

IN THE 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. IPR2024-01222
Patent No. 6,949,389

PETITIONER'S REPLY BRIEF

First Petition, Asserting Prior Art Under Sections 102(a), (b), and (e)

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1001	U.S. Patent No. 6,949,389 (“the ’389 patent”)
1002	Certified File History for U.S. Patent No. 6,949,389
1003	Declaration of Vivek Subramanian, Ph.D. (Yamazaki and Weaver grounds)
1004	Declaration of Vivek Subramanian, Ph.D. (Kijima grounds)
1005	U.S. Patent Application Publication No. 2003/0206332 (“Yamazaki”)
1006	U.S. Patent Application Publication No. 2001/0052752 (“Ghosh”)
1007	U.S. Patent Application Publication No. 2003/0011300 (“Palanisamy”)
1008	U.S. Patent Application Publication No. 2002/0140347 (“Weaver”)
1009	U.S. Patent No. 6,866,901 (“Burrows”)
1010	Japanese Published Application No. H09-245964, certified translation (“Kijima”)
1011	Japanese Published Application No. H09-245964, original document
1012	U.S. Patent No. 6,198,217 (“Suzuki”)
1013	U.S. Patent No. 6,087,196 (“Sturm”)
1014	Japanese Published Application No. H10-41069, certified translation (“Fujimori”)
1015	Japanese Published Application No. H10-41069, original document
1016	International Publication No. WO 2001/08242 (“Duthaler”)
1017	U.S. Patent No. 6,660,409 (“Komatsu”)
1018	J. Birnstock et al., <i>Screen-Printed Passive Matrix Displays Based on Light-Emitting Polymers</i> , 78 Appl. Phys. Lett. 3905 (2001) (“Birnstock”)
1019	Complaint, <i>Pictiva Displays Int’l Ltd. v. Samsung Elecs. Co., Ltd., et al.</i> , 2:23-cv-00495-JRG (E.D. Tex. Oct. 19, 2023)
1020	U.S. Patent Application Publication No. US 2003/0062186 (“Boroson”)
1021	U.S. Patent No. 6,770,502 (“Cok”)
1022	U.S. Patent No. 6,214,631 (“Burrows-631”)
1023	Jun Hyung Souk, <i>Advances and New Challenges in LCD</i> , International Meeting on Information Display Digest, 24 (2002) (“Souk”)

Exhibit No.	Description
1024	<i>OLED Fundamentals: Materials, Devices, and Processing of Organic Light-Emitting Diodes</i> (Daniel J. Gaspar & Evgueni Polikarpov eds., 1st ed. 2015) (excerpted) (“Gaspar”)
1025	Takashi Ohta, <i>Next Generation AMLCD Production Technologies for Large Substrate</i> , International Meeting on Information Display Digest, 3 (2001) (“Ohta”)
1026	Blank
1027	Annotated Excerpt of Exhibit 2006
1028	D. Redinger, S. Molesa, S. Yin, R. Farschi, & V. Subramanian, <i>An Ink-Jet-Deposited Passive Component Process for RFID</i> , 51(12) IEEE Transactions on Electron Devices 1978 (Dec. 2004)
1029	D.J. Hayes, M.E. Grove, D.B. Wallace, et al., <i>Inkjet Printing in the Manufacture of Electronics, Photonics, and Displays</i> , 4809 Nanoscale Optics and Applications 94 (2002)
1030	2002 MRS Spring Meeting Program, <i>available at</i> https://web.archive.org/web/20020802113232/http://www.mrs.org/meetings/spring2002/program/symposia
1031	2002 MRS Spring Meeting Symposium G Abstracts, <i>available at</i> https://web.archive.org/web/20040907215326/http://www.mrs.org/meetings/spring2002/abstracts/AbstractBookG.pdf
1032	Declaration of Vivek Subramanian, Ph.D. in Support of Reply (Yamazaki and Weaver grounds)
1033	Declaration of Vivek Subramanian, Ph.D. in Support of Reply (Kijima grounds)
1034	F. Santerre, J. P. Dodelet, Y. Sun, A. R. Hlil, A. S. Hay, and M. D'Iorio, <i>OLED Performance and the Use of a Hole Transport Molecule Dissolved in a High Tg Host Polymer</i> , 1999 Int’l Conf. on Digit. Printing Tech., 15 IS&Ts NIP 747-750 (1999)
1035	Deposition Transcript of Kurt Humphrey (IPR2024-01222)
1036	Deposition Transcript of Kurt Humphrey (IPR2024-01223)

I. CLAIM CONSTRUCTION

A. “Planarization Layer”

Pictiva urges the Board to adopt the parties’ agreed construction in the district court of “planarization layer”—namely “a layer of material that planarizes such that the propagation of defects from one layer to another layer can be interrupted and the topography of the underlying layer is not reproduced.” Ex. 2048, 18-19. As discussed below, the prior art clearly teaches a “planarization layer” regardless of whether this construction is adopted. Therefore, Petitioner does not believe an express construction is necessary to resolve the parties’ disputes.

B. “Selectively Depositing”

For “selectively depositing,” Pictiva urges the Board to apply the construction proposed in district court by the defendants—namely “depositing a material only in desired areas, such that no additional processing must be performed for removing unwanted material.” POR, 22-23. Petitioner notes that the district court did not adopt this construction, but instead construed the term to mean “depositing a material in desired areas.” Ex. 2048, 19-20. Again, the prior art teaches this element under any construction, as discussed below. Therefore, Petitioner does not believe an express construction is necessary.

II. THE ASSERTED REFERENCES ARE PRIOR ART

A. The 2008 Email Chain Does Not Show Conception

Pictiva attempts to antedate certain references as to claims 34-37, 40-41, and 46 of the '389 patent by asserting that those claims were conceived by February 8, 2001. Pictiva's sole basis is a one-page excerpt of an email chain between inventors Pichler and Frischknecht. POR, 5-6; Ex. 2006, 1 (the "2008 Email Chain"). This brief exchange, which is neither authenticated nor otherwise supported by inventor testimony, is insufficient.

"Conception is the 'formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention....'" *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376 (Fed. Cir. 1986). "An idea is definite and permanent when the inventor has a specific, settled idea, a particular solution to the problem at hand, not just a general goal or research plan he hopes to pursue." *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994).

