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UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG DISPLAY CO., LTD.;)
 Petitioner,)
 vs.) Case No. IPR2024-01222
PICTIVA DISPLAYS) Patent No. 6,949,389
INTERNATIONAL LTD.;)
 Patent Owner.)
_____)

REMOTE DEPOSITION OF
VIVEK SUBRAMANIAN, Ph.D.
Barberine, France
Friday, October 31, 2025

Reported by:
Lynda L. Fenn, CSR, RPR
CSR No. 12566
JOB No. 7682406

1 UNITED STATES PATENT AND TRADEMARK OFFICE
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD
3

4 SAMSUNG DISPLAY CO., LTD.;)
5 Petitioner,)
6 vs.) Case No. IPR2024-01222
7 PICTIVA DISPLAYS) Patent No. 6,949,389
8 INTERNATIONAL LTD.;)
9 Patent Owner.)
10 _____)

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12
13 REMOTE DEPOSITION of VIVEK SUBRAMANIAN,
14 Ph.D., taken on behalf of Patent Owner,
15 Barberine, France, at 11:01 a.m. and ending at
16 2:57 p.m., Friday, October 31, 2025, reported
17 by Lynda L. Fenn, CSR No. 12566, Certified
18 Shorthand Reporter within and for the State of
19 California, pursuant to notice.
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I N D E X

EXAMINATION BY:	PAGE
MS. ZHONG	6

EXHIBITS MARKED

NUMBER	DESCRIPTION	PAGE
Exhibit 1	A five-page document entitled SPIE Publications	55

EXHIBITS MARKED IN PRIOR SESSIONS

NOT ATTACHED

DEPOSITION EXHIBIT	PAGE
Exhibit 1001	53
Exhibit 1003	8
Exhibit 1004	94
Exhibit 1005	135

1
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EXHIBITS MARKED IN PRIOR SESSIONS - (Continued)

NOT ATTACHED

DEPOSITION EXHIBIT	PAGE
Exhibit 1006	75
Exhibit 1008	115
Exhibit 1028	53
Exhibit 1029	54
Exhibit 1032	22
Exhibit 1033	94
Exhibit 1060	98
Exhibit 2023	52
Exhibit 2048	26
Exhibit 2100	134

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Barberine, France
Thursday, October 31, 2025
11:01 a.m. - 3:02 p.m.

THE COURT REPORTER: Good morning. This
is Lynda Fenn, California CSR No. 12566.

Doctor, please raise your right hand to be
sworn.

VIVEK SUBRAMANIAN, Ph.D.,
produced as a witness on behalf of the Patent Owner,
and having been first duly sworn, was examined and
testified as follows:

THE COURT REPORTER: Thank you very much.
Go ahead, Counsel.

EXAMINATION

BY MS. ZHONG:

Q Good evening, Dr. Subramanian.
I first wanted to discuss with you the
meaning you have applied to the term "planarization
layer."

So for your opening declaration what is

1 the meaning of "planarization layer" that you
2 applied?

3 A Okay. Good evening.

4 So, as you know from my declarations, I
5 didn't actually have to construe planarization layer
6 for the purposes of my opinions simply because in my
7 opinion the grounds that I identify for my
8 invalidity analysis disclosed planarization layer
9 under any reasonable meaning of the term.

10 Having said that, in general, if we look
11 at the characteristics of a planarization layer,
12 some of the characteristics that we might see in a
13 reasonable interpretation of that would involve, for
14 example, reduction in the non-planarity or a
15 smoothing of the underlying topology, whether that
16 topology is intentional topology, such as steps or
17 unintentional topology, such as defects.

18 Q Okay.

19 And let's just be clear. In your original
20 declaration, you did not make any analysis that the
21 planarizing material in Yamazaki would interrupt the
22 defect characterization; is that correct?

23 What are you looking at, Dr. Subramanian?

24 A Well, you asked me a question in relation
25 to my original declaration, which is Exhibit No. --

1 I believe it's Exhibit No. 1003, and that's exactly
2 what I'm looking at.

3 Q Okay.

4 (Exhibit 1003, previously marked, not
5 attached.)

6 THE WITNESS: Okay.

7 So with respect to the planarization layer
8 and with respect to what I cite to in Yamazaki, for
9 example, with respect to element 34(b), I address
10 the planarization layer analysis, for example, in
11 paragraphs 94 with respect to some of the teachings
12 of Yamazaki and further with respect to paragraph 97
13 with respect to Yamazaki.

14 Now, in both of those, I do call out that
15 it is -- it provides planarity, so it has the
16 smoothing function that I described earlier.

17 In my opinion that would, indeed,
18 address -- because it's smoothing, it will address
19 underlining non-planarity, whether that is from
20 defects or from intentional planarity, but it is
21 true that I didn't explicitly call out addressing
22 defects in these situations.

