that do not involve “sealing” may be relevant to the ’801 patent. PO argues that the ’801 patent is analogous to the *Toshiba* patent and its “reflecting

layer formed on [the] substrate” for claim construction, but similar disclosures referencing “reflecting light” are not. POR at 35. Likewise, the POR rejects certain prior art references as irrelevant for being related to semiconductor technology rather than LCD sealing, while simultaneously relying on semiconductor technology, such as building circuits and capacitors, and other non-sealing teachings to support its arguments for how a POSITA would construe the terms of the claims. POR at 23-27, 31-33. PO offers no explanation for these contradictions.

PO’s expert, Dr. Bretschneider, explained that these known methods would be relevant to a POSITA at least because a POSITA would seek to use existing processes, including photolithography. EX1025 at 116:4-18 (“Q: So a POSITA would use a known process to create the via holes? A: Yes.”), 117:21-118:12 (“a POSITA is going to look to a known process that’s already been verified to be suitable for etching a via”), 131:20-132:11, 135:2-9. He also offered no opinion regarding whether a prior art reference must mention or describe sealant or sealing regions to be relevant to the ’801 patent. EX1025 at 202:8-17.

The scope of analogous prior art is broader than PO’s limited interpretation and each prior art reference identified in the Petition is relevant to at least the concept of creating an opening in an organic layer with a predetermined angle. For example, PO asserts that “nowhere does Shinego disclose a sidewall for any organic film” and “the sidewall portion with the disclosed angle . . . does not even

have a sealant touching it.” POR at 17. PO is wrong on both accounts. Shigeno teaches “mak[ing] the inner wall slope of the lower contact hole[] . . . 42 . . . at an angle of about 45°” in “resin insulation film 5” comprising photoresistive type organic resins.” EX1010 at 0168, 0075.



PO’s discussion of maximizing contact area is inapposite. POR at 52-54. Kwak and Zhang already teach creating an opening with angled sidewalls. The other prior art references demonstrate that the angles of Kwak and Zhang could be created in a known ways that would result in a predetermined angle. Further, Dr. Bretschneider agreed that “the prior art references talk about [increasing bonding strength by increasing the surface area of contact],” despite having never applied those principles himself. EX1025 at 36:3-15.

II. CLAIM CONSTRUCTION

A. “Layer”

A POSITA reading the '801 patent would understand this term to mean “one or more material layers.” PO has already agreed to the above construction in the related district court litigation. EX1024 at 11 (“While Optronic does not believe BOE’s argument is consistent with the intrinsic evidence, to streamline proceedings, Optronic agrees to BOE’s proposed construction.”); *see* IPR2023-01274, Paper 27 at 14-15 (“[G]iven Petitioner’s agreement with PO’s construction in the district court, we see no reason to apply a different construction here simply because Petitioner proposed that construction prior to agreeing to the construction with PO in district court”); IPR2018-00315, Paper 35 at 12-13 (finding agreed construction in district court supports applying the same construction in the related IPR). In this proceeding PO advances a different, overly broad construction that ignores the plain language of the claims and specification, relies on irrelevant extrinsic evidence, and mischaracterizes the law.

PO ignores and rewrites the language of the related dependent claims to reach the flawed conclusion that “[n]one of the claims of the '801 Patent [sic] anything contrary to PO’s proposed construction.” POR at 25. Claims 4 and 12 recite a “predetermined material layer [that] **comprises** a passivation layer,” Claims 5 and 13 recite a “predetermined material layer [that] **comprises** a metal electrode

layer,” and claims 8 and 14 recite an “organic material layer [that] **comprises** polymethyl methacrylate (PMMA) or photosensitive-methylsilsequiazane (PS-MSZ). The claim language clarifies that the layers may comprise one or more material layers. PO ignores the “comprises” language without explanation and incorrectly asserts that these same claims allow for only a single layer. *See* POR at 26 (“Claim 4 (the predetermined material layer **is** a passivation layer) and 5 (the predetermined material layer **is** a metal electrode layer)”). PO arrives at this conclusion by introducing unclaimed limitations that allegedly restrict the claims to a “particular purpose” or “specific function.” *See* POR at 25, 26. But nothing in the claims supports such a reading; instead they recite the composition of the predetermined material layer and do not limit it to any one specific function.