The 2008 Email Chain is merely a brainstorming discussion about encapsulation approaches for future development. The inventors discuss options for deposition techniques, but make clear that they "haven't yet thought up a reasonable method for keeping the electrical pins free of the coating" (Frischknecht) and "don't know if this will work" (Pichler). Ex. 2006, 1. Indeed, as Pichler stresses, "[t]hese

are all just ‘undeveloped’ ideas without [sic] really having thought through them.”

Id. Pichler further acknowledges that he had not yet had time to consider any “serious bottlenecks,” and that he had “certainly...not done any practical trials whatsoever,” concluding that he was “looking forward to keep this discussion rolling.” *Id.*

This theoretical and ongoing discussion is insufficient to show “a definite and permanent idea” of the invention. *Hybritech*, 802 F.2d at 1376. Indeed, the Federal Circuit has held that “[a] ‘preliminary’ statement about a ‘possibility’ or ‘potential use,’ alongside a recommendation for continued work and a ‘report back’ in the future, falls short” of this standard. *Dawson v. Dawson*, 710 F.3d 1347, 1353 (Fed. Cir. 2013). And as Pictiva’s expert admitted during deposition, the email chain does not even provide “sufficient detail here to really be exactly sure what it is they’re – they’re trying to communicate back and forth.” Ex. 1035, 31:12-32:7; *see also id.*, 58:22-59:18 (“So I think he’s leaving it open to, you know, continued development...”).

Additionally, “[a] conception must encompass all limitations of the claimed invention.” *Singh v. Brake*, 317 F. 3d 1334, 1340 (Fed. Cir. 2003). The inventors’ brainstorming discussion fails to do so.

First, the 2008 Email Chain does not discuss depositing a *planarization layer*, as required by both independent claims (34[b] and 41[c]). Pictiva points to the mere reference to “PML encapsulation” as evidence of this element, asserting that a

POSITA “would understand that the inventors were discussing selectively depositing an organic planarization layer of the PML, even though the term ‘planarization layer’ does not appear.” POR at 7. Pictiva’s only documentary support for this assertion is the ’389 patent specification—which of course did not exist at the time. *See* POR, 6-7; EX2046, ¶¶150-153.

Additionally, Pictiva advances a construction requiring that the planarization layer “planarizes such that defects from one layer to another layer can be interrupted and the topography of the underlying layer and/or structure is not reproduced,” POR, 22-23. The 2008 Email Chain is silent on these issues.

Pictiva’s assertion that “PML encapsulation” evidences a planarization layer is also contracted by its insistence that Yamazaki and Weaver do not teach a planarization layer—even though those references admittedly disclose PML encapsulation structures, Ex. 1035, 108:10 (“Technically it [Weaver] would be a PML, I believe.”), 108:12-13 (“I think the Yamazaki disclosure satisfies the broad definition of a PML structure.”)—and even though the references expressly disclose layers that are “planarizing” (Weaver, [Abstract]) and have “planarity” (Yamazaki, [0178]).

Second, the 2008 Email Chain does not even contemplate any encapsulation method that combines *selectively depositing [a] planarization layer* and *selectively depositing [a] barrier layer*.

For selectively depositing a planarization layer (34[b] and 41[b]-[d]), Pictiva relies on the middle the message from Frischknecht. Pictiva cites to his “proposals for selectively depositing an ‘acrylate layer,’” arguing that this shows “selectively depositing an organic planarization layer.” POR, 6-7; *see also id.*, 8-9 (citing Frischknecht for 34[b] and 41[b]-[d]).

For selectively depositing a barrier layer (34[c] and 41[e]), Pictiva relies instead on the top message from Pichler, arguing that “Pichler in turn suggested selectively depositing the barrier layer ... by sputtering the barrier layer through mask.” POR, 7; *see also id.*, 8-9 (citing Pichler for 34[c] and 41[e]).

However, Pictiva does not assert that the inventors propose to use these techniques in combination, and indeed they do not. That is, Pichler’s message does not contemplate using his sputtering technique (the alleged selective deposition of a barrier layer) in combination with Frischknecht’s proposals for depositing the acrylate layer (the alleged selective deposition of a planarization layer). Rather, as shown below, Pichler’s message proposes *alternative* techniques for depositing the organic acrylate layer, which are *not* alleged to be selective:

Pichler Karl (ITC)

From: Pichler Karl (ITC)
Sent: Thursday, February 08, 2001 4:28 PM
To: Frischknecht Kyle (ITC)
Cc: Proulx George (ITC); Pakbaz Hash (ITC)
Subject: RE: Meeting with Dr. John Affinito

Hi Kyle,

YES, I believe there may be a combination technique with spin-coating that I believe should work (also discussed at FED and I have been considering filing a patent for a long time - lack of time). Spin-, roll- or whatever-coat, cross-link/cure and then sputter the dielectric barrier through a mask over the OLED area only, i.e. leave the contact pads, scribe lines, etc. free from the barrier and then stick the whole thing in, for example, a plasma asher and **ash-off the organic where there is no dielectric barrier film**. I have a patent from CDT-time (for a completely different purpose) that shows that just a few (say around 10 or more Angstroms) of good sputtered dielectric (e.g. AlOx) act as a perfectly good oxygen plasma ash barrier. Alternatively, I have been thinking if we could deposit the organic liquid layer (via flash-evaporation, spin- or roll-coat or whatever) and then do the **UV cross-linking through a mask**. The idea is that after this we may be able (don't know if this will work, never tried) to thermally evaporate or somehow spray/wash off the non-cross-linked molecular organic film and then sputter the dielectric also through a mask or alternatively make the contacts first and then sputter the dielectric. In addition, the non-cross-linked organic may be volatile enough so laser ablation becomes perfectly feasible - not sure. This may also have the advantage that the mask-cross-linking should provide a smooth transition from the regions with to those without the organic layer (instead of a sharper step). These are all just 'undeveloped' ideas without really having thought through them in detail to spot serious bottlenecks and certainly I have not done any practical trials whatsoever (other than the thin oxide as ash barrier). Just a note: the reason why I was originally thinking of spinning the layer was that this could very easily be added on to e.g. a Satella via a separate spin-chamber without the need to custom-build a flash-evaporator for the organic.