23 MS. ZHONG: Okay.

24 BY MS. ZHONG:

25 Q So let's be clear, in your original

1 declaration you never applied expressly that
2 Yamazaki cover layer 1105 or 1407 would cover or
3 interrupt a defect; correct?

4 A I think I understand.

5 And by expressly do you mean did I
6 expressly use the words "defects," and in that case
7 I would say no.

8 And as I just pointed out, I not use the
9 word "defects" in this situation and discuss how it
10 would cover it.

11 But the nature of the material or the
12 nature of the planarization function provided by
13 this material would be what a POSITA would know to
14 be equally applicable, whether it was intentional
15 topography or unintentional topography arising from
16 defects.

17 Q Okay.

18 So someone has to read your mind to
19 understand what you are saying; correct?

20 MR. GARR: Objection.

21 THE WITNESS: No, I disagree. I think a
22 POSITA who is reading what Yamazaki discloses would
23 know it. They don't need to reading my mind.

24 BY MS. ZHONG:

25 Q So for the Yamazaki section, the word

1 "defect" just does not appear; correct?

2 A For the Yamazaki section, you mean what I
3 wrote with respect to that section?

4 Q Yes, correct.

5 A Agreed. I agreed.

6 Q Okay.

7 And does Yamazaki actually mention defect
8 at all?

9 A Please bear with me. I'm going to have to
10 open Yamazaki.

11 No, I don't believe so. I did a quick
12 search and I didn't see the word "defect" appear in
13 Yamazaki.

14 Q Okay.

15 And in your reply declaration you start to
16 address Yamazaki's supposed defects by referencing
17 Suzuki; is that correct?

18 A No, that's not entirely true.

19 So, it is true that I mention Suzuki in
20 paragraph 14 of my reply declaration. But in
21 paragraph 13, I essentially say what I just told you
22 now and what is essentially what was in my original
23 declaration, which is the nature of the
24 planarization layer, the fact that the it provides
25 this planarization would address the defects.

1 So in paragraph 13 I'm not referencing
2 Suzuki, but I say specifically a POSITA would also
3 understand that Yamazaki's cover layer 1105 or 1407
4 would interrupt the propagation of defects from one
5 layer to another layer and then I go on to site to
6 specific language within Yamazaki.

7 Q Okay.

8 In paragraph 13 it's just your opinion,
9 you don't have any support?

10 A I disagree. I point to specific sections
11 of Yamazaki which describes how the layer works.

12 Q Okay.

13 So the layer of Yamazaki only says it is
14 appropriate use material that has planarity.

15 Nothing about defects; correct?

16 A I agree.

17 Q Okay.

18 Then you say as a POSITA would recognize
19 something of an uneven surface in this way would
20 prevent any defects from the underlying surfaces to
21 be propagated to layers above.

22 That's your opinion; correct?

23 A Yes, that -- I mean, this whole report is
24 my opinion.

25 Q That's your opinion, but you did not cite

1 anything else outside of your opinion to say -- to
2 indicate -- to show that a POSITA would, indeed,
3 recognize that's a fact; right?

4 A Outside of citing to the planarity,
5 specifically identified by Yamazaki itself, it's
6 true. I didn't cite to anything else in this
7 paragraph.

8 Q Okay.

9 So you basically saying to the board trust
10 me, that's what a POSITA would understand, it's
11 because I said so?

12 A No, that's not true.

13 Q Okay.

14 A I think -- I certainly -- I hope the board
15 does trust me, but that's not just what I'm saying.

16 Q Okay.

17 A I'm pointing to the specific language of
18 Yamazaki which identifies that the material provides
19 planarity. And then I relate that specifically to
20 how that would react to defects from the underlining
21 surfaces.

22 Q Okay. So --

23 A So, it's not just a matter of saying trust
24 me. It's actually calling out what planarity would
25 mean in this context.

1 Q So which reference actually links
2 planarity to defect, that interrupt the defect
3 propagation, besides your word, a POSITA would
4 recognize it.

5 So which reference actually linked those
6 two prongs?

7 A Well, with respect to paragraph 13, I
8 don't -- as I've already told you, I'm only pointing
9 to Yamazaki. And with respect to Yamazaki, I've
10 agreed it doesn't identify any defects.

11 So, at least with respect to paragraph 13,
12 there's no explicit linking of defects to planarity.

13 Q Okay.

14 So, in order to link planarity to defects,
15 you are looking to Suzuki; correct?

16 A No, that's not true. It is one of the
17 things I do.

18 Q Okay.

19 A But I also say that it is within the
20 knowledge of a POSITA.

21 Q Okay.

22 A So, within the knowledge of a POSITA and
23 to show some -- set an example of how it would be
24 within the knowledge of POSITA, I do point to Suzuki
25 and that's in paragraph 14.

