

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG DISPLAY CO., LTD.
Petitioner,

v.

PICTIVA DISPLAYS INTERNATIONAL LTD.,
Patent Owner.

Case No. IPR2024-01223
Patent No. 6,949,389

PATENT OWNER SUR-REPLY

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EXHIBIT LIST

Exhibit No.	Document Description
EX2001	Pre-Institution Declaration of Mr. Kurt Humphrey
EX2002	Declaration of Dr. E. Fred Schubert on behalf of Samsung Electronics Co., Ltd. et al. in <i>Pictiva Displays Int'l Ltd. v. Samsung Electronics Co. Ltd.</i> , et al., Case No. 2:23-cv-000495 (Nov. 12, 2024)
EX2003	Samsung's Notice of Corrected Exhibit B to Joint P.R. 4-3 Statement in <i>Pictiva Displays Int'l Ltd. v. Samsung Electronics Co. Ltd.</i> , et al., Case No. 2:23-cv-000495, Dkt. 110 & 110-1 (E.D. Tex. Nov. 13, 2024)
EX2004	Samsung's Proposed Claim Constructions for the Terms and Phrases Identified for Construction per Local Rule 4-2 in <i>Pictiva Displays Int'l Ltd. v. Samsung Electronics Co. Ltd.</i> , et al., Case No. 2:23-cv-000495 (E.D. Tex. Oct. 22, 2024)
EX2005	Thermal Conductivity tables, downloaded from hyperphysics.phy-astr.gsu.edu/hbase/Tables/thren.html (last visited Dec. 11, 2024), referencing Chapter 15 of Young, Hugh D., University Physics, 7th Ed., Addison Wesley, 1992.
EX2006	Thermal conductivities of common solids, liquids and gases, from https://www.engineeringtoolbox.com/thermal-conductivity-d_429.html (last visited Dec. 11, 2024)
EX2007	Ekaterina Selzneva et al., <i>Strong Suppression of Thermal Conductivity in the Presence of Long Terminal Alkyl Chains in Low-Disorder Molecular Semiconductors</i> , Advanced Materials 33, 2008708 (2021)
EX2008-EX2013	omitted
EX2014	Docket Control Order in <i>Pictiva Displays Int'l Ltd. v. Samsung Electronics Co. Ltd.</i> , et al., Case No. 2:23-cv-000495, Dkt. 40 (E.D. Tex. Apr. 17, 2024)
EX2015	Federal Court Management Statistics for U.S. District Courts, available from https://www.uscourts.gov/statistics/table/na/federal-court-management-statistics/2024/06/30-1

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EX2016	Samsung Invalidity Contentions in <i>Pictiva Displays Int'l Ltd. v. Samsung Electronics Co. Ltd., et al.</i> , Case No. 2:23-cv-000495 (E.D. Tex. Jun. 11, 2024)
EX2017	<i>Sotera</i> Stipulation
EX2018	Declaration of Mr. Kurt Humphrey in Support of POR
EX2019	Markman Hearing Transcript in companion district court case, <i>Pictiva Displays Int'l Ltd. v. Samsung Electronics Co. Ltd., et al.</i> , Case No. 2:23-cv-000495 (E.D. Tex. Feb. 4, 2024)
EX2020	2025-05-30 Deposition Transcript of Dr. Vivek Subramanian
EX2021	2025-05-31 Deposition Transcript of Dr. Vivek Subramanian
EX2022	U.S. Patent No. 6,590,157 to Boroson et al.
EX2023	Steven Molesa et al., “High-quality inkjet-printed multilevel interconnects and inductive components on plastic for ultra-low-cost RFID applications,” <i>Mat. Res. Soc. Symp. Proc. Vol. 769, H.8.3.1-H8.3.6</i> (2003)
EX2024	Jin-Seong Park et al., “Thin film encapsulation for flexible AM-OLED: a review,” <i>Semicond. Sci. Technol.</i> 26, 034001 (2011)
EX2025	Daniel Huang et al., “Plastic-Compatible Low Resistance Printable Gold Nanoparticle Conductors for Flexible Electronics,” <i>Journal of The Electrochemical Society</i> , 150 (7), G412-G417 (2003)
EX2026	Wenbo Zhou et al., “Experimental Study on Viscosity of Colloidal Silica in Aqueous Electrolytic Solutions,” <i>Journal of Dispersion Science and Technology</i> , 29:842-847 (2008)
EX2027	Junhui He et al., “Preparation of Porous and Nonporous Silica Nanofilms from Aqueous Sodium Silicate,” <i>Chem. Mater.</i> , 2003, 15, 3308-3313 (2003)
EX2028	Kyoung-Min Kim et al., “Surface treatment of silica nanoparticles for stable and charge-controlled colloidal silica,” <i>International Journal of Nanomedicine</i> 2014:9 (Suppl 2) 29–40 (2014)
EX2029	389 Invention Disclosures for IPR2024-01223

Exhibit No.	Document Description
EX2030	Lorenza Moro et al, “Large-Scale Manufacturing of Polymer Planarization Layer,” informationdisplay.org, 10-15 (March/April 2021), available from https://sid.onlinelibrary.wiley.com/doi/epdf/10.1002/msid.1194 (last visited Jun. 20, 2025)
EX2031	[Under Seal], Deposition Transcript of Dr. Homer Antoniadis in <i>Pictiva Displays Int’l Ltd. v. Samsung Electronics Co. Ltd., et al.</i> , Case No. 2:23-cv-000495 (E.D. Tex. Jun. 4, 2025)
EX2032	Deposition Exhibit 5 to Dr. Antoniadis’s deposition, Final Technical Progress Report Polymer OLED White Light Development Program – (#DE-FC26-04NT41947)
EX2033	reserved
EX2034	Jeff Hebb of Kateeva, “Advanced Inkjet Printing: Enabling the OLED Revolution” (Sept. 28, 2017), available from https://nccavs-usergroups.avs.org/wp-content/uploads/TFUG2017/TFUG917-3-Hebb.pdf (last visited June 15, 2025)
EX2035	Roll to Roll (R2R) Processing Technology Assessment, Pre-decision draft, available from Available from https://www.energy.gov/sites/prod/files/2015/02/f19/QTR%20Ch8%20-%20Roll%20To%20Roll%20Processing%20TA%20Feb-13-2015.pdf (last visited June 15, 2025)
EX2036	Chandra Kant et al., “Large area inkjet-printed OLED fabrication with solution-processed TADF ink,” nature communications (2023)
EX2037	P.E. Burrows et al., “Gas Permeation and Lifetime Tests on Polymer-Based Barrier Coatings,” Proceedings of SPIE Vol. 4105, 75-83 (2001)
EX2038	Screenshot of https://global.samsungdisplay.com/31159 , “[Learn Display] 100. Inkjet Printing” by Samsung Display
EX2039	[Under Seal] Pictiva 80x48 display product specification
EX2040	U.S. Patent No. 6,605,483 to Add-Vision, Inc.
EX2041	U.S. Patent No. 7,115,216 to Add-Vision, Inc.