I am looking forward to keep this discussion rolling.
Charlie

Ex. 1027.

Whereas Frischknecht had suggested “vapor deposition through a shadow mask” for the organic acrylate layer, Pichler responded with a suggestion to instead “[s]pin-, roll- or whatever-coat [the organic layer],” and then “ash-off [i.e., remove] the organic where there is no dielectric barrier film.” Ex. 2006, 1. As Mr. Humphrey explained, “it appears that they're taking the selective barrier layer and using it as a mask to remove the -- the organic material in unwanted areas.” Ex. 1035, 116:13-21. Pictiva does not contend that this constitutes selective deposition of the organic layer. On the contrary, Mr. Humphrey admitted that this would not satisfy the construction that Pictiva seeks to apply (“depositing a material only in desired areas, such that no additional processing must be performed for removing unwanted

material,” POR, 22). *See* Ex 1035, 118:2-5 (“If we apply Subramanian’s definition [of selectively depositing] strictly to what’s described in that email, it would not be consistent with Subramanian’s definition.”), 118:6-10.

Accordingly, even under Pictiva’s interpretation of the 2008 Email Chain, there is no discussion of an encapsulation method that satisfies all of the selective deposition elements. Rather, Frischknecht proposes a first method that would allegedly satisfy certain elements (selectively depositing a planarization layer), and Pichler proposes a second method that would allegedly satisfy different elements (selectively depositing a barrier layer).

B. Pictiva’s Contentions Demonstrate Lack of Diligence in Reducing Alleged Invention to Practice

Pictiva similarly fails to show that the inventors exercised reasonable diligence in reducing to practice. Pictiva points to nothing from the time of the February 2001 email until August 2001, when it asserts that Pichler “sketched out additional thoughts.” POR, 9-10. Pictiva seeks to explain away this six-month period of inactivity based on generalized purported efforts to commercialize other products. POR, 10-11. Yet it provides no explanation for why it can point to nothing across this entire period that the inventors did to advance the claimed encapsulation of the ’389 patent.

Pictiva also points to alleged OLED commercialization efforts and patent applications directed to OLED formation as showing diligence in reducing to

practice the claimed encapsulation of the '389 patent. POR, 12-14. But beyond Pictiva's assertions that there must first be an OLED to encapsulate, there is no connection between these efforts and the claimed encapsulation of the '389 patent.

For example, the referenced U.S. Patent Applications, including U.S. Pub. Nos. 2003/0054579 and 2003/0052616 relate to deposition of OLED organic layers, not encapsulation layers, as Pictiva acknowledges. POR, 12-13. But the invention of the '389 patent relates to encapsulating an OLED device, not depositing the OLED device itself. Indeed, elsewhere Pictiva asserts that "inkjet printing of EL is completely different from inkjet printing of an organic encapsulant". POR, 42. Nor does the '389 patent suggest that improvements in the development of the OLED device itself are necessary in order for the claimed encapsulation to work. Thus, these efforts directed to different technologies should not be attributed to reducing the claimed encapsulation of the '389 patent to practice, nor excuse the inventors' failure to exercise diligence in reducing the claimed encapsulation to practice.

III. THE PETITION IS FULLY COMPLIANT WITH SECTION 311(B)

Pictiva is wrong to argue that Grounds I-II should not be considered because they incorporate the AAPA. POR, 16. This case differs from *Qualcomm Incorporated v. Apple Inc.*, 134 F.4th 1355 (Fed. Cir. 2025), where the petition had identified "the basis" of its ground as "§ 103: AAPA in view of Majcherczak and Matthews." *Id.* at 1358-59.

Here, the Petition does not identify the AAPA as the “basis” of its challenge, or present any grounds that use the AAPA as primary art. Rather, this case is analogous to *Shockwave Medical, Inc. v. Cardiovascular Systems, Inc.*, where the Federal Circuit held that an “IPR petition did not violate § 311(b)” where it “properly relied on general background knowledge to supply missing claim limitations (which [the patent owner] does not argue were novel to the invention) and used AAPA as evidence of that general background knowledge.” 142 F.4th 1371, 1380 (Fed. Cir. 2025). The Federal Circuit reached this conclusion even though the underlying petition (as here) had referenced the “AAPA” in its headings and listings of grounds:

Ground	Reference(s)	Challenged Claims
1	§ 103 Levy as modified by AAPA in combination with Mantell, Uchiyama or Willneff	1-6, 11, 14-16
2	§ 103 Levy as modified by AAPA in combination with Mantell, Uchiyama or Willneff, and in further view of Hayes	7, 12
3	§ 103 Levy as modified by AAPA in combination with Mantell, Uchiyama or Willneff, and in	8, 12

Shockwave petition
(IPR2019-00405, Paper 1)

III. SUMMARY OF CHALLENGE
Petitioner requests IPR based on the following grounds:
• Ground I: Claims 34, 35, 37, and 40 are obvious over Yamazaki in view of the applicant admitted prior art (“AAPA”) and/or Ghosh; • Ground II: Claims 41-46 are obvious over Yamazaki in view of AAPA/Ghosh and Fujimori;

Petition here

Moreover, the present Petition utilizes the AAPA *in the alternative* with Ghosh, to show that it was known to manufacture OLED devices in bulk (which Pictiva does not dispute). The Petition identifies disclosures in Ghosh that independently demonstrate the same teachings for which the AAPA is cited. *See, e.g.*, Pet. at 21-22. Thus, the Petition also complies with the requirement of 37 C.F.R. § 42.104(b)(4) that “[t]he petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon.” It would be

illogical to reject grounds as impermissibly “based on” the AAPA, when they establish that every claim element was obvious based on prior art patents and printed publications alone.¹

IV. GROUND I: YAMAZAKI IN VIEW OF GHOSH

A. Claims 34 and 40

1. Yamazaki teaches a “planarization layer.”

As explained in the Petition, Yamazaki discloses a cover layer that is a planarization layer. Pet. at 25-26. Yamazaki teaches that for this layer “it is appropriate to use a material that ... has planarity,” Yamazaki, [0178], and includes Figures showing that the cover layer 1105/1407 has a planar top surface despite the uneven topography below:

¹ Further, Yamazaki, Weaver, and Palanisamy qualify as printed publications under *Lynk Labs, Inc. v. Samsung Elecs. Co., Ltd.*, 125 F.4th 1120, 1132 (Fed. Cir. 2025), as Pictiva acknowledges (POR, 17). The Board should reject Pictiva’s counterargument.