1 Q So, the evidence for you to say it's
2 within the knowledge of a POSITA to link planarity
3 with defect is Suzuki; correct?

4 A No, no, that's not true. That is one of
5 the pieces of evidence. But that, again, this
6 ground or at least with respect to this limitation
7 doesn't specifically require Suzuki.

8 It's the knowledge of a POSITA to show one
9 example of what a POSITA would know, I do point to
10 Suzuki.

11 Q Okay.

12 So, the evidence, besides your own words
13 to say that's within the knowledge of a POSITA is
14 Suzuki; correct?

15 So, taking away what you say as a POSITA
16 would recognize blah, blah, blah, I'm asking you to
17 show me a piece of independent evidence that a
18 POSITA would recognize planarity and defects are
19 linked together.

20 The only evidence you have cited a Suzuki;
21 correct?

22 MR. GARR: Objection.

23 BY MS. ZHONG:

24 Q Not your own words, some independent
25 source that's support your words?

1 A I'm not sure I fully understand, but I
2 think you are asking me if there's any other
3 reference outside of the disclosure of Yamazaki
4 itself, and the only thing I point to with respect
5 to this is Suzuki.

6 Q Okay.

7 So, other than your own words that you --
8 you basically are asking the board to trust you, and
9 Yamazaki's disclosure that its material has
10 planarity, the only thing you have is Suzuki;
11 correct, to link planarity to defects?

12 MR. GARR: Objection.

13 THE WITNESS: So, of course, that's an
14 incorrect characterization of what I said earlier.

15 I did say that all I'm asking the board to
16 do is trust me. I have pointed to how a POSITA
17 would interrupt it.

18 But it is true that other than Yamazaki
19 and how the language of Yamazaki would be read by a
20 POSITA, the only additional reference that I point
21 to in this section is Suzuki.

22 MS. ZHONG: Okay.

23 BY MS. ZHONG:

24 Q So, in order to go from Yamazaki's
25 reference to just planarity -- to that particular

1 planarity, is going to interrupt the propagation of
2 defects, the board has to look to -- first of all,
3 to look to Suzuki.

4 And then second, to your opinion that
5 supposedly a POSITA would recognize the planarity --
6 a planar surface would prevent any defects from the
7 underlying surface to be propagated to layers above;
8 right?

9 A I didn't understand the question.

10 Could you ask that again, please? It was
11 sort of -- I didn't get the phraseology.

12 Q Okay.

13 So, Yamazaki only mentions planarity, no
14 defects; correct?

15 A I agree.

16 Yamazaki specifically talks about
17 planarity and the words "defects" do not appear.

18 Q Okay.

19 So, in order for you to link the planarity
20 to the defect aspect, you are relying on two types
21 of evidence.

22 One is your opinion of what a POSITA
23 allegedly would understand; correct?

24 A Well, no, that's not entirely true. I
25 think -- so it is true that it is my opinion that

1 that's how a POSITA would understand it, but that is
2 the nature of defects and non-planarity.

3 In other words, if we have a pinhole, by
4 definition a pinhole is a change in the topology, so
5 it's not that it's my opinion, that's the facts.

6 And it is true how a POSITA would
7 interpret it would then be that a planar surface on
8 top of that will prevent the propagation of said
9 defects.

10 Q Okay.

11 Can you point me in your opening
12 declaration where you say a pinhole is a topology or
13 a defect is a topology? Where did you say that in
14 your opening report or opening declaration?

15 A I don't think I used the word "pinhole."

16 Q Okay.

17 A So I guess, therefore, the answer would be
18 I did not.

19 Q Okay.

20 Now, what is the relevance of Suzuki to
21 Yamazaki?

22 A I don't understand your question.

23 Q Why are you citing Suzuki?

24 A Oh, so again, with respect to paragraph
25 14, the reason I'm citing Suzuki is just as

1 additional evidence for what was within the
2 knowledge of a POSITA.

3 And I'm not -- it's not a part of the
4 ground. It's just -- because this ground is
5 Yamazaki and Ghosh.

6 Here it's just to -- I make a statement as
7 the prior art teaches in paragraph 14 -- as the
8 paragraph -- as the prior art teaches, it was within
9 the knowledge of a POSITA that such an organic layer
10 could be used to make a smooth surface on the
11 relatively irregular surface of the cathode when
12 forming OLED devices and that comes from Suzuki.

13 But what that is really backing up is what
14 I said in the previous paragraph is that the
15 planarity would smooth out underlying surfaces and
16 would prevent any defects from the underlying
17 surfaces to be propagated to layers above.

18 Q And you are not saying that Yamazaki has
19 the same material sets or topology as in Suzuki;
20 correct?

21 A No, I'm not.

22 Q Okay.

23 And Yamazaki is not using the same
24 manufacturing methods as Suzuki either; correct?

25 A They're certainly not identical, I agree

1 with that.