Exhibit No.	Document Description
EX2042	U.S. Patent Application Publication No. 2008/000889 to 3M
EX2043	Patrick Stark et al., “OLED – Evaluation and clarification of the new Organic Light Emitting Display technology,” Department of Science and Technology, Linkopng University, Sweden (Mar. 11, 2002), available from https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A18218&dswid=4057 .
EX2044	U.S. Patent No. 6,337,222 to Shimoda
EX2045	Screenshot of https://kateeva.com/solutions/technology/why-inkjet/ (last visited June 20, 205)
EX2046	Declaration of Mr. Kurt Humphrey in Support of IPR2024-01222 POR
EX2047	Memorandum Claim Construction Opinion and Order in Pictiva Displays International Ltd. V. Samsung Electronics Co., Ltd., 2:23-cv- 495 (E.D. Tex. June 27, 2025)
EX2048	Reserved
EX2049	2025-10-30 Deposition Transcript of Dr. Vivek Subramanian
EX2050	2025-10-31 Deposition Transcript of Dr. Vivek Subramanian
EX2100	Conor Madigan, “Inkjet Technology for OLED SSL Mass Production,” (Jan. 28, 2015), available from https://energy.gov/sites/prod/files/2015/02/f19/brown-madigan_inkjet_sanfrancisco2015.pdf .

I. Claim Construction of “Planarization Layer”

Long before its pre-institution reply in January 2025 (Paper 9), Samsung proposed a construction for “planarization layer” that became the basis of the construction adopted by the district court. *See* EX2004; EX2047, 18-19, 49. Petitioner did not inform the Board of this fact and took advantage of an institution decision that endorsed a claim construction inconsistent with its position before the district court. D.I., 9-10; *see also* EX2020_2025-05-30-Final, 10:3-11:21, 18:4-18 (Subramanian interpreted “planarization layer” as “a layer that increases the planarity of the surface”); EX2049_2025-10-30-Final, 14:9-15:6, 28:11-17 (confirming that he did not apply the district court’s construction but what he argued to be “plain and ordinary meaning”: “I used the plain and ordinary meaning [and] I think that was appropriate.”).

Petitioner continues to resist the court’s construction in this proceeding (Reply 1), even though the district court found that “[t]he intrinsic record supports [Samsung’s proposed] construction” (EX2047, 18-19; POR, 10-13). That is improper. *See Revvo Technologies, Inc. v. Cerebrum Sensor Technologies, Inc.*, IPR2025-00632, Paper 20 (Squires November 3, 2025) (precedential) (vacating institution decisions where the petitioner took different claim construction position before the PTAB and the district court). This continued gamesmanship and non-

compliance with the rules undermine the Office’s goal of “providing greater predictability and certainty in the patent system.” *Id.*, 4-5.

On the merits, because the Petition has neither explained why Samsung took inconsistent positions, nor specified where the limitations are found in the prior art under both proposed constructions, it is fatally defective. That deficiency cannot be cured by untimely arguments raised for the first time in the Reply when the statute and USPTO rules require them to be in the Petition. *See* 35 U.S.C. §312(a)(4); 37 C.F.R. §42.104(b)(3)-(4).

Moreover, the construction of “planarization layer” requires “a layer of material that planarizes” for two distinct functions. *First*, the planarization interrupts “the propagation of defects from one layer to another layer.” *Second*, the planarization results in “the topography of the underlying layer” not being reproduced.¹ As noted in the POR, Samsung expressly argued for these two planarization prongs during the Markman hearing. EX2019, 36:24-37:16, 38:13-19; POR, 13-14. Moreover, the experts in this IPR agree that the court’s construction requires that both planarization prongs be satisfied. *See* EX2049_2025-10-30-Final, 32:1-4 (“In order to be a planarization layer, you have to satisfy both prongs.”), 31:10-16; *see also* EX2018, ¶¶24-25 (Mr. Humphrey applying the agreed-to

¹ The POR refers to these ‘planarization prongs’ as 2A and 2B.

construction, adopted by the court, because it is consistent with the specification and prosecution history).

Petitioner does not argue that the construction is incorrect, and indeed Petitioner's expert, Dr. Subramanian, agrees that the construction is "certainly a reasonable construction." EX2049_2025-10-30-Final, 27:12-28:1; EX2020_2025-05-30-Final, 212:9-213:9 (same). As such, the Board should adopt the same construction, which is supported by the intrinsic evidence, in order to avoid inconsistent outcome (especially given that the '389 patent expired in 2022).

II. Petitioner Has Not Established That the Proposed Combination Includes the Recited "Planarization Layer" (All Grounds)

All grounds rely on Suzuki's organic barrier layer 20 being added to Kijima's device allegedly as a "planarization layer." However, the Petition failed to establish that the Suzuki's organic barrier layer 20, in the combination with Kijima, comprises the recited "planarization layer" for the reasons set forth in the POR. *See* POR, 16-21. Now, in its Reply, Petitioner advances two reasons as to why Suzuki's organic barrier layer may allegedly satisfy the recited "planarization layer" under the agreed-to claim construction. **First**, Petitioner conflates the two planarization prongs of the "planarization layer" in its *application* of the construction, relying on Suzuki's disclosure of defects being smoothed out to satisfy both planarization prongs. Reply,

6. ***Second***, Petitioner alleges that Suzuki’s “rounded corners” show the underlying topology is not reproduced. Reply, 7-8.

But, as a procedural matter, the Board should disregard these new arguments because, under § 312(a)(4) and Rule 104(b)(3)-(4), Petitioner should have explained why it took different constructions and how the prior art renders obvious the claims under its district court constructions. *See Revvo*. These reply arguments are therefore improper attempts to backfill the gaps in the Petition. In any event, as described below, neither reason is correct and therefore the challenge fails.