Fig.11

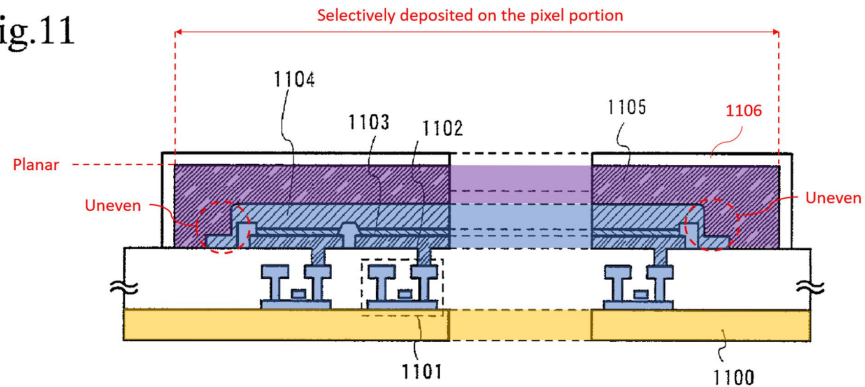
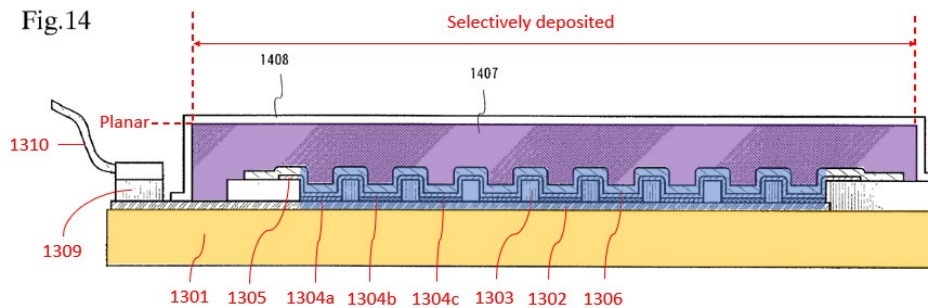


Fig.14



Figs. 11, 14 (annotated).

Pictiva seeks to fault Petitioner for not addressing the district court construction of “*planarization layer*” in the Petition (POR, 26), even though the parties had not agreed to that construction until the petition was filed (*see, e.g.*, Ex. 2019 at 40:24-35). Yamazaki’s cover layer plainly meets this construction. *See* Ex.1032 ¶¶11-14.

For example, Yamazaki teaches that “[a]s a material for forming the cover layer 1105 made of an organic resin, it is appropriate to use a material that ... has planarity.” Yamazaki, [0178]. As Dr. Subramanian explains, a POSITA would understand from this disclosure that the cover layer serves to smooth out uneven

surfaces below it. Ex.1032 ¶12. That is, it “planarizes such that ... the topography of the underlying layer is not reproduced,” as specified by the construction.

Similarly, a POSITA would appreciate Yamazaki’s cover layer “planarizes such that the propagation of defects from one layer to another layer can be interrupted,” as the construction further specifies. For example, it was known that “it is inevitable that some pinholes or defects” will be formed on the cathode of OLED devices (such as in Yamazaki). Suzuki 5:41-45. And it was known that an organic layer (like Yamazaki’s cover) may be used to “make[] a smooth surface on the relatively irregular surface of the cathode,” to facilitate encapsulation. Pet. at 27 (citing Suzuki, 5:59-62; Ex.1003, ¶94); *see also* Ex.1032 ¶14. Thus, a POSITA would recognize that the “planarity” of Yamazaki’s cover layer would ensure that defects will be filled in or smoothed over and thereby not propagated. Ex.1032 ¶14. At a minimum, this would have been obvious, given the known benefits of using such a layer to form a smooth surface over such defects. Accordingly, Yamazaki teaches or at a minimum suggests a planarization layer under the district court construction.

In fact, Mr. Humphrey asserted during deposition that a POSITA would have understood a PML structure such as Yamazaki’s to include a planarization layer that meets Pictiva’s proposed construction. For example:

Q: Does the – do all PMLs include a planarization layer that meets the construction in Paragraph 19?

A: In conception I believe yes.

Q: Why is that?

A: Because that is known to be a function of polymer multi-layers, and in relation to thin film encapsulation

Ex. 1035 at 82:22-83:8 (objections omitted); *see also id.* at 70:13-17 (“Q: Do you believe a POSITA looking at the Pichler email would have the same understanding of what the term PML signifies as you put forward in Paragraph 150? A: Yes, I believe so.”), 82:13-22 (“[T]he email exchange refers to PML And that already indicates to a POSITA that an organic film used for planarization is included”), 72:18-73:7, 78:17-79:4. Additionally, Mr. Humphrey admitted during deposition that Yamazaki teaches a PML structure. Ex. 1035 at 103:16-18 (“I think the Yamazaki disclosure satisfies the broad definition of a PML structure.”); *id.*, 108:11-13. Thus, Mr. Humphrey’s testimony further supports that a POSITA would understand that Yamazaki discloses a planarization layer that meets the district court construction.

Pictiva is wrong to argue that Yamazaki’s cover layer would be too thin to prevent defect propagation. POR at 26-30. Pictiva assumes that because Suzuki suggests that *its* planarizing layer should be 500 nm, whereas Yamazaki describes a

lower preferred thickness range, that Yamazaki's cover layer is too thin. This does not follow. As Dr. Subramanian explains, the thickness of Suzuki's layer relates to the specific needs of Suzuki. Ex.1032 ¶15. That Suzuki used a thicker layer does not mean that Yamazaki's cover layer is insufficient for Yamazaki's application. *Id.* Moreover, "there are a range of different resins with different physical and chemical properties, so to assume just because Suzuki identifies a problem with a thin layer it will necessarily be the case for all such thin layers is incorrect." Ex. 2020 124:16-125:9; *see also id.* 123:22-124:15 ("So his [Humphrey's] analysis here is just wrong. Then that leads to errors in his subsequent paragraphs regarding his whole analysis on the layers being too thin for effective protection."); Ex.1032 ¶16.