2 Q Okay.

3 And Suzuki and Yamazaki also use different
4 encapsulation methods; right?

5 A Please bear with me while I open up
6 Suzuki.

7 Could you repeat your question, please?

8 Q Let's take a look at the real-time.

9 Suzuki and Yamazaki also use different
10 encapsulation methods; correct?

11 A Could you explain what you mean? I'm not
12 sure what you mean by that.

13 Q Suzuki and Yamazaki use different
14 encapsulation methods; correct?

15 A Just to be clear, I said I didn't
16 understand what you meant by that, but just repeated
17 the question, so it hasn't changed.

18 I don't understand what you mean by that
19 question.

20 Q Which aspect don't you understand?

21 A So, you are saying "methods."

22 Is there something specific you are
23 referring to with respect to Suzuki and Yamazaki? I
24 haven't memorized them --

25 Q Okay.

1 A -- so I need to understand what you are
2 specifically referring to.

3 Q So, for example, Yamazaki uses inkjet
4 printing and electric field application methods
5 specifically for its cover layer; correct?

6 A Those are two specific techniques that it
7 calls out, yes.

8 Q Okay.

9 Suzuki doesn't mention either; correct?

10 A I agree with that, that's true.

11 Q Okay.

12 And Suzuki specifically mentions for its
13 system it needs to have an organic layer that is at
14 least 500 nanometers thick and preferably at least
15 one micron thick; correct?

16 A Could you point me to what you are
17 referring to, please?

18 Q Do you have Suzuki?

19 A I do.

20 Q Okay.

21 Look at it bigger.

22 A Okay.

23 Q Do you so for its performance in order to
24 get reasonable performance, the thickness of the
25 organic layer needs to be 500 nanometers at least?

1 A I understand. So you are referring to
2 figure four?

3 Q Yes, in particular.

4 A I agree.

5 With respect to this figure if you are
6 looking at the metric of -- of the average diameter
7 of dark spots, to get to the minimum you need to be
8 at or more than 500 nanometers, so half a micron or
9 more.

10 Q Yeah.

11 And preferably probably one or more one
12 microns, because 500 nanometers seems that that
13 curve is too curving, curving downwards.

14 It's not reaching the flat area yet;
15 correct?

16 A Well, it depends on what your target is,
17 but it's certainly true that it's not fully
18 saturated in terms of that.

19 Q Okay.

20 And so at the time of the invention, which
21 is 2001, 2002, what's the target dark spot diameter,
22 typically?

23 MR. GARR: Objection.

24 THE WITNESS: I don't know. Certainly
25 that's not a fact I've memorize.

1 MS. ZHONG: Okay.

2 (Exhibit 1032, previously marked, not
3 attached.)

4 BY MS. ZHONG:

5 Q And for the Yamazaki examples you
6 specifically used two figures for the -- what you
7 call the planarization layer, which is Yamazaki
8 figure 11 and Yamazaki figure 14; correct?

9 A With respect to the section where I teach
10 -- so where I discuss what Yamazaki teaches for the
11 planarization layer, which in my reply declaration,
12 Exhibit No. 1032, for claims 34 and 40, I address in
13 paragraphs 11 and 12 of my declaration -- and I
14 guess it goes on it -- yeah, paragraphs 11 and 12.

15 The figures that I cite to there are
16 annotated versions of figures 11 and 12 -- sorry,
17 figures 11 and 14.

18 Q And the same in your opening declaration;
19 correct?

20 A Yes, those same figures appear at the
21 bottom of paragraph 92 and paragraph 95 of my
22 opening declaration.

23 Q And you are not relying on other figures
24 for the -- against claims 34, et cetera; correct?

25 A Did you mean with respect to this

1 planarization?

2 Q Yes.

3 A Yes, that's true, with respect to the
4 figures I -- besides the various parts of the text,
5 the figures that I put in my declaration, both the
6 original and the rely are figures 11 and 14 and I
7 don't put any other figures there.

8 Q Okay.

9 And figure 11 is associated with
10 embodiment number three; correct?

11 Why don't we go to Yamazaki paragraph 175,
12 176 and 177 and take a look at it.

13 A Yes, I agree the discussion of figure 11
14 falls under the subheading embodiment three, which
15 is paragraph 175.

16 Q Okay.

17 And in this embodiment number three, and
18 the rest of the Yamazaki, it doesn't mention that
19 the cathode have defects, for example; correct?

20 A If I could -- I think you asked me sort of
21 a broader question than that earlier which is, does
22 the word "defect" appear?

23 Q Okay.

24 A And the answer is not.

25 So, the word "defect" wouldn't appear in

1 discussing the cathode.