A. Petitioner Relies on an Improper Application of the Claim Construction for ‘Planarization Layer’

In an apparent attempt to address the agreed-to construction, the Reply argues that “Suzuki’s organic barrier layer 20 is a planarization layer under the district court construction, because it smooths out the irregular surface beneath it, thereby not following the underlying topography, and it covers defects, thereby preventing defects from propagating.” Reply, 6; EX1033, ¶¶11-12 (same). However, that apparent *application* of the construction deviates significantly from its plain reading, as well as Samsung’s extensive arguments in the district court. Specifically, rather than treating the two planarization prongs as distinct requirements, Petitioner’s Reply argument attempts to sweep both prongs under a single umbrella. Petitioner’s argument is essentially that, simply by smoothing out an irregular surface, Suzuki’s

organic barrier layer 20 necessarily prevents defect propagation **and** does not follow the underlying topology. But the only ‘smoothing’ mentioned in Suzuki is in connection with covering “**defects**” on an otherwise “irregular surface” to ensure formation of a layer which is “**substantially defect-free**.” EX1012-Suzuki, 5:59-67.² However, covering defects, in and of itself, says nothing of whether or not the topology of the underlying layer has been reproduced, as required under the second planarization prong which, according to Samsung’s counsel, was to obtain a “substantially smoother surface” and prevent “folds and creases” of the underlying OLED structures from being replicated in the barrier layer. EX2019, 38:13-20, 36:13-23.

Moreover, the experts agree that surfaces can have unintentional defects, which are distinct from the intentional topology of a surface. For example, Dr. Subramanian testified that a surface can have an “*intentional* topography or topographical variations,” such as “steps in the layer that are a consequence of previous deposition and/or etch process steps.” EX2049_2025-10-30-Final, 19:14-22, 20:19-21:1. Dr. Subramanian went on to further testify that “defects such as pinholes are not intentional.” *Id.*, 22:7-10. Mr. Humphrey similarly explained that “defects are created unintentionally on the surface of the underlying layer and is

² All emphasis added unless otherwise indicated.

generally not considered to be part of the underlying layer's topology, which is a property of design." EX2001, ¶ 33. But, Dr. Subramanian attempts to blur the lines between these distinct characteristics by arguing that "topological variations would result from defects -- or they could result from defects, but they could also result from something that the practitioner, during the fabrication or production of that part, intended to happen." EX2049_2025-10-30-Final, 22:11-15. As described below, however, that argument is inconsistent with a plain reading of the construction, Samsung's extensive arguments before the district court, and the weight of the evidence in the IPR.

Petitioner's incorrect application of the construction stems from it having failed to engage on the construction issue in the Petition, thereby leaving a significant evidentiary gap in Petitioner's case in chief. For example, Dr. Subramanian confirmed that he applied what he calls the "plain and ordinary meaning" to the term "planarization layer," not the agreed-to and now-adopted district court construction. EX2049_2025-10-30-Final, 14:9-15:6 ("I used the plain and ordinary meaning and I think that was appropriate."); *see also id.*, 28:11-17; EX2021, 147:4-17; EX2020, 18:4-18. And, for his analysis of Ground 1 in his original declaration, Dr. Subramanian failed to address the underlying topology at all, instead stated that "the organic barrier layer 20 [of Suzuki] constitutes a planarization layer as it is used to 'make[] a smooth surface on the relatively irregular

surface of the cathode 18’ such that when the ‘inorganic barrier layer 22 is formed on the smooth surface’ it is ‘substantially defect-free and dense.’” EX1004, ¶75 (citing Suzuki at 5:59-67). But neither that statement nor anything else in Dr. Subramanian’s original declaration addresses how Suzuki’s alleged planarization layer satisfies the second planarization prong, *i.e.*, that the topology of the underlying layer not be reproduced.

Thus, Dr. Subramanian now attempts to bridge that evidentiary gap in his reply declaration, but not by explaining how Suzuki or the other prior art satisfies each of the planarization prongs of the construction. Instead, Dr. Subramanian simply takes the position that he “didn’t have to adopt that [construction] specifically for the purposes of [his] analysis,” (EX2049_2025-10-30-Final, 28:11-17) because he “believe[s] under any reasonable construction, the grounds that I provided disclosed that layer.” *Id.*, 14:4-17. He concludes, without explanation, that “because Suzuki teaches that this layer smooths out the irregular surface beneath it ..., it does not follow the underlying topography.” EX1033, ¶12. But given that Suzuki describes smoothing out irregular surfaces only to “cover[] defects” (EX1012-Suzuki, 5:59-66), Dr. Subramanian’s conclusion about the underlying topology does not represent a reasoned analysis, and therefore is insufficient to support obviousness. *See TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1359-61 (Fed.

Cir. 2019) (“conclusory expert testimony is inadequate to support an obviousness determination on substantial evidence review”).

To support its challenge, Petitioner needs Suzuki’s covered defects to somehow satisfy both of the planarization prongs because Suzuki does not teach or suggest the second and distinct requirement, *i.e.*, that the underlying topology is not reproduced by its organic barrier layer. That the two planarization prongs of the construction are distinct is clear not only from the plain language of the construction, but also from the intrinsic evidence and from Samsung’s extensive claim construction arguments before the district court. For example, during prosecution, the applicant argued that the metal structure in the prior art (Palmans) relied on by the examiner cannot be a planarization layer because “[m]etals, and copper in particular, that are evaporated onto a layer do not cover-up the imperfections of the underlying layer, but rather, the metals reproduce the topography of the underlying layer.” EX1002, 18. Based on that, Samsung’s claim construction expert, Dr. Schubert, argued that this means “the applicants made clear that the ‘planarization layer’ they claimed could **only** encompass a layer that ‘cover[s]-up the imperfections of the underlying layer’ **and** that does not ‘reproduce the topography of the underlying layer.’” EX2002, ¶59.

Moreover, Samsung particularly argued during the Markman hearing that “from an engineering standpoint it is important” to have both conditions. EX2019, 36:24-37:16. Samsung represented to the Court that:

So the planarization layer, Your Honor, *performs two functions*. One is, *to the extent that you have a defect* in the underlying layer, for example, there might be a dust particle in the OLED device, that dust particle *does not get propagated* up towards the upper layers. *And then also you are not reproducing the underlying topography*, which is another way of saying you're *smoothing out the contours* of the underlying device structure.

EX2019, 29:15-22.

Samsung then explained for the Court *why*, in its view, this distinction is “*really important*”:

So there are these *defects*, for example, the dust particles and so on that might exist on the OLED device, but *the other really important aspect* of the planarization layer is that -- if you remember, Your Honor, *the OLED device is a structure that protrudes from the surface of the substrate*.

So if I'm putting down a thin barrier layer like an aluminum foil to try to cover that, what it does is it creates creases around that and that can cause breakage in that foil. So what you want to do is actually -- this second piece is about *smoothing out the contour of that underlying topography* over the OLED device. *Regardless of whether there's a defect or not, you want a smooth, flatter surface*.

EX2019, 31:23-32:12.

The concept of not reproducing the underlying topography by smoothing out the contours of the OLED device protruding up from the substrate is particularly reflected in FIG. 5 from the '389 patent. In the annotated version of FIG. 5 reproduced below, the OLED device **504** is shown in **red**, the organic planarization layer **506** is shown in blue, and the barrier layer **508** is in yellow. As can be seen below, where the planarization layer **506** is eliminating the sharp corners of the OLED device **504**, the rectangular topology of the OLED device **504** is not reproduced by the planarization layer **506**.