Nowhere in the POR does the PO address the plain teachings of the specification that “the predetermined material layer may comprise a combination of passivation materials/layers and may further comprise (i.e., additionally comprise) a combination of metal materials/layers.” Paper 13, Petitioner’s Reply to Preliminary PO Response, at 1 (hereinafter “Reply to POPR”). PO cites to the same passages as Petitioner, but offers no rebuttal. *See* POR at 25. Like the dependent claims, PO ignores the ’801 patent’s explicit use of “comprise” to indicate that the predetermined material layer may include one or more material layers.

The PO relies on irrelevant and incorrect extrinsic evidence. Oddly, PO's analysis begins with reliance on Dr. Bretschneider's testimony regarding, not the language of the '801 patent, but rather the teachings of a third-party textbook and its teachings on building circuits and capacitors. POR at 23. At no point does PO explain the relevance of these materials and the teachings of the '801 patent or the meaning of the term "layer" in the context of the '801 patent. *See id.* at 23-24.

The testimony of experts in different proceedings opining on different patents identified by PO are not relevant the meaning of the terms within the '801 patent. PO admits that the expert testimony it relies on is "not specific to the '801 patent." POR at 26. The testimony is also not directed to the general or ordinary meaning of "layer" as PO contends. POR at 26-27. Instead, PO is relying on the discussion of teachings and embodiments specific to different, unrelated patents. *See id.*

PO's reliance on *AFG* contradicts itself. The POR states that "the Federal Circuit . . . affirmatively decided that materials of *different compositions* are different layers," but provides no citation for support. POR at 28. Instead, *AFG* stated that "the specification of the [patent] nowhere limits the term 'layer' to a deposit bounded by a material of a different chemical composition. We thus decline to include such a limitation in our construction of the term 'layer.'" *AFG Indus. v. Cardinal IG Co.*, 239 F.3d 1239, 1250 (Fed. Cir. 2001). Like the patent in

AFG, the '801 patent does not limit a layer to a single material, but rather teaches that a layer may contain multiple different materials. See '801 patent, 2:46-65.

Thus, *AFG* supports Petitioner's proposed construction that a layer may be one or more material layers, including layers of different types of material.

Petitioner's proposed construction aligns with the plain meaning of the intrinsic record and does not render the claim "meaningless" or "superfluous." POR at 28-29. PO's argument relies on the flawed assumption that a "layer" must be "one layer." POR at 28. Again, the '801 patent explains that the claimed "layer" may be one or more layers, such as a predetermined material layer comprising a passivation layer and a metal electrode layer.

Thus the term "layer" should be construed to mean "one or more material layers."

B. "formed on"

The term "formed on" should be giving its plain and ordinary meaning, including both directly formed on and indirectly formed on. PO's construction, "forming in a manner directly touching the below layer or substrate" (POR at 29), ignores portions of the intrinsic record, relies on irrelevant extrinsic evidence, and mischaracterizes the law.

The POR fails to address the parties' dispute. The parties agree that a layer directly on another layer would be "formed on" the underlying layer. The dispute

centers on whether formed on also includes layers indirectly formed on those below. Rather than address this, PO addresses a construction that Petitioner never advanced. *See* POR at 29 (“BOE’s apparent argument that ‘formed on’ should be read as formed ‘anywhere above’”). In doing so, PO focuses on non-limiting embodiments that are not in dispute, i.e., embodiments in which the layer is directly formed on the layer below and attempts to import those embodiments into the claims as limitations. POR at 30-31. But the POR is notably silent regarding other embodiments, such as those allowing for the predetermined material layer to comprise multiple different material layers. *See* ’801 patent at 2:46-65. PO offers no explanation or analysis addressing the ’801 patent’s teachings where at least one layer of a multi-layered layer does not directly contact the substrate or organic layer.

The testimony of experts in separate IPR proceedings confirms that the plain meaning of “formed on” includes both directly and indirectly formed on. The POR relies on incomplete testimony from Dr. Neikirk in a different proceeding, IPR2024-01315 (EX 2012), and ignores his testimony from the same explaining that “all of these layers are formed on the layers below. Some of them are formed directly on, and that’s . . . a narrower statement.” EX2012 at 90:20-91:13. Dr. Neikirk’s statements are consistent with Petitioner’s explanation of the plain and ordinary meaning. Likewise, the cited testimony of Dr. Baker merely confirms that

a layer directly in contact with the underlying layer is “formed on” that lower layer. See POR at 32-33. PO admits that Dr. Baker explained that “‘formed on’ could be construed as not directly touching . . .” POR at 33; *see also* EX2017, 176:1-11 (“I think ‘formed on’ could be directly or indirectly above something”); 177:3-16 (“ [formed on] doesn’t require that . . . something being formed on something else is directly touching”).