2 Q Okay.

3 So Yamazaki doesn't mention that its
4 cathode has defects?

5 A That's fair.

6 Q Okay.

7 A It certainly doesn't use the word
8 "defects."

9 Q Okay.

10 And you are drawing the inference that
11 Yamazaki's cathode could have defects by referencing
12 to Suzuki; correct?

13 A No, that's not true. I point out that
14 Yamazaki clearly identified the planarization.

15 Q Uh-huh.

16 A In the case where there are defects,
17 whether they are there or not, it doesn't matter.

18 The planarization function would cover or
19 eliminate the topological variations coming from
20 such defects. And as further evidence of that, I
21 point to where one of skill would know, for example,
22 as evidenced by Suzuki.

23 Q Okay.

24 So it's not inherent that Yamazaki's
25 cathode has defects?

1 A I agree with that.

2 Q Okay.

3 And your position is that if there is
4 defects, then the planarity can fill in those
5 defects and smooth it out; is that correct?

6 A Yeah. I mean, that's approximately what I
7 say with respect to the specific defect section that
8 I provide in the reply declaration that we've been
9 discussing, which I believe was in paragraph 13 and
10 14 of my reply declaration.

11 Q Okay.

12 So then let me understand your -- let me
13 just clarify something with you.

14 So, for the district court claim
15 construction for planarization, there are two
16 prongs; correct? One is the layer of material that
17 planarizes would not -- would interrupt the
18 propagation of defects. And the second is that it
19 would not reproduce the underlying topography.

20 So, is it your opinion that those two
21 prongs go hand in hand?

22 A Could you -- I'm sorry, you are asking me
23 about the district court claim construction, which I
24 certainly have not memorized.

25 Could you please provide that to me again,

1 please?

2 Q Sure. Let me see -- you want to use the
3 Exhibit Share, right?

4 A Yeah.

5 I mean, I have the drop box opened, so if
6 it's a simple document, I can download it from
7 there.

8 Q Okay. That would be Exhibit No. 2048.
9 (Exhibit 2048, previously marked, not
10 attached.)

11 THE WITNESS: Okay. The claim
12 construction order. Okay. Just bear with me.

13 No, it's going to requiring me to -- no, I
14 can continue to do it. It says, Continue with
15 download only.

16 Okay. Bear with me while I transfer it
17 into the blank folder that I'm using.

18 BY MS. ZHONG:

19 Q And go to page -- I believe it's page 50.
20 No, page 49.

21 A Okay.

22 Yeah, I have it in front of me.

23 Q Okay.

24 So, do you see the two -- the claim
25 construction for planarization layer?

1 A Yes.

2 Q And the definition is: A layer of
3 material that planarizes, such that the propagation
4 of defects from one layer to another layer can be
5 interrupted and the topography from the underlying
6 layer is not reproduced.

7 Do you see that?

8 A I do.

9 Q So, is it your opinion that if the
10 topography of the underlying layer is not
11 reproduced, then the propagation of defects is
12 necessarily interrupted from one layer to another
13 layer?

14 A So, I mean, at a high level -- so it's not
15 necessary.

16 So every planarization layer will work
17 within a certain sort of manufacturing reality. For
18 example, if I had a defect that was a meter tall,
19 putting a micrometer layer of planarization, would
20 not eliminate the defect.

21 But given the typical range of defects
22 that you would expect, the same planarization
23 function that will interrupt -- that will planarize
24 underlying topography so that the underlying
25 topography is not reproduced, will tend to also

1 interrupt the propagation of defects.

2 Q Okay.

3 It will tend to, but it's not necessarily
4 doing that; correct?

5 A Well, that's fair enough. I mean, I think
6 it -- so it's depends on -- if you -- again, as I
7 said, if you have the extraordinary case of having a
8 defect that is a meter tall, you are not going to
9 planarize it. You are not going to interrupt it,
10 because it's going to punch through everything.

11 But is it the nature the layer of material
12 that planarizes would be such that if you had
13 certain types of defects and the common defects are
14 much, much smaller than the underlying layer of
15 topography, then the general result would be,
16 indeed, that you would interrupt the propagation of
17 the defects and you would not reproduce the
18 underlying layer of topography.

19 Q Okay.

20 And in Yamazaki's device, what would be
21 the typical defect size?

22 A So, generally speaking, if you look at
23 defects that occur in these systems, they are a
24 fraction of the topography of the layer of
25 thickness.

1 It's extremely unlikely to get defects
2 that are much larger than the thickness of the layer
3 itself.

4 So, as a general result what you will get
5 in a functional device is, let's say, I have a layer
6 of thickness of 200 nanometers, you would have
7 defects within it that will be less than 200
8 nanometers in height.

9 And the point being, therefore, if you
10 have a layer that planarizes a 200 nanometer
11 intended step, it will then also provide
12 planarization and, therefore, prevent the
13 propagation of defects that will be 200 or less.