Regardless, Yamazaki teaches that its cover layer may readily be made thicker if necessary. *See, e.g.,* Yamazaki, [0090] ("it is possible to make the film thickness thereof thicker than the above stated range by repeating the application and drying processes."). As Dr. Subramanian explains, a POSITA would understand the thickness that would be necessary for the intended application, and it would have been obvious to a POSITA to make the cover layer thick enough to prevent defect propagation. Ex.1032 ¶15.

Pictiva similarly points to Mr. Humphrey's assertion that Yamazaki's inkjet printing and electric field application methods would not be sufficient to "decouple" defects in lower layers while still maintaining planarity. POR at 29-30. This assertion

is similarly unfounded, these methods were known to form sufficiently thick layers, including, for example, by tuning the ink to increase viscosity, or to make further passes. *See* Ex. 2020, 124:1-15; Ex.1032 ¶¶17-19. Pictiva and Mr. Humphrey similarly overstate the “difficulty” of using inkjet techniques to form a layer on “a relatively large area.” POR at 30. In fact, a particular strength of printing techniques such as inkjet is that they scale well to larger areas. Ex.1032 ¶19. Finally, any alleged “precision” issues with inkjet would not increase with scale, as Pictiva suggests. *Id.*

2. A POSITA would have selectively deposited a barrier layer.

The Petition explained that a POSITA would have used Yamazaki’s encapsulation to manufacture a plurality of devices, as taught, for example, by Ghosh. Pet. at 19-23. The result of that modification of Yamazaki is a selectively deposited barrier layer over a plurality of devices. *Id.* Pictiva seeks to complicate the Petition’s theory by suggesting that a POSITA would necessarily make a further modification in view of Ghosh. POR at 31-38. Pictiva’s arguments fail.

Yamazaki expressly discloses that its “barrier layer 1106 is formed selectively using a shadow mask,” Yamazaki, [0183]; Pet. at 29-32, and its figures further illustrate this:

Fig.11

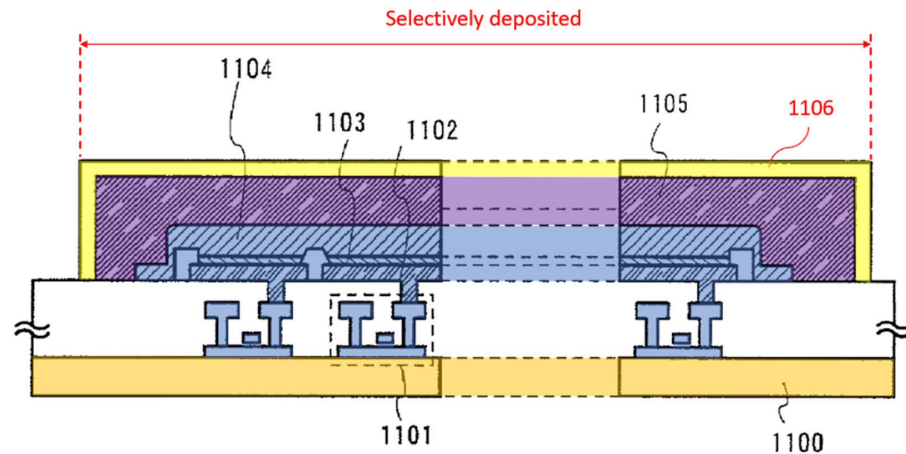
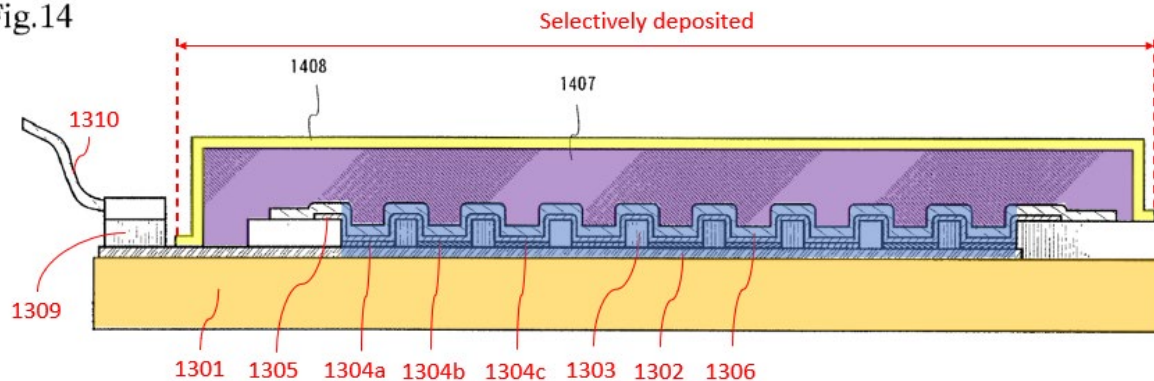


Fig.14



Figs. 11 and 14 (annotated).

Pictiva argues that because Yamazaki “does not involve multiple devices on a substrate” a POSITA would have looked to references like the AAPA or Ghosh for their teachings on depositing a barrier layer. POR at 32. This argument ignores that the Petition specifically relied upon Ghosh for its teachings relating to batch fabrication, not for its teachings on depositing a barrier layer. Pet. at 20-23; Ex.1032 ¶¶22-23. Indeed, the Petition and Dr. Subramanian explained known benefits of such batch manufacture, and that a POSITA would have had a reasonable expectation of success. Pet. at 22-23; Ex.1003, ¶¶84-86; *see also* Ex.1032 ¶¶22-23.

3. A POSITA would have applied Yamazaki's encapsulation to a plurality of devices.

As set forth in the Petition, and as described above, a POSITA would have applied Yamazaki's encapsulation methods to encapsulate a plurality of devices as taught by Ghosh. Pet. at 17-32. The Board credited the Petition's arguments regarding this combination at the institution stage. D.I. at 16.