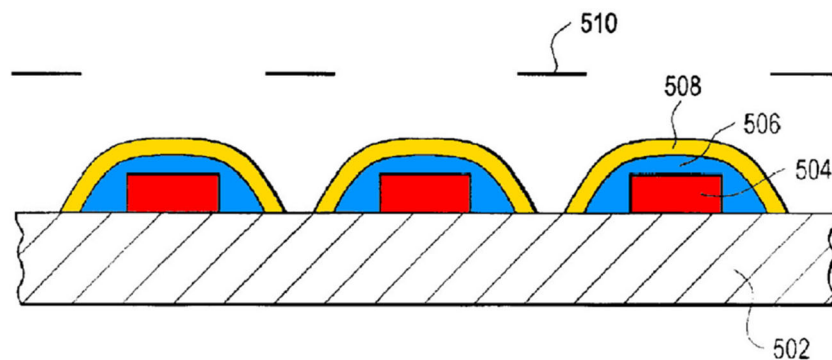


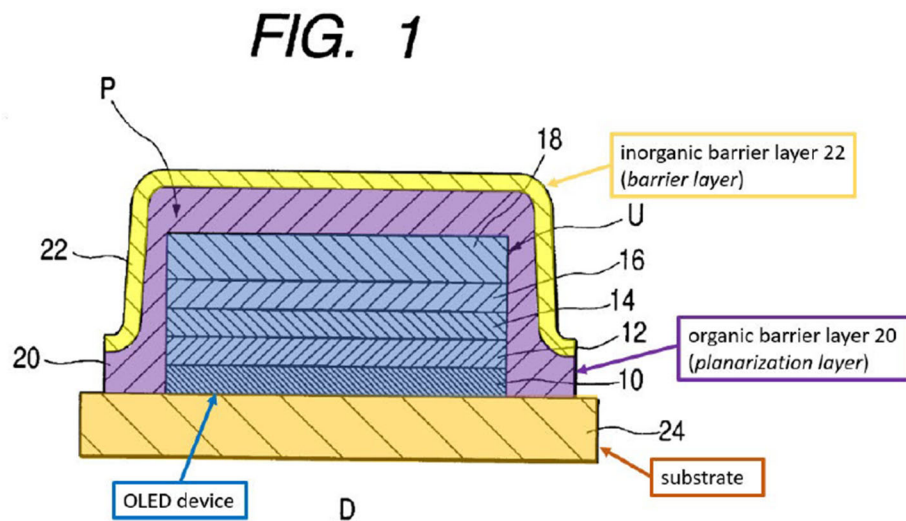
FIG. 5

In short, Samsung represented to the district court that the distinction between the planarization prongs is “really important.” Yet, it now wants the Board to find that any smoothing out of a surface’s unintentional defects, such as those in Suzuki, necessarily also results in the underlying topology not being reproduced. The Board should reject Petitioner’s attempt to advance inconsistent positions here in order to

ensure consistency between proceedings by requiring Petitioner to establish that the two distinct planarization prongs of the construction are met by the prior art.

B. The Proposed Combination of Kijima and Suzuki Reproduces the Underlying Topology

The Reply argues that Suzuki's "smoothing" is depicted in Figure 1 "the top of this layer (purple) having visibly rounded corners, unlike the sharp corners of the underlying topology:



Reply, 7.

Moreover, Suzuki's "smoothing" is exclusively described in connection with it covering "defects" in order to "make[] a smooth surface on the relatively irregular surface of the cathode 18," the result being that the barrier layer 22 above is "*substantially defect-free* and dense." EX1012-Suzuki, 5:59-67. That is, there is no teaching or suggestion in Suzuki's that its 'smoothing' is related in any way to rounded corners or that the rounded corners are a consequence of planarization. This

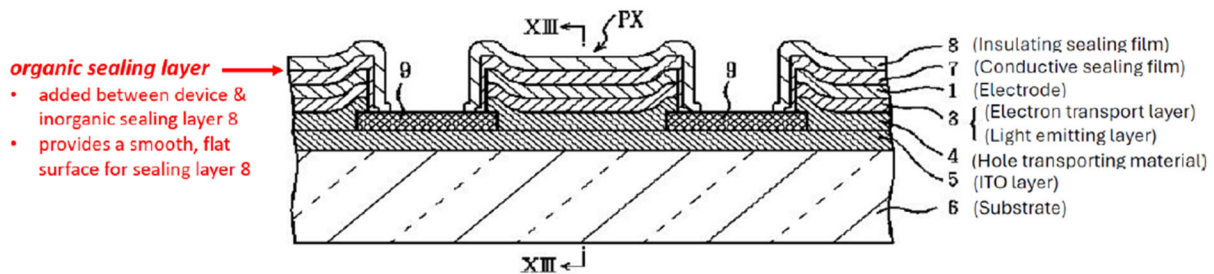
is another attempt by Petitioner to conflate Suzuki's teachings with respect to unintentional defects in the cathode with the concept of intentional topology.

Petitioner also alleges that Suzuki's "rounded corners" show the underlying topology is not reproduced. Reply, 7-8. However, Mr. Humphrey confirmed that even though there is "some minor rounding of the corners, [] it largely follows the topology of the -- of the underlying material." EX1036, 18:2-13. Nothing suggests that Suzuki's patent drawings are to scale, and Suzuki does not suggest there is any significance to the shape of the corners, and so none can be inferred. *Compare* FIG. 1 to FIG. 2. Petitioner's attempt to find actual topological differences between Suzuki's layers based on "minor rounding of the corners" which are not otherwise described or discussed in Suzuki is insufficient to meet its burden. *See, e.g.*, EX2020, 16:2-17:15 (increase in planarity may require examining spatial frequency of height variations using Fourier transformation).