14 Q Okay.

15 So, in Yamazaki's embodiment three, what
16 is the size of the device that it is covering?

17 A You said embodiment three?

18 Q Correct.

19 A So, with respect to embodiment three -- so
20 in the specific text of embodiment three between
21 paragraphs 176 and 184, it doesn't call out the
22 layer of thicknesses, but it points back to the fact
23 that the layers that could be used could be the same
24 materials as the previous embodiment.

25 And specifically, refers to embodiment one

1 for the EL layer.

2 Q Uh-huh.

3 A It does talk about the cover layer
4 thickness as being between ten and 300 nanometers.

5 Q Okay.

6 A If we go back to the EL layers that are in
7 embodiment one, it says the EL layer thickness is in
8 the range of 30 to 150 nanometers, preferably 40 to
9 100 nanometers.

10 Q But the cover layer also has to cover the
11 cathodes and the anodes, as well as the TFT; right?

12 A Yes, I agree.

13 Q And what's the thickness of the cathodes,
14 the anodes and the TFT?

15 A So, let's see.

16 So, for the TFT, the channel film
17 thickness, which is the -- what it calls the active
18 -- I believe it calls it the active layer of
19 thickness, it does.

20 Q Okay.

21 A It is 20 to 50 nanometers, more preferably
22 25 to 40 nanometers.

23 Let's see.

24 Q How about for cathodes?

25 A Yeah, bear with me.

1 Q The cathode is not the active film; right?

2 A Sorry, say that again, please.

3 Q The 20 to 25, that's for the TFT; right?

4 A Correct, that's the channel film of the

5 TFT.

6 Q Okay.

7 I don't see the thickness for the anodes

8 or the cathodes.

9 A So, in embodiment two, it does call out

10 the thickness of the indium tin oxide. Indium tin

11 oxide would be a typical anode material and it calls

12 it out as 110 nanometers.

13 Q 110. Okay.

14 A Yep.

15 Q So 40 to 60 for the EL layer, 20 to 50 for

16 the or 20 to 40 for the TFT layer.

17 What about for the cathode?

18 A Yeah. So I found out in paragraph 139

19 when it talks about the cathode, it says the

20 thickness of the cathode is between 180 and 300

21 nanometers, typically between 200 and 250

22 nanometers.

23 Q Okay.

24 So, if we just add up the cathode and the

25 anode, to me that's already exceeding -- or pretty

1 close to the 300 nanometers, exceeding the 300
2 nanometer range; right?

3 A I didn't write all of those numbers down,
4 but I'm happy to proceed with that assumption.
5 Sure.

6 Q So, if I remember you said the anode is
7 around 110 nanometers; right?

8 A Sorry, I didn't write it down while I was
9 answering your series of questions.

10 I will have to go back and check.

11 Q Okay.

12 A So, let me go -- let's start from where I
13 was. I said, so the anode which was the ITO --

14 Q You said it's around 110 nanometers?

15 A Yes, that's right. That was in paragraph
16 129 of Yamazaki.

17 Q Okay.

18 Then paragraph 139 mentions an EL layer
19 where it's a thickness between 80 to 200 nanometers,
20 typically between 100 and 120 nanometers.

21 And the cathode is between 180 and 300
22 nanometers. And typically between 200 to 250
23 nanometers.

24 So, if we just add up the two thickness in
25 paragraph 139 and the lower end of the typical

1 range, that's going to be 300 nanometers there;
2 right?

3 A I agree ,Yes.

4 Q And without adding the channel films
5 thickness or the anode; right?

6 A Well, just to be clear, the channel is not
7 under the -- they are not stacked on top of each
8 other. The channel is always to the side, so adding
9 it would be technically wrong.

10 Q Okay.

11 A But it's true that the anode was not
12 included.

13 Q Okay.

14 So, if we added the 110 or anode that will
15 be about 400 nanometers at least, 410 nanometer to
16 be more --

17 A Approximately, yes, I agree. It's on the
18 order of 400 nanometers.

19 Q And that would exceed the preferred
20 thickness range for the cover layer in embodiment
21 three; right?

22 A Correct, and that's the whole point of the
23 planarization. If you look -- let's look
24 specifically at figure 11.

25 Q Uh-huh.

1 A So, in the areas -- so, let's say the
2 height of the structure is 400 nanometers. So if we
3 look at the annotated figure 11 that I have on the
4 top of page five of my reply declaration.

5 Q Okay.

6 A Let's say that the total -- the blue stack
7 that I show there above the bottom white region is
8 using your numbers. Let's say it's about 400
9 nanometers thick.

10 Q Uh-huh.

11 A And then on top of that we're putting the
12 planarization layer.

13 On the side where the blue layer is not
14 there because of the planarization function, it
15 would be effectively much thinner. That's the whole
16 point of planarization is in the regions where it
17 doesn't need to be thick, it will hit the target
18 film thickness.

19 But in the regions where it needs to be
20 much deeper, it will be much thicker. That's the
21 whole point of planarization. It fills the gaps, so
22 to speak.