Pictiva nevertheless argues that a POSITA would not have used Yamazaki's encapsulation to encapsulate a plurality of devices. POR at 33-34. Pictiva dismisses the rationale of the Petition, apparently because it includes "concerns specific to manufacturing and commercialization." POR at 34. Pictiva and Mr. Humphrey assert without support that "Yamazaki's methods are far from ready for manufacturing." POR at 34 (citing Ex. 2046 at ¶¶56-58). Mr. Humphrey appears to criticize Yamazaki for being "silent on fundamental manufacturability concerns." Ex. 2046, ¶59. This simply ignores the rationale presented in the Petition as to why a POSITA would make this modification. *See, e.g.*, Pet. at 22-23; Ex.1003, ¶¶84-86.

Pictiva appears to raise a concern with Yamazaki's use of inkjet for depositing both its EL layer and its cover layer. POR at 34-35. As an initial matter, the '389 patent itself does not describe any particular challenges associated with using inkjet for depositing encapsulation layers on an OLED device. *See generally*, '389 patent at 1:56-67 (describing use of invention to encapsulate "ink-jet printed OLEDs"); 1:48-55 (describing that screen-printing or ink-jet printing may be employed for

depositing the organic layer on the OLED device”). It is thus surprising that Pictiva appears to argue that depositing the EL layer and cover layer using inkjet as taught by Yamazaki would be challenging, or somehow inapplicable for bulk manufacturing. Ex.1032 ¶24.

Moreover, as Dr. Subramanian explains, these purported concerns raised by Pictiva and Mr. Humphrey are unfounded. First, Pictiva and Mr. Humphrey make much of purported challenges with inkjet printing of the OLED device itself. POR at 34-36. But as noted above, the ’389 patent never describes any such challenges, nor describes any particular issues with use of inkjet to deposit an organic layer on top of the OLED device. Ex.1032 ¶25. While Pictiva points to alleged challenges with precision in depositing the OLED layers, POR at 35-36, it fails to explain why these concerns would be material to depositing the claimed encapsulation layers of the ’389 Patent. As Dr. Subramanian explains, there may be different challenges associated with depositing these different layers, they would be particular to the layer being deposited. Ex.1032 ¶26. Indeed, if anything, depositing the encapsulation layers would require less precision than depositing the EL layers, not more. *Id.*

Pictiva next asserts that there would have been issues with inkjet due to the size of the printed area. POR at 36-37. But as Dr. Subramanian explains, a particular advantage of inkjet printing is that it scales well to larger areas. Ex.1032 ¶27. Mr.

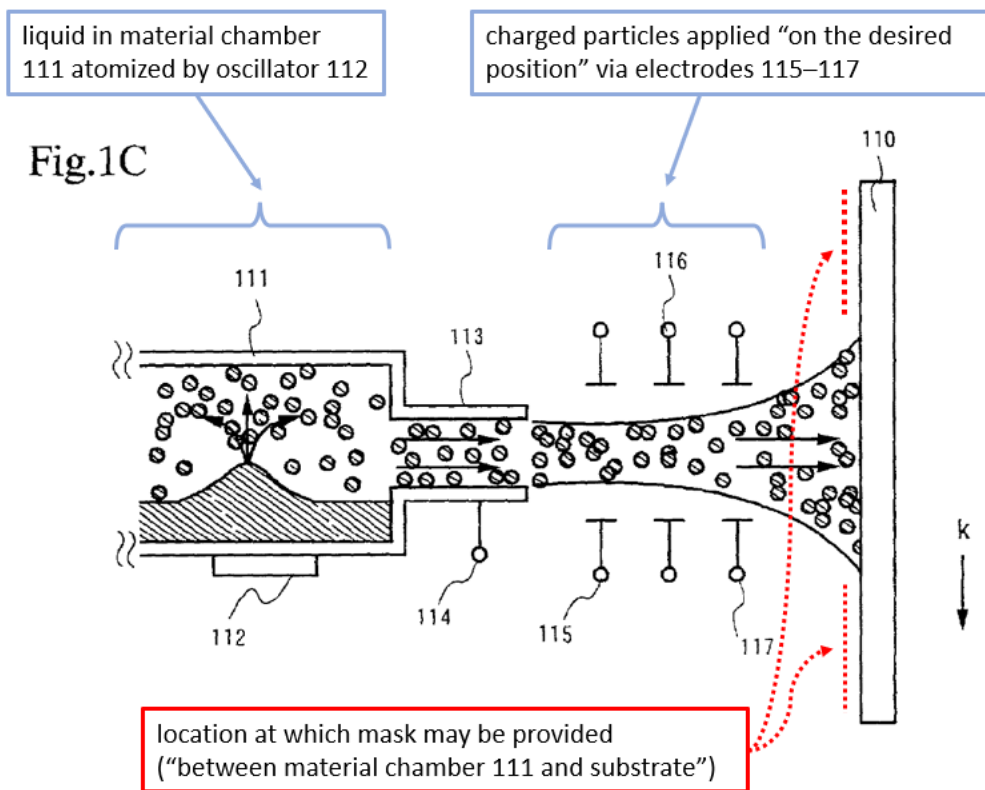
Humphrey's citations to articles relating to other devices, or the work of Vitex do not suggest otherwise. *Id.* Moreover, as Dr. Subramanian explains, it was known at the time of the '389 patent that inkjet could be used to print multiple devices on a glass substrate. Ex. 2020, 153:4-14; Ex.1032 ¶¶27-28.

B. Claim 35

Pictiva repeats the same arguments discussed above with respect to claim 35's requirement that the planarization layer is deposited by inkjet. POR at 38-39. As discussed above, Yamazaki discloses the use of inkjet printing to selectively deposit its cover layer. Pet. at 36-37. And as Dr. Subramanian explains, it was known to use inkjet printing to deposit such layers. Ex. 2020, 153:4-14; Ex.1032 ¶29. Pictiva's arguments thus fail for the same reasons described above.

C. Claim 37

Yamazaki teaches depositing an organic cover layer through a shadow mask. Pet. at 33.



The Petition further explains that, to the extent there is any doubt, it would have been obvious to deposit Yamazaki's organic cover layer through a shadow mask, as taught by Ghosh. Pet. at 34-37; Ex.1032 ¶¶30-31.