In any event, Petitioner's argument fails for an even more fundamental reason. Even if Suzuki's manufacturing techniques produce different rounding on the corners of *its* layered structure, as compared to the electroluminescent unit U below, Petitioner's proposed combination is *not* based on Suzuki's manufacturing techniques or its layered structure, but on Kijima's techniques and general structure. In particular, Petitioner proposes to modify Kijima's layered structure by interspersing Suzuki's "organic sealing layer," which corresponds to Suzuki's

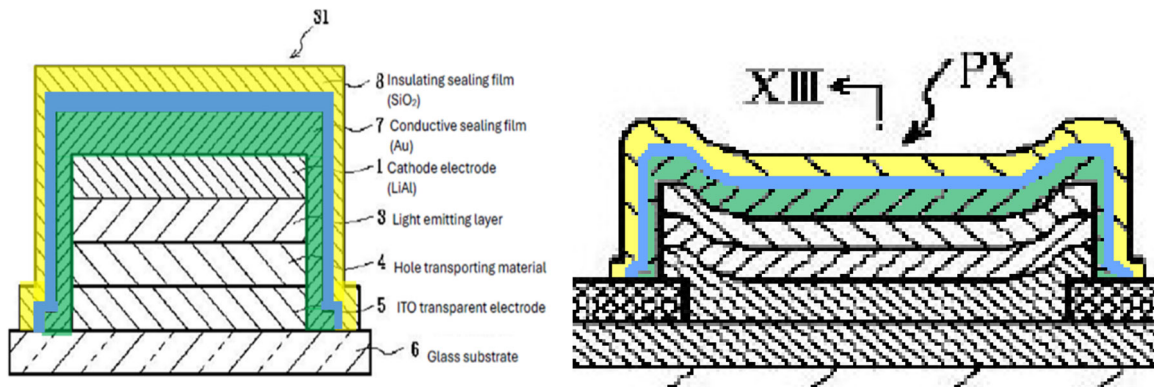
organic barrier layer 20, between Kijima's conductive sealing film 7 and insulating sealing film 8, as Petitioner annotates below.

[FIG. 12]



Pet., 32-33.

But Petitioner does not propose any modification to Kijima's *existing* layers, including any changes to the contours of their corners. Petitioner instead touts a “simple modification [that] would entail adding a new organic sealing layer on top of Kijima's OLED in order to form a smooth surface on which to deposit Kijima's inorganic sealing film 8,” as shown above. Pet., 32-33. Because the newly-added layer will be between the existing insulating sealing film 8 and the conductive sealing film 7 and because the films 7 and 8—as shown above—have generally the same topography, a POSITA would understand that the added organic layer (annotated in blue below) will also have the same topography to the existing sealing film 7 below it and the sealing film 8 above it. EX2018, ¶¶34-37.



The Reply attempts to discredit this point by arguing that it “is based on the illustrated topography of Kijima’s layers, rather than that of Suzuki’s organic barrier layer 20” and “Pictiva provides no explanation for why it contends a POSITA would deviate from Suzuki’s teachings in applying Suzuki’s organic barrier layer 20 to Kijima.” Reply, 8. But the illustrated topology above is based on *Petitioner’s* “simple modification” of adding a new layer to *Kijima’s* existing structure. Pet., 32-33. Petitioner is the master of its own petition, and its attempt to now distance itself from its original theory should be rejected.

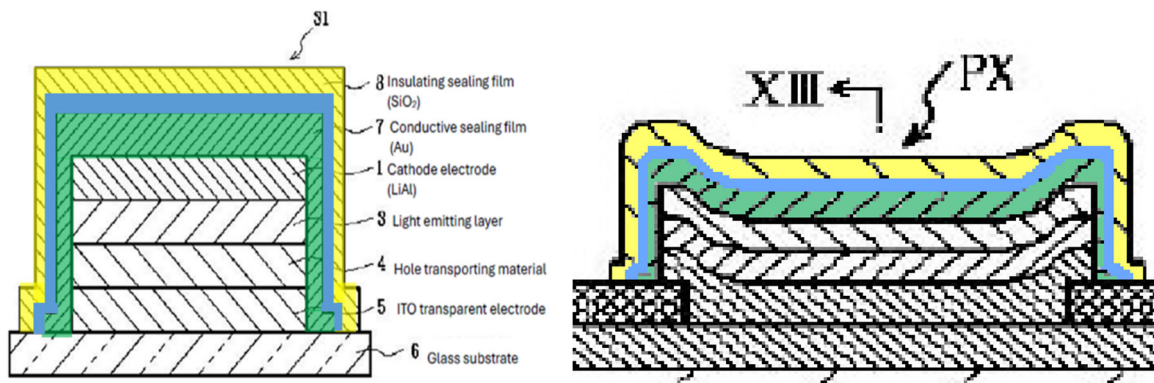
Moreover, Dr. Subramanian confirmed that he is only relying on “disclosures within Kijima itself” to disclose the recited “method of encapsulating a plurality of devices,” as recited in the preamble of claim 34. EX2049_2025-10-30-Final, 37:21-38:2. Dr. Subramanian further confirmed that he is relying only on Kijima’s disclosure to satisfy the element of “fabricating a plurality of devices on a substrate” recited in Element 34[a]. *See id.*, 38:16-19. And finally, for Element 34[b], Dr. Subramanian confirmed that “[w]ith respect to the specific disclosure of performing

the deposition selectively, [he is] relying on the disclosure of Kijima for the selective aspect of it.” *Id.*, 39:15-40. Dr. Subramanian also confirmed that, in the proposed combination, “the deposition techniques would generally follow what Kijima discloses.” *Id.*, 44:11-45:8. And, as Dr. Subramanian verified, this also applies to the manner in which Suzuki’s organic barrier layer is added to Kijima.

And what we are doing is we are making a structural modification which would then require an additional deposition step, and it’s a selective deposition step through a mask. But *we’re still following the kinds of steps that are taught by Kijima.*

Id., 45:9-14.

Consequently, the existing structure of the Kijima, as well as the process by which Suzuki’s barrier layer is proposed to be added, follows **Kijima’s** teachings, not Suzuki’s teachings. Thus, the resulting structure of the combination would continue to follow Kijima’s teachings, as Mr. Humphrey explained and as shown below, without material differences between the topologies of the layers, including without material differences in how corners are rounded. EX2018, ¶¶34-37.

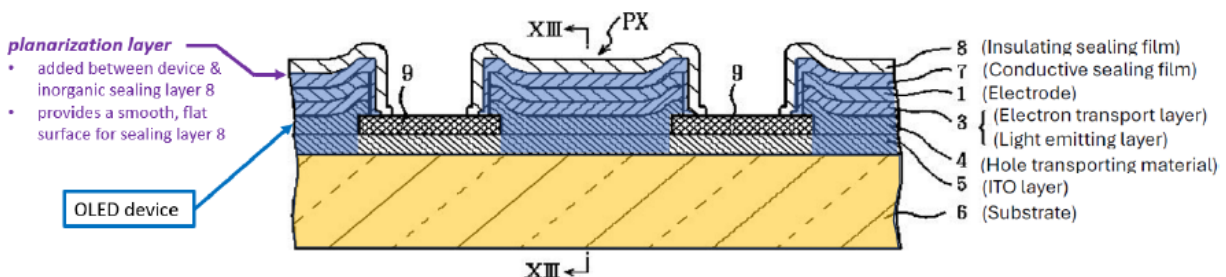


Thus, for reasons stated above, Petitioner has failed to establish that the added organic layer satisfies the “planarization layer” limitation of the challenged claims. EX2018, ¶¶38-39. And, because the added organic layer is the only structure the Petition relies on for the “planarization layer” limitation, Petitioner has not established that the challenged claims are obvious.