23 Q Okay.

24 So, is it your position that in the
25 material that's deposited directly above the cathode

1 would be much thinner than the materials that's on
2 the edge?

3 A I mean, that's what the figure shows,
4 right.

5 Q Okay.

6 A We can see that. We can see it's thinner
7 over the active device and in the field regions it's
8 thicker, that's the nature of planarization.

9 Q Okay.

10 So, for example, the material that's above
11 the cathode, could be just ten nanometers thick;
12 right?

13 A No. Actually, if you look at the figures,
14 it doesn't suggest that. If you look at the way
15 this is drawn, it's not intended to be to scale.
16 But the thicknesses are all in the same region.

17 So, it's not like it's ten nanometers on
18 top of a 400 nanometer stack. It is hundreds of
19 nanometers on top of hundreds of nanometer stack.
20 And on the side it's much thicker. That's what the
21 figure shows.

22 Q What I'm saying is that given that the
23 preferred range is 10 to 300 nanometers.

24 The layer that's directly above the
25 cathode could be as low as 10 nanometers thick;

1 correct?

2 A If for that particular device structure
3 you chose to take the lowest end of the range, I
4 agree.

5 In that situation it would be on the top
6 of the topography, you would have a continuous film
7 of the planarization layer that would be given the
8 lower end of the range would be ten nanometers
9 thick.

10 Q Okay.

11 A But the disclosure says it could also be
12 made much thicker.

13 Q Understood.

14 Have you done simulation or experiment to
15 see what the resulting reliability would be for
16 moisture and -- moisture and oxygen permeation for
17 Yamazaki's figure 11 device with 300 nanometers
18 thick cover layer?

19 A Me personally, no, I have not.

20 Q No simulation?

21 A No.

22 Q Okay.

23 And you don't know how many -- what type
24 of defects Yamazaki's device would have in figure 11
25 or 14; right?

1 MR. GARR: Objection.

2 THE WITNESS: You mean in terms -- just to
3 clarify, you mean in the defects of the underlying
4 layers that we're talking about blocking the
5 propagation of?

6 MS. ZHONG: Yes.

7 THE WITNESS: Well, as I've already said,
8 Yamazaki does not talk about defects. It doesn't
9 say anything specifically.

10 MS. ZHONG: Okay.

11 THE WITNESS: But there are the typical
12 defects such as pinholes that a POSITA would know
13 about, but I've already told you Yamazaki doesn't
14 explicitly call them out.

15 BY MS. ZHONG:

16 Q And you did not specifically analyze what
17 defects there would be; correct?

18 A Well, I mean in my reply declaration, I
19 specifically did call out pinholes.

20 But it's true that with respect to
21 Yamazaki, Yamazaki, doesn't say anything about
22 defects.

23 Q And you did not talk about the pinhole
24 distribution, the effects of the pinholes, the type
25 of -- it's spatial distribution, the frequency that

1 occurs, the type of pinholes.

2 You did not analyze any of those; correct?

3 A That's fair.

4 Q Fair. Okay.

5 And you are not -- so, in your original
6 declaration you did not propose that you would
7 change the thickness of Yamazaki's cover layer 1105
8 of 1407 in any way; right?

9 A I'm not sure that I understand what you
10 mean by the question.

11 Q Okay.

12 So in your rely declaration you can say,
13 oh, a POSITA could always make the cover layer
14 thicker if it needs to be; correct?

15 A Could you point out to what you are
16 referring to? Again, I haven't memorized by
17 declaration.

18 Q Okay.

19 Did you draft it yourself?

20 A Of course, but I wrote a long time ago and
21 I haven't memorized it.

22 Q Okay.

23 You drafted at the beginning of this
24 month; right, October ninth?

25 A That's right. But that's a long time ago.

1 Q Okay.

2 A I mean, as I think you know, I have a
3 full-time job as a professor.

4 Q Okay.

5 So you teach from France?

6 A No, I live and teach in Switzerland. It's
7 just for the purposes of the deposition, I'm in
8 France.

9 Q Paragraph 15, you said it would have been
10 well within the skill of a POSITA to repeat an
11 application in this manner to form a thick layer?

12 A Yes.

13 So, I don't think -- at a high level, I
14 agree that one -- a POSITA would know and this
15 sentence does say that a POSITA would know that they
16 can change the thickness.

17 But the specific statement here is really
18 about repeated application.

19 But having said that, I agree that a
20 POSITA would know that it would be possible to tune
21 the thickness.

22 Q Okay.

23 You don't mention any of that in your
24 opening declaration; correct?

25 A At least with respect to the paragraphs

1 that we were -- that I cite and I was discussing
2 with you previously which is the paragraphs the 91
3 through 98 of my original declaration, I agree. I
4 do not discuss tuning the thickness.