Pictiva argues that Yamazaki's disclosures about forming the cover layer using the same process as the EL layer are provided with respect to a different embodiment, and so should not be considered to apply to cover layer 1105/1407. POR at 40. Relatedly, Pictiva argues that the layer described in paragraph [0202] as part of Yamazaki's Embodiment 3 would not be a cover layer because it is the topmost layer. POR, 40. But Yamazaki teaches that Figure 14 (and its cover layer 1407) is part of this same embodiment, and in Figure 14 "barrier layer 1408 is

formed after forming a cover layer 1407.” Yamazaki, [0203]; Ex.1032 ¶32. Indeed, Pictiva acknowledges elsewhere that Yamazaki discloses that its EL layer and the cover layer are formed using the same process. *See, e.g.*, POR, 34 (“The obstacle with Yamazaki would be severe because it uses the same method to deposit both the organic layers of the OLED and the organic cover layer of the encapsulant.”).

Pictiva next argues that even if the cover layer is formed using the same process as the EL layer, it would not be formed with a mask. POR, 40. Puzzlingly, Pictiva points in support to paragraph [0086] of Yamazaki, which specifically teaches that, while it is not shown in Figure 1C, “a mask may be provided.” Pictiva’s argument is contrary to Yamazaki’s teachings. Ex.1032 ¶33.

Pictiva additionally argues that even if a mask were used, it would not be a shadow mask, because the mask “does nothing to further define that position.” POR, 41. This argument similarly fails. Ex.1032 ¶34. Indeed, Yamazaki specifically teaches that a mask may be used “to thereby control the positions on the substrate at which the application liquid is via the mask.” Yamazaki, [0186].

Finally, Pictiva argues that a POSITA would not have used Ghosh’s shadow masking technique to deposit Yamazaki’s layers. POR, 42. However, as noted above, Pictiva has acknowledged that Yamazaki teaches that its cover layer may be deposited using the same technique as the EL layer. POR, 34. Pictiva additionally argues that Ghosh teaches an evaporative process and that a POSITA would not have

extended such a process to Yamazaki's solution-based process. This overlooks that Yamazaki expressly describes the use of a mask with the film deposition method (electric field application method) to control positions. Ex.1032 ¶35. Indeed, this is what the Petition proposed for the combination of Yamazaki and Ghosh. *Id.* Pictiva's argument similarly ignores the known advantages of using a shadow mask. Ex.1003, ¶117; *see also* Burrows-631 (Ex.1022), 4:18-19.

V. GROUND II: YAMAZAKI IN VIEW OF GHOSH AND FUJIMORI

A. A POSITA would have combined Yamazaki with Fujimori

As set forth in the Petition, a POSITA would have applied Fujimori's mask approach when applying Yamazaki's methods to encapsulate a plurality of OLED display panels. *See, e.g.*, Pet. at 38-44; Ex.1003, ¶¶121-22; Ex.1032 ¶¶36-37.

Pictiva argues that even if a POSITA were to use a mask (as Yamazaki affirmatively teaches may be done, Yamazaki, [0086]), it would be placed "between" the material chamber and the substrate, not in contact with the substrate. But a mask in contact with the substrate would still be "between" the material chamber and the substrate. Ex.1032 ¶38. It was well known to apply masks in such a way, and Dr. Subramanian has explained particular benefits associated with such an application. Ex.1003, ¶¶132-39.

Pictiva additionally argues that a shadow mask could not be combined with an electric field application method. POR at 45-46. Pictiva attempts to fault the

Petition for not explaining whether the electromagnet used to adhere the mask would alter particle trajectory. POR at 46. But Dr. Subramanian explained that any such deviation would be “miniscule, and can be ignored.” Ex. 2020, 231:19-234:15. Pictiva seeks to fault Dr. Subramanian for not providing “specifics,” POR at 46, but as Dr. Subramanian testified, his analysis is based on having “personally worked on acceleration and having used magnetic masks before,” such that “[i]t’s clear that this is not going to cause significant deviation.” *Id.* 234:16-22; *see also* Ex.1032 ¶39. Indeed, nothing in Dr. Humphrey’s unsupported conjecture regarding multiplied error rates changes this analysis. *Id.*

Moreover, any such deviations would be much smaller than the natural deviation that occurs using an electric field method. Ex. 2020, 234:12-15; Ex.1032 ¶39. Thus, using Fujimori’s mask to deposit only at the desired position (i.e., the mask opening) would *reduce* the uncertainty of the electric field method. *Id.* Moreover, since Fujimori’s mask is in contact with the substrate, the layer formed on the substrate is deposited only through the mask opening, thereby preventing any lateral particle deviation from impacting the deposited layer. Ex.1032 ¶40. And it would have been well within the skill of a POSITA to adjust the magnetic force and magnetic position to perform the deposition process in this manner. *Id.*

VI. GROUND III: WEAVER

A. Weaver discloses a “planarization layer.”

Weaver expressly discloses a “planarizing layer” 151a made from a “layer of planarizing material,” which “[m]eans a material that forms a smooth planar surface, rather than forming a surface that reflects irregular contours of the underlying surface.” Weaver, [0035], [0052]; Pet. at 71-72. Thus, Pictiva’s assertion that there is “a complete failure of proof” on whether Weaver discloses a planarization layer (POR, 56) is puzzling. Pictiva appears to fault the Petition for not using the language of the district court construction, despite the fact that the parties had not agreed to that construction when the Petition was filed. *Id.* Moreover, Mr. Humphrey admitted that Weaver discloses a PML structure (Ex. 1035 at 108:10 (“Technically it [Weaver] would be a PML, I believe.”), and that a POSITA would have understood a PML structure to include a planarization layer that satisfies this construction (*id.* at 82:22-83:8).

Indeed, Weaver’s disclosures would inform a POSITA that its “planarizing layer” 151a would meet the district court construction of “planarization layer,” as Dr. Subramanian explains. Ex.1032 ¶¶41-42. Weaver teaches that its “planarizing layers” are made from “planarizing material” that “forms a smooth planar surface upon application, rather than forming a surface that reflects irregular contours of the underlying surface.” Weaver, [0035]. Weaver thus teaches that its planarizing layers

do not follow the topology of the underlying surface, as required by the district court construction. Ex.1032 ¶42. Similarly, by smoothing out the underlying contours and forming a “planar surface,” Weaver’s planarizing layers fill in or smooth out any defects in the underlying surface, including defects from cathode formation as Suzuki described. *See, e.g.*, Suzuki 5:41-45; Ex.1032 ¶42.