III. A POSITA Would Not Have Carried out the Proposed Modification of Kijima Based on Suzuki’s Organic Barrier Layer (All Grounds)

All grounds require modifying Kijima by adding an organic layer, which serves as the claimed ‘planarization layer,’ between Kijima’s conductive sealing film 7 and insulating sealing film 8. Pet. 32-36.

[FIG. 12]

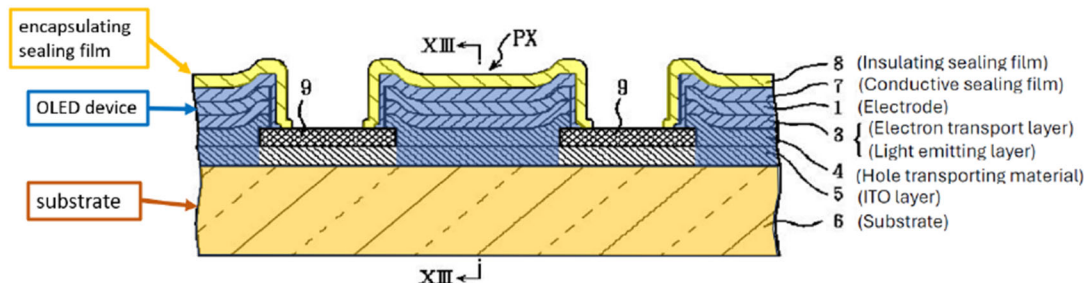


(Pet. 37)

However, a POSITA would not have been motivated to make such a modification for the reasons in the POR and below.

As previously argued in the POR, Petitioner's theories for why a POSITA would allegedly construct what it characterizes as a "protective double layer" is fundamentally flawed. POR, 27-36. To reiterate, the flaw is that Petitioner has not presented evidence that a "protective double layer" is desirable when Kijima already has a protective double layer, and where the proposed combination would result in a protective *triple* layer. *See id.*

[FIG. 12]



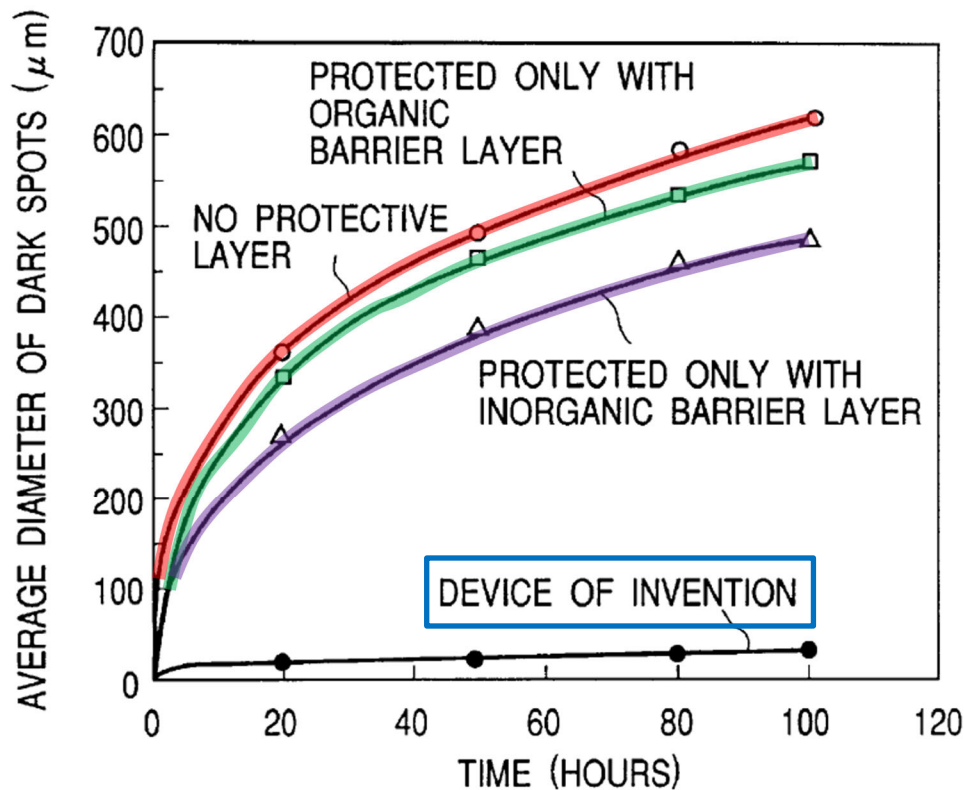
Pet., 18 (annotating EX1010-Kijima, FIG. 12); EX1004, ¶63 (Dr. Subramanian stating in his original declaration that the “conductive film 7 would be part of the striped ‘negative electrode 1’ as illustrated in Figure 24.”).

Although Petitioner now concedes that in the Reply that the “conductive sealing film 7 provides protection to the elements below it,” Petitioner nonetheless argues that the *type* of protection it provides “is different from the protection encapsulation provides.” Reply, 19-20. Specifically, Petitioner argues that Kijima’s conductive sealing film 7 serves to prevent degradation due to radiant heat during manufacturing, which is allegedly “in contrast to the protection an encapsulating layer provides” because the “conductive sealing film 7 does not provide adequate protection from exposure after manufacturing.” *Id.* This argument fails for multiple reasons.

First, while Kijima’s conductive sealing film 7 does serve to protect the organic layer due to radiant heat during vapor deposition of the insulating sealing film 8, Kijima expressly discloses that the function of the conductive sealing film 7 is *also* “protecting the underlying organic layer and electrode and preventing *oxidation* of the electrode 1.” EX1010-Kijima, [0055]. In the very next sentence, Kijima states that the insulating sealing film 8 has that same function, i.e., “further enhanc[ing] the effects of *preventing oxidation* of the electrode 1 and degradation of the organic layer.” *Id.*; *see also* EX2021_2025-05-31-Final, 152:14-24, 149:6-19;

151:10-16. Kijima consistently and repeatedly describes the conductive sealing film 7 as being every bit the protective encapsulation layer that the insulating sealing film 8 is, which Petitioner does not dispute is an encapsulation layer. POR, 27-31; Pet., 32, 37-39. In fact, the insulating sealing film 8 is optional. POR, 30. The fact that Kijima's conductive sealing film 7 may provide other benefits as well does not undermine Kijima's express disclosure of a double encapsulation layer. EX2049_10-30-25-Final, 72:7-23 (Dr. Subramanian agreeing that Kijima is concerned with oxidation *after* manufacturing).