PO misunderstands the findings in *AFG* and *Toshiba*. In *AFG*, the Federal Circuit found that the patent disclosed layers and interlayers and “determined that the claim language and the specification permit the presence of interlayers between layers.” *See AFG Indus. v. Cardinal IG Co.*, 239 F.3d 1239, 1251 (Fed. Cir. 2001). Thus “‘formed on’ does not mean ‘directly in contact with.’” *Id.* Conversely, in *Toshiba*, the court found that “there is no language or figure in the [] patent that even hints at extra layers between the reflecting layer and the substrate.” *Toshiba Corp. v. Imation Corp.*, 2010 U.S. Dist. LEXIS 45653, at *27-28 (W.D. Wis. May 10, 2010). The court noted that Figure 16B relates to a specific embodiment without intervening layers and depicts “a disc according to ‘the present invention’” such that “it is appropriate to apply this description to the invention as a whole.” *Id.* at 27. The ’801 patent aligns with the facts in *AFG*. Like *AFG*, the ’801 patent describes multi-layer layers in which one layer may be formed on another layer without being directly touching it. Unlike Figure 16B from *Toshiba*, the ’801

patent figures are described as merely “embodiments of the present invention” rather than “the present invention.” See POR at 36 (comparing Fig. 2C from ’801 patent with Fig. 16B from *Toshiba*).

The plain and ordinary meaning of “formed on,” as explained by Petitioner, is not “meaningless.” POR at 36-37. The term “formed on” indicates an order, i.e., the underlying layer must exist for the layer to be formed on it. Simply claiming “a predetermined material layer” as PO suggests, would broaden the claim and allow for a number of alternative combinations and ordering of layers.

The term “formed on” should be given its plain and ordinary meaning including allowing for directly and indirectly formed on.

C. “predetermined angle”

Petitioner does not agree with any of PO’s various attempts to narrow the meaning of this term, and PO has not cited or identified support for its proposed limitations. Regardless, the prior art invalidates the Challenged Claims under both the plain and ordinary meaning of the term as well as PO’s narrower interpretation. See Petition at 3-4.

The parties agree that “predetermined angle” within claims 1 and 9 is not limited to any particular angle or range of angles. See POR at 38. These claims allow for angles greater than 60° that do not address the alleged problem or provide the benefits described in the ’801 patent specification. See *id.* at 2:37-40

(“Voids or bubbles 150 formed during application of the sealant 146 occur due to angle θ . . . exceeding 60 degrees.”), 3:27-30 (“With predetermined angle α , air exhausts easily via the tapered profile . . . during application of sealant, avoiding formation of voids or bubbles in the sealant”).

The disclosure of specific ranges of angles in the prior art identified in this petition demonstrates a predetermined angle. The prior art discloses predetermined angles with the same or greater specificity as the '801 patent. Claims 1 and 9 allow for any angle or range of angles so long as it is “predetermined,” but the patent does not provide guidance on this term’s meaning. A POSITA would understand similar levels of disclosure in the prior art to teach a predetermined angle.

III. INVALIDITY

A. Ground 1 – (Kwak § 102, Claim 9)

1. Kwak Discloses a Predetermined Angle

Kwak teaches the use of a predetermined angle in the sidewall of via hole 811. “Petitioner has indeed identified an angle,” but PO argues that “there is no disclosure that this angle is predetermined.” POR at 40. PO argues that “§ 102 is not met” due to the lack of “disclosure about **when** the angle was determined.” *Id.* (emphasis added). But the '801 patent has no such limitation and requires only that the determination of the angle before its creation. A POSITA implementing the teachings of Kwak—which teaches specific angles—would seek to adhere to the

teachings of the reference and would determine the angle or range of angles used in that implementation prior to creating the angle.

Kwak also teaches creating via hole 811 within specific parameters that define a predetermined angle. For example, “it is desirable for the cross-section of the via hole 811 to be smaller than that of the corresponding penetration hole 301.” *Id.*, 10:34-36. Thus, in addition to depicting angled sidewalls, Kwak also teaches increasing contact area via vertical or near vertical sidewalls and forming the angle under the constraints of the corresponding penetration hole.

2. Petition Is Unrebutted Under the Correct Claim Construction

PO advances arguments regarding limitations 9[b] and 9[c] under only its incorrect claim constructions for the “layer” and “formed on” terms. *See* POR, 41-49. Thus, under the correct constructions, the Petition stands unrebutted.