B. Weaver discloses “selectively depositing.”

Pictiva argues that Weaver does not disclose selective deposition of its layer 151a because structure Weaver’s structure *could* be formed by non-selective deposition followed by patterned etching. POR at 58-59. Weaver provides no support for this conjecture. Instead, Weaver discloses deposition sources with apertures that selectively deposit its planarization and barrier layers:

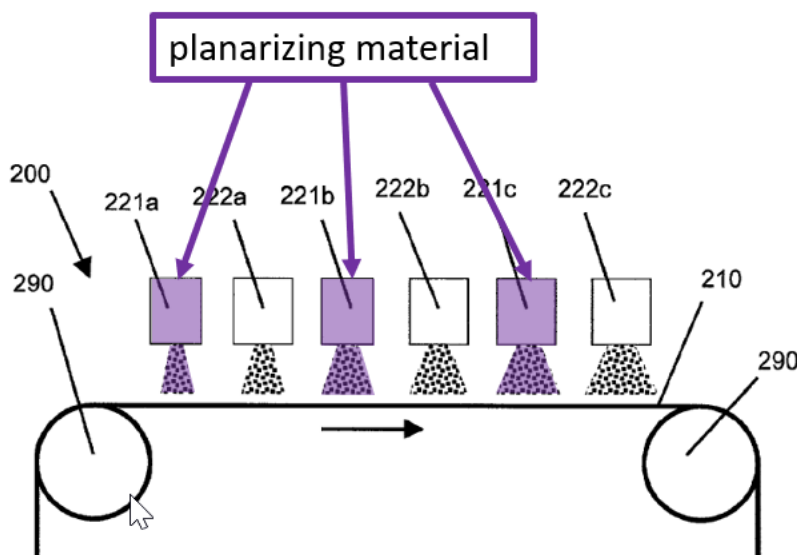


Fig. 8

Weaver, Fig. 8; *see also* Fig. 9; Pet., 72-73. This method is selective, as it “deposits[s] a material only in desired areas, such that no additional processing must be performed for removing unwanted material.” Ex.1032 ¶¶43-44.

Weaver does not describe any subsequent etching step. Ex.1032 ¶45. And elsewhere in its POR Pictiva acknowledges that Weaver’s web-based processing “achieved ‘selective deposition.’” POR, 73. In addition, to obtain the structures shown in Weaver’s figures without selective deposition, an etch step would have to be used after depositing each layer, thereby effectively doubling the number of necessary process steps. Ex.1032 ¶45.

Pictiva also appears to argue that the deposition process of Figure 8 would apply only to Weaver’s barrier region 120, and not to barrier region 150. POR at 60-62. Not so. Weaver explains that “[d]eposition of progressively larger cooperative barrier layers can be achieved in a number of ways,” referring specifically to Figure 8. Weaver, [0057]. Weaver further teaches that barrier region 150 comprises cooperative barrier layers, Weaver, [0052], and that barrier region 150 “can be arranged in essentially the same fashion as the first barrier region 120,” *id.*, [0010]. Accordingly, a POSITA would recognize that the Weaver’s selective deposition method, as shown in Figure 8 would be used for its barrier region 150. Ex.1032 ¶46.

VII. GROUND IV: WEAVER IN VIEW OF PALANISAMY

A. Claim 35

Pictiva disputes that a POSITA would have deposited Weaver's organic layer using inkjet printing. POR at 63-71. Pictiva largely repeats criticisms of the use of inkjet to selectively deposit encapsulation layers generally, which fail for the same reasons described for Grounds I-II. Pictiva again points to Sturm's disclosures relating to the thickness of its inkjet printed layer, but as Dr. Subramanian explains, Sturm was focused on depositing an EL layer, not an encapsulation layer. Ex.1032 ¶47. As Dr. Subramanian explains, it was well within the skill of a POSITA to form thicker layers using inkjet printing. *Id.* Pictiva also overlooks Weaver's teaching that its planarizing layers can be "provided using techniques known in the art," Weaver, [0035], and "in a number of ways," *id.*, [0057]. Deposition by ink jet was a known technique for depositing such planarization layers, and was further known to provide specific benefits. Pet. at 77-80; Ex.1003, ¶¶198-204. Moreover, Palanisamy expressly discloses the use of an "ink jet printer" for "selectively applying an organic passivation material." Palanisamy, [0021], Abstract. Thus, contrary to Pictiva's contention that there would somehow be "a large number of choices," POR at 70, inkjet printing was one of a finite number of known options, known to provide specific benefits. Ex.1032 ¶¶47-48. As the Petition explains, a POSITA would have

used this approach to obtain these known benefits. Pet. at 77-80; Ex.1003, ¶¶198-204.

B. Claim 36

While Pictiva argues that there is no evidence that screen printing could operate at low temperature, or with the desired viscosity for Weaver's process, POR at 72-73, this overlooks that Palanisamy specifically teaches a low temperature process, Palanisamy, [0025]. Moreover, as Dr. Subramanian explains, it would have been obvious to a POSITA to use a material with a viscosity conducive to screen printing as taught by Palanisamy. Ex.1032 ¶¶49-50.

VIII. GROUND V: WEAVER IN VIEW OF BURROWS

Pictiva fails to engage with the Petition's grounds in arguing that Petitioner has not explained why a POSITA would use Burrows' masks with Weaver. POR at 73-74. The Petition and Dr. Subramanian explain the benefits obtained from Burrows' shadow masks, Pet. at 88-90, including the more precise control afforded by shadow masks. *See also* Ex.1003, ¶222. Additionally, Weaver explains that its method of depositing its layers "can be achieved in a number of ways," and the use of Burrows' shadow masks would have been a natural application of a known technique ready for improvement. Pet. at 88-90; Ex.1003, ¶¶212-23. Accordingly, a POSITA would have used Burrows' shadow masks to deposit Weaver's layers. Ex.1032 ¶51.

Date: October 9, 2025

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CERTIFICATION UNDER 37 C.F.R. § 42.24(D)

I certify that the foregoing complies with the type-volume limitation of 37 C.F.R. § 42.24 and contains 5,513 words based on the word count indicated by the word-processing system used to prepare the paper, and excluding those portions exempted by § 42.24(a).

Date: October 9, 2025

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6, I hereby certify that the foregoing Petitioner's Reply was served by electronic mail on the following counsel of record for patent owner:

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