Second, Petitioner appears to argue that the conductive sealing film 7 is not an encapsulating or barrier layer because it does not, *by itself*, "provide adequate protection from exposure after manufacturing." Reply, 20. Petitioner bases this on Kijima's Comparative Example 3 which exposed the conductive sealing film 7 to atmospheric conditions temporarily before depositing the insulating sealing film 8. EX1010-Kijima, [0084]. Kijima notes that the EL element produced in this manner showed "adverse effects of exposing the element to the atmosphere," including an "increase in dark spots." *Id.*, [0086]-[0087]. From this, Petitioner concludes that the "conductive sealing film 7 *alone*, even deposited in vacuum conditions, did not protect the underlying EL device from subsequent exposure." Reply, 20-21. But that is a red herring because Suzuki's barrier layers, individually, are also incapable of providing adequate protection, as Suzuki expressly shows in FIG. 3 below.

FIG. 3

EX1012-Suzuki, Fig. 3 (annotated).

For example, FIG. 3 above plots the presence of dark spots as a function of time. EX1012-Suzuki, 2:41-44. Suzuki states that dark spots refer to “non-light-emitting region,” which are “caused and facilitated to develop in the device by the presence of moisture entering from defective portions thereof.” *Id.*, 1:45-53. However, FIG. 3 shows that Suzuki’s organic barrier layer (annotated above in **green**) by itself was barely better than no protective layer (annotated above in **red**) in preventing dark spots. Similarly, protection using only Suzuki’s inorganic barrier layer (annotated above in **purple**) did not fare much better. It was only when the

two layers were used **together** that Suzuki achieved the “device of the invention” (**blue** above). Indeed, Dr. Subramanian acknowledged that Suzuki’s organic barrier layer by itself is “not much better” than no protective layer at all and “[i]t’s certainly not acceptable.” EX2049_10-30-2025-Final, 96:18-97:4; *see also id.*, 97:13-21 (agreeing that Suzuki’s inorganic barrier layer is also “not acceptable.”); *see also id.*, 97:22-98:7.

That Kijima’s conductive sealing layer 7 is a protective encapsulation layer, same as either of Suzuki’s barrier layers, is also clear from the results Kijima reports in its comparative examples. In Comparative Example 3, Kijima’s device was exposed temporarily to atmospheric conditions **after** the conductive sealing layer 7 was deposited. Kijima-EX1010, [0086]. However, under Comparative Example 2 Kijima’s device was exposed to atmospheric conditions **before** the conductive sealing layer 7 was deposited. Kijima-EX1010, [0076]-[0078]; EX2049_10-30-25-Final, 86:16-21 (Subramanian confirming the difference between the two examples is that “in the Comparative Example 2, the atmospheric exposure is done before the conductive sealing film seven. And in Comparative Example 3, the atmospheric exposure is done after conductive sealing seven but before conductive sealing film eight.”). Everything else was the same. EX2049_10-30-25-Final, 104:1-105:14. But the degree of degradation and resulting performance that Kijima achieved between his comparative examples was significantly different. Specifically, in

Comparative Example 2 (atmospheric exposure *before* deposition of the conductive sealing layer 7), Kijima's device achieve a luminescence of only 500 cd/m² at an applied voltage of 13 V. EX1010-Kijima, [0080]. Conversely, in Comparative Example 3 (atmospheric exposure *after* deposition of the conductive sealing layer 7), Kijima's device almost doubled the luminescence to 900 cd/m² using only 9 V (about 30% less voltage). EX1010-Kijima, [0086]; EX2049_10-30-25-Final, 103:22-25 (confirming that Kijima achieved "a higher luminescence in Comparative Example 3 than he achieved with his Comparative Example 2"). Thus, Kijima objectively discloses that its conductive sealing layer 7 provides material protection from degradation due to atmospheric exposure.³

Third, Petitioner criticizes Kijima for conducting his experiments "for only a fraction" of the lifespan of an actual OLED device, but Dr. Subramanian acknowledged that "accelerated lifetime testing" is "a common thing" because "[y]ou don't want to wait ten years to figure out if a particular encapsulation is good enough." EX2049_10-30-25-Final, 98:12-100:14. Dr. Subramanian explained that

³ For Comparative Example 2, Kijima characterizes the degree of degradation as resulting in "a large number of dark spots," whereas for Comparative Example 3, the degree of degradation resulted in just "an increase in dark spots." EX1010-Kijima, [0080], [0086].

this is typically done by putting the device in “really bad conditions, much worse than you would normally expect to see and that way you get the degradation much faster” *Id.*, 99:25-100:12. In fact, Suzuki tests its device over a period of only 100 *hours*, not 100 *days*, as Kijima does. EX1012-Suzuki, FIG. 3, 2:45-49, 8:31-41. A POSITA would expect Kijima also used accelerated lifetime testing because it is “a very standard practice in the industry,” as Dr. Subramanian confirmed. EX2049_10-30-25-Final, 100:7-14.

That Kijima’s conductive sealing film 7 *functions* as a protective *encapsulation* layer is clear from the above. But Kijima’s conductive sealing film 7 is also *structurally* an encapsulation layer. For example, Kijima repeatedly and consistently identifies the layer as a “sealing film,” and expressly discloses that the “conductive sealing film 7 and an insulating sealing film 8 are successively formed on the electrode 1 so as to *cover the side surfaces* of the element.”), EX1010-Kijima, [0038], [0050] (“form a conductive sealing film 7 so as to cover the surface of the laminate body of the organic layers 4, 3 and the electrode 1”); EX2018, ¶¶57-58.

Thus, a POSITA would understand that Kijima’s conductive sealing film 7 is a protective encapsulation layer that is structurally similar and functions largely the same as Suzuki’s barrier layers, which Petitioner acknowledges are both encapsulation layers.

B. Neither the Prior Art nor Petitioner's Evidence Motivates Creation of Petitioner's Proposed Triple-Layer Structure

Petitioner's failure to recognize Kijima's *existing* double layer encapsulation undermines its analysis and renders its arguments and related evidence irrelevant because the proposed structure is in fact a *triple*-layer barrier structure. *See* POR, 27-37. This is fatal to the Petition because none of the evidence supports or even addresses triple-layer barrier structures. Indeed, Dr. Subramanian confirmed that Kijima "doesn't talk about using three sealing layers" (EX2021_2025-05-31-Final, 151:17-152:1), while Suzuki only "uses a bilayer encapsulation structure." EX2049_10-30-25, 60:2-13. Dr. Subramanian similarly confirmed that Komatsu discloses is also two layers. *See* EX2049_10-30-25, 60:22-61:9; EX1017, 10:13-15; *see also* Pet., 35; EX2018, ¶70. In fact, Dr. Subramanian could not "say one way or the other" whether there were any references describing more than two protective layers before the date of the invention. EX2049_10-30-25-Final, 62:20-63:4; EX2050_10-31-25-Final, 122:2-16 (Dr. Subramanian testifying that Weaver's layers 121 and 122 do not encapsulate the device); *see also id.*, 115:16-127:20 (discussing Weaver); EX2049_10-30-25-Final, 120:6-21 (Dr. Subramanian confirming that the background of the '389 patent does not disclose depositing multiple barrier layers on top of each other). In fact, Dr. Subramanian has never seen the triple-layer barrier structure he contends would have been so obvious at the

time of the invention. POR, 34; EX2021_2025-05-31-Final, 67:1-14 (testifying that his group has “done planarization layers on top of gold But in our work I’m positive we did *not* put a third layer on top of that.”), 71:11-72:2; EX2050_10-31-25-Final, 137:17-138:5 (not aware of any OLED structure that comprises the proposed combination of layers, *i.e.*, gold→organic→inorganic).