B. Ground 2 – (Kwak § 103, Claims 1-6, 8-14)

1. Petition Is Unrebutted Under the Correct Claim Construction

PO’s arguments regarding limitation 9[b] contain analysis only under its incorrect claim constructions for the “layer” and “formed on” terms. *See* POR, 49-50. Thus, under the correct constructions, the Petition stands unrebutted. PO also suggests that layers 120, 140, and 160 could not be combined because doing so would “eliminate driving power supply line 300,” but figures 3A and 3B depict the

supply line 300 separate from all three layers, and figures 2D and 4A show the layers formed around supply line 300 such that it need not be removed.

2. Kwak Renders Obvious the Predetermined Angle of 9[c]

PO forgets its earlier admission and claims under Ground 2 that “Kwak ***does not disclose any angles.***” POR at 51 (emphasis in original); *but see* POR at 40 (“Petitioner has indeed identified an angle”). Kwak discloses a predetermined angle. *See* III.A.1.

Kwak also renders obvious the use of a predetermined angle. The specification discloses an opening in an organic layer with a sidewall having a predetermined angle. Kwak does not identify any specific measurement for the angle. But, as Dr. Bretschneider acknowledged, a POSITA (in certain instances) would have found it desirable (and thus predetermined) to have sidewalls as vertical as possible (i.e., 90°). EX1025 98:20-99:15 (“A POSITA understood it’s desirable for the sidewalls of a via to be as close to vertical as possible”), 101:10-102:6. PO objects to the use of shallower angles based on maximizing surface area in a predefined space but does not account for other criteria a POSITA would consider in determining the appropriate angle. POR at 52 For example, maintaining layer continuity or preventing breaks or buildups in the sealant may cause a POSITA to use an angle less than 90° or shallower. Thus, Kwak renders obvious the use of a predetermined angle, including the claimed angle ranges.

C. Ground 3 – (Kwak-Vaganov § 103, Claims 2-3, 6, 10-11)

1. There Are No Deficiencies in Kwak for Vaganov to Cure

PO argues that Vaganov does not cure the fact that Kwak does not meet PO's constructions for "layer" and "formed on." POR at 55. These arguments should be rejected for the reasons above. *See* III.A.2, III.B.1.

2. There Is No Hindsight or Lack of Motivation to Combine

PO argues a POSITA would not combine Vaganov with Kwak. POR at 55-56. Vaganov is analogous prior art and teaches techniques relevant to use with Kwak. *See* I.A.3; *see also* I.A.4-5, I.B (teaching using analogous openings within the required ranges). A POSITA would have been motivated to combine Vaganov with Kwak to create openings having the claimed predetermined angles.

D. Ground 4 – (Kwak-Kim § 103, Claims 1-3, 6, 8, 10-11, 14)

1. There Are No Deficiencies in Kwak for Kim to Cure

PO argues that Kim does not cure the fact that Kwak does not meet PO's constructions for "layer" and "formed on." POR at 57. These arguments should be rejected for the reasons above. *See* III.A.2, III.B.1.

2. There Is No Hindsight or Lack of Motivation to Combine

PO does not dispute that Kim teaches the claimed layers like Kwak, or that Kim teaches the use of predetermined angles, including 45° angles. Instead, PO argues that Kim "is completely unconcerned with sealing" and is instead directed "to a contact structure for a semiconductor device." POR at 57-58. Kim is

analogous prior art and teaches techniques relevant to use with Kwak. *See* I.A.4; *see also* I.A.3, I.A.5, I.B (teaching using analogous openings within the required ranges). A POSITA would have been motivated to combine Kim with Kwak to create openings having the claimed predetermined angles.

E. Ground 5 – (Kwak-Yamazaki 336 § 103, Claims 2-3, 6, 10-11)

1. There Are No Deficiencies in Kwak for Yamazaki to Cure

PO argues that Yamazaki does not cure the fact that Kwak does not meet PO's constructions for "layer" and "formed on." POR at 58-59. These arguments should be rejected for the reasons above. *See* III.A.2, III.B.1.

2. There Is No Hindsight or Lack of Motivation to Combine

PO does not contest that Yamazaki teaches tapering or angling the edge of an organic layer in the sealant region. Instead, PO argues that Yamazaki is limited only to scenarios where the layer is doped. POR at 59-60. Yamazaki is not so limited. *See* I.A.5; *see also* I.A.3-4, I.B (teaching using analogous openings within the required ranges). A POSITA would have been motivated to combine Yamazaki with Kwak to create openings having the claimed predetermined angles.

F. Ground 6 – (Zhang § 103, Claims 1-6, 9-13)

1. PO Misreads and Misunderstands Petitioner's Positions Regarding Zhang

PO improperly truncates Dr. Neikirk's testimony to suggest he misunderstood Zhang to explicitly disclose an organic material layer when his

opinion relied on § 103. POR at 4, 61. PO included only the first sentence of Dr. Neikirk's response.

So given Zhang's teachings about the use of photoresist, yes, I believe there is sufficient teaching there. So this would be paragraphs 187 through 191. And ***this is in view of the POSITA's knowledge***, so it's still -- ***this ground, to be clear, is an obviousness ground, not an anticipation ground***. So as I've stated in paragraph 187, this does depend on the knowledge of one of ordinary skill looking at the entirety of these disclosures from Zhang, but ***Zhang does explicitly disclose the use of photoresist, and I believe one of ordinary skill would understand that to include the use of photoresist as part of layer 380a***.

EX2011 at 107:11-108:4 (emphasis added).

Petitioner and Dr. Neikirk did not assert "that 3B of Zhang already included an organic photoresist" as PO claims. POR at 61. Rather, Zhang teaches improvements to two types of LCD panels, one of which includes an organic photoresist layer, and a POSITA would have understood the teachings of Zhang to apply to both types of LCD panels regardless of whether the figures explicitly depict the photoresist layer when describing the teachings. See I.A.2. PO's attempt to frame this as a failed combination (POR at 63) misunderstands the most basic teachings of Zhang. The prior art figures are not embodiments, but rather Zhang describes improving on what already existed. Zhang does not disparage the use of organic layers but describes improving on sealant strength in the same. POR at 63. Thus, an organic photoresist layer would be included within Zhang's improved system when implemented in conventional reflective LCD panels.

2. Petitioner's Theory is Coherent and Consistent

Petitioner has consistently explained that the teachings of Zhang, when implemented in a conventional reflective LCD, render the '801 patent claims obvious. When describing the initial layers, Petitioner identified the relevant layers in Figures 3A-E and cited to the prior art figures which include similarly numbered layers that correspond to those in figures 1A-B and 2A-B. Later, when discussing the organic material pattern layer in claim 9[c], Petitioner explained that the layers depicted in Figures 3A-E, when implemented in conventional reflective LCDs, would include the organic photoresist layer shown in Figures 2A-B.

Rather than address Petitioner's positions as written, PO has resorted to attacking arguments and combinations that Petitioner has not raised. POR at 66 (suggesting replacing the layers of Figure 2B with the layers of 3A-E such that the photoresist layer is removed). PO's perceived incoherencies are of its own making.

3. PO's "Motivation to Swap" Is Irrelevant

PO's search for "a motivation to swap the inorganic layer over a conventional organic layer (or vice versa)" has no basis in Petitioner's arguments. POR at 67-68. The Petition, which the POR cites, explains that a POSITA would have understood the teachings of Zhang to apply to conventional reflective LCD panels. POR at 67 (citing Petition at 59-60). No swapping is needed. PO's misunderstanding appears to derive from its incorrect understanding that Zhang

teaches away from using an organic layer. POR at 68. Zhang teaches an organic layer because it teaches improving conventional reflective LCD panels that include an organic photoresist layer. Zhang teaches increasing sealing strength by increasing the surface contact area for sealant, not via the inclusion or exclusion of an organic layer, as PO suggests.

4. Zhang Does Not Teach Away From Organic Layers

Zhang does not disparage or teach away from implementing its teachings in conventional reflective LCD panels comprising organic photoresist layers. See POR at 68-69. Zhang discusses two types of conventional LCD panels and finds both lacking. EX1006 at 7. Thus, Zhang's solution of increasing surface area to increase sealant strength would apply to both. The patent need not explicitly mention the organic layer of conventional reflective LCD panels for a POSITA to have understood it could be included in the implementation of the invention.

5. PO Relies on Incorrect Claim Constructions

PO also argues that Zhang fails to disclose certain limitations under its construction of "layer" and "formed on." POR at 69-71. PO's constructions are incorrect, and these arguments should be rejected for the reasons above. See II.A and II.B.

6. The Other Contested Claims are Obvious in View of Zhang

PO does not contest that Zhang discloses a predetermined angle for claim 9 and thus also claim 1. Because PO does not contest the angle of claim 1, it also

does not contest that Zhang discloses the predetermined angles in claims 2 through 6. See POR at 72 (explaining “claim 2-6 depend from claim 1 and are not obvious for the same reasons”). PO offers no new arguments for dependent claims 12 and 13, and those claims are rendered obvious for the same reasons above.