Thus, nothing in the prior art nor in Dr. Subramanian’s extensive experience before or after the invention suggests that a POSITA would have constructed the proposed triple-layer barrier. That is objective evidence of what a POSITA would have done.

Recognizing the paucity of evidence supporting its original theory, the Reply attempts to introduce a new argument by taking the position that “whether the resulting structure is characterized as “dual-layer” or “triple-layer,” a POSITA would have recognized the benefits of that encapsulation.” Reply, 21 (citing to EX1033, ¶¶33-34). But nothing in the record supports that statement, and Dr. Subramanian’s reply declaration adds nothing of substance. As noted above, Dr. Subramanian could not identify any reference predating the ’389 patent that discloses the use of more than two barrier layers. *See also*, POR, 34-35.

C. Petitioner Has Not Established That Adding Suzuki's Organic Layer On Top of Kijima's Conductive Sealing Film Would Reduce Defects in Kijima

On Reply, Petitioner argues that it “does not rely upon Kijima for the motivation to add Suzuki’s organic barrier layer 20” because, so the argument goes, “Suzuki’s organic barrier layer 20 would cover defects in Kijima.” Reply, 22. But Kijima says nothing of defects, and the “defects” and “surface irregularities” described in Suzuki are on the cathode 18 (equivalent to Kijima’s electrode 1), not on top of a protective encapsulation layer covering the cathode, as is the case in the proposed combination. *See* Pet., 33-34; EX1004, ¶81. Specifically, the Petition proposed to add Suzuki’s organic layer on *top* (not beneath) of Kijima’s existing conductive sealing layer 7 that *already* covers the cathode. In *that* arrangement, nothing in Suzuki or otherwise suggests that defects would be reduced. POR, 37-40. In fact, as Dr. Antoniadis, who was in charge of OSRAM’s OLED program in the relevant period and who has been retained by Samsung as an expert in the district court, testified that adding an organic layer could actually “*introduce* particles and managing these particles could be an issue.” EX2031, 40:25-41:4.

Finally, Dr. Subramanian’s testimony and reply declaration statement that Kijima’s conductive sealing layer 7 could have other defects, such as buckling, is an unsupported opinion. Dr. Subramanian testified about these alleged buckling issue in his first deposition, to which the POR responded in full. POR, 39-40. Petitioner

and Dr. Subramanian then had a full opportunity to introduce evidence in reply to support their “buckling” theory, but did not do so. At any rate, Kijima does not indicate that its gold conductive film has any such issues.

IV. A POSITA Would Not Use Sturm’s Ink-Jet Printing in the Proposed Kijima-Suzuki Combination (Claim 35)

Sturm uses ink-jet printing “to make the dielectric for the gate” of a transistor, as Dr. Subramanian confirmed, which is not analogous to OLED encapsulation. EX2049_10-30-25-Final, 112:6-10; POR, 55-57, 59. The evidence shows encapsulation is “[v]ery different” and presents unique challenges. POR, 54-55. At a minimum, the lack of a reference that teaches using inkjet printing to deposit planarization layers begs the question why a POSITA would make the proposed modification. *Arendi S.A.R.L v. Apple Inc.*, 832 F.3d 1355, 1365-66 (Fed. Cir. 2016) (prior art’s searching by names or addresses for duplicative entries does not render obvious searching for duplicative entries by telephone numbers).

Kijima emphasizes that all films should be deposited under vacuum conditions, while inkjet printing is not done under vacuum. POR, 64-65. Dr. Subramanian introduces a new argument to address this issue based on his “glove box” theory. But Subramanian acknowledged that he did not provide any evidence, including with his reply declaration, showing that ink-jet printing was known before

the '389 patent to be done under nitrogen in a glove box, as Petitioner alleges. EX2049_10-30-25-Final, 120:10-21.

Regarding the notion that Kijima's conductive sealing film 7 could also be deposited by inkjet printing, Dr. Subramanian again relies on evidence (EX1031) that has nothing to do with ink jet printing *planarization* layers. EX2049_10-30-25-Final, 123:24-126:20 (confirming that EX1031 relates to gold "conductors," not organic planarization layers); EX2050_10-31_25-Final, 98:19-100:6 (Duthaler's ink-jet printing not used for OLED materials). In fact, Dr. Subramanian confirmed that he is unaware of any publication that predates the '389 which discloses ink jet printing a gold barrier layer. EX2049_10-30-25-Final, 126:21-127:1; EX2050_10-31_25-Final, 101:18-103:14 (did not use ink-jet printing for OLED encapsulation before the '389). Petitioner has no answer to the additional reasons at POR 62-63 for why the proposed combination would not yield an operable.

V. Grounds III-IV

Grounds III-IV are deficient for at least the reasons in the POR. Dr. Subramanian's testimony confirms additional deficiencies. *See* EX2050_10-31-25, 98:19-99:11-Final (confirming Duthaler does not relate to OLED encapsulation); EX2049_10-30-25-Final, 129:24-132:1 (confirming the substrate in Kijima is glass); *id.*, 128:4-18 (confirming Fujimori does not address encapsulation, and that he has

no recollection of prior art using a magnetized mask for depositing an encapsulation layer).

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CERTIFICATE OF WORD COUNT

I hereby certify, pursuant to 37 C.F.R. section 42.24, that the foregoing Patent Owner Sur-Reply contains 5,528 words, excluding the words in the table of contents, table of authorities, exhibit list, this certificate of word count, signature block and certificate of service. The word count is based on the word count of the Microsoft Word program used to prepare the Patent Owner Sur-Reply.

/Pia Kamath/
Pia Kamath

CERTIFICATE OF SERVICE

I hereby certify, pursuant to 37 C.F.R. section 42.6, that on November 7, 2025, a complete copy of the foregoing **PATENT OWNER SUR-REPLY** and **EXHIBITS 2049-2050** were served by electronic mail, as agreed to by the parties, upon the following:

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