The parties dispute whether Zhang renders obvious Claims 10 and 11 in view of the prior art. PO does not dispute that Zhang discloses a predetermined angle or that the prior art references disclose forming an angle in the organic layer having a predetermined angle within the claimed ranges. PO argues only that the “none of the references Petitioner has identified are for sealing.” POR at 71-72. The identified prior art references all disclose analogous art that a POSITA would have looked to when attempting to implement the predetermined angled opening in the organic layer of Zhang. See I.A.3-5, I.B. Vaganov teaches increasing bond strength by increasing contact area and using etching techniques, such as photolithography. See I.A.3. Kim teaches creating a predetermined angle in an organic layer. See I.A.4. Yamazaki discloses a tapered edge with a predetermined angle in an organic layer in a sealant region. See I.A.5. Shinego teaches a 45° angle in an organic layer in the sealant region. See I.B. Yamazaki 496, Shimada 376, Shimada 722, Kim 935, and Tanaka all disclose creating a predetermined angled opening in an organic layer. *Id.* Thus, PO’s only objection to claims 10 and 11 under Ground 6, the alleged lack of analogous art, fails.

G. Ground 7 – (Zhang-Vaganov § 103, Claims 2-3, 6, 10-11)

1. There Are No Deficiencies in Zhang for Vaganov to Cure

PO argues that Vaganov does not cure the fact that Zhang does not “disclose or render obvious using an organic layer. POR at 72. Zhang discloses renders obvious the use of an organic layer in the invention depicted in Figures of 3A-3E when applied to the conventional reflective LCD panels of Figures 2A-B. See III.F.1-4.

2. There Is No Hindsight or Lack of Motivation to Combine

PO does not contest that Vaganov discloses the predetermined angles recited in the claims but rather argues that a POSITA would not combine Vaganov with Zhang because the former “cannot be used on an organic layer.” POR at 73. But Vaganov is not limited to techniques that “require a single crystalline structure,” as PO contends. *Id.*; see I.A.3. PO’s expert acknowledged that Vaganov discloses the use of photolithography when creating the micro-profiling and that photolithography may be used to create patterns in organic layers. EX1025 at 28:9-18 (“Vaganov in many cases talks about masking, and masking is referring to a photolithography process”), 28:2-5. Even more, Dr. Bretschneider agreed that both Vaganov and Zhang teach increasing bonding strength by increasing the surface area for contact, supporting Petitioner’s position regarding motivations to combine. See EX1025 at 40:2-13.

The other claims of Ground 7 are obvious over the combination of Zhang with Vaganov for the same reasons above. *See* III.F. 6.

H. Ground 8 – (Zhang-Yamazaki § 103, Claims 2-3, 6, 10-11)

1. There Are No Deficiencies in Zhang for Yamazaki to Cure

PO argues that Yamazaki does not cure the fact that Zhang does not “disclose or render obvious using an organic layer. POR at 72. Zhang discloses and renders obvious the use of an organic layer in the invention depicted in Figures of 3A-3E when applied to the conventional reflective LCD panels of Figures 2A-B. *See* III.F.1-4.

2. There Is No Hindsight or Lack of Motivation to Combine

PO does not contest that Yamazaki teaches the claimed predetermined angles but rather argues a POSITA would not combine Zhang with Yamazaki, which is limited to scenarios in which the layer is doped. POR at 73-74. Yamazaki is not so limited. *See* I.A.5. Yamazaki teaches that the side surface of the organic layer “*can* be modified” without a tapered edge in certain circumstances, not that it must. EX1009 at 5:45-49. Nothing in Yamazaki prevents or teaches away from creating a predetermined angle in the sidewall of an organic layer in the sealant region in other scenarios.

The other claims of Ground 8 are obvious over the combination of Zhang with Yamazaki for the same reasons above. *See* III.G.6.

IV. CONCLUSION

For the reasons stated above and in the Petition, all Challenged Claims of the '801 patent should be found unpatentable.

Date: August 1, 2025

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner certifies that this reply includes 5,600 words, as measured by Microsoft Word, exclusive of the table of contents, mandatory notices under § 42.8, certificates of service, word count, claim listing, and exhibits.

Date: August 1, 2025

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CERTIFICATE OF SERVICE

The undersigned certifies that on August 1, 2025, a true and correct copy of the Petitioner's Reply was served by emailing a copy of same (by agreement) to the following attorneys for the PO:

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