5 Q Okay.

6 And Yamazaki's paragraph 0090, that is in
7 connection with embodiment number one, not
8 embodiment number three or four; correct?

9 A You said, sorry, 00?

10 Q 90. Yamazaki paragraph 90?

11 A Yes, it's part of the embodiment one --
12 it's part of the embodiment one discussion.

13 I will point out that both embodiment one
14 and two refer back to the layers specifically
15 discussed in embodiment one.

16 Q Not the encapsulation layers; correct, you
17 are talking about the EL?

18 A Correct.

19 Q Okay.

20 So, let's just be clear and be precise as
21 to what is referred back.

22 Now, Yamazaki's embodiment --

23 MR. GARR: Objection.

24 BY MS. ZHONG:

25 Q -- number one does not have the structure

1 that you relied on in figure 11 and 14; correct?
2 Specifically in Yamazaki's embodiment number one,
3 the cover layer is on top of the barrier layer;
4 correct, not the other way around?

5 A Can you point me to what you are referring
6 to as the cover layer and the barrier layer in
7 embodiment one, just so I understand what you are
8 talking about?

9 Q Let me see, do you see 0090 mentions cover
10 layer 46?

11 A Yeah.

12 Q And if you go to -- let me see -- figure
13 two, 46 is the outermost layer; right? There isn't
14 a barrier layer on top of it; correct?

15 A That is true. And in figure two, the
16 uppermost layer is 46.

17 Q And so that -- that structure is different
18 than in figure 11 and 14 where the cover layer
19 is kind of -- there's another barrier layer on top
20 of the cover layer; correct?

21 A I think I understand. Okay.

22 Yeah, so if we look at what -- in
23 embodiment three is identified as the cover layer.
24 That's the cover layer in figure 11, it's 1105.

25 Q Uh-huh.

1 A And on top of that a barrier layer 1106 is
2 deposited.

3 So to that extent I agree. They're in the
4 embodiment of figure three. There's an additional
5 layer, specifically, the barrier layer that's put on
6 top of the cover layer.

7 Q Okay.

8 In embodiment number three, that cover
9 layer 1105 is deposited directly on top of the
10 cathode 1104; correct? Look at paragraph 177.

11 A Yes, I agree.

12 Q Okay.

13 And if you take a look at paragraphs 89
14 and 90 in the embodiment number one, which is where
15 paragraph 90 is associated with, at the cathode 43
16 you first form the barrier layer 45 and then you
17 deposit the cover layer 46; correct?

18 A Could you repeat the question? Sorry, I
19 was getting to that section.

20 Q So if you go to paragraphs 89 and 90.

21 A I have that.

22 Q Okay.

23 So, in embodiment number one you have a
24 cathode and at the cathode you have the barrier
25 layer 45. And then after the barrier layer 45, you

1 have the cathode 46; correct?

2 A Yes, I agree.

3 Q Okay.

4 So when the light comes out, let's say,
5 from the top side --

6 A Uh-huh.

7 Q -- would the light reflexion and
8 refraction differ depending on whether at the
9 cathode it's first the barrier layer, then the
10 organic layer versus whether it's first the organic
11 layer, then the barrier layer?

12 A It depends. It depends on the refractive
13 indices of the respect materials in the stack.

14 Q Okay.

15 A This is something that's routinely tuned
16 in OLED manufacturing.

17 Q Let's assume it's the same material, for
18 example, I believe -- what is that layer of
19 material? Okay.

20 So the barrier layer of material is
21 silicon nitrite, indium tin oxide or carbon. And
22 the cover layer is organic resin, which I believe is
23 Accolades polyamides, et cetera.

24 Would that be -- would it make a
25 difference?

1 A No, because these are bottom emitting
2 devices. These devices are bottom emitters. These
3 devices are not top emitters. That's why the ITO,
4 the indium tin oxide is on the bottom.

5 Q But isn't top emitting ones, the ITO is
6 also at the bottom?

7 A No, no, because there are both types. But
8 this is a bottom emitter.

9 You know that this is a bottom emitter
10 because of the structure. This is not a top
11 emitter.

12 Q But we can agree that the thickness that
13 you mention in paragraph 90, that's in connection
14 with the embodiment number one.

15 It's not in connection with embodiment
16 number three; correct?

17 A I agree that's the thickness that's called
18 out for the cover layer, in other words, being in
19 the range of 0.1 to 20 microns is, with respect to a
20 section, that is for embodiment number one.

21 And I agree that that is not from a
22 section from embodiment number three.

23 Q And embodiment number one actually doesn't
24 use inkjet printing.

25 It uses the electric field application

1 method; correct?

2 A So, with respect to the discussions of
3 embodiment number one, I think it only calls --
4 specifically, when it's talking about individual
5 layers, it only talks about the electric field
6 application method.

7 However, right at the start of the
8 section, which is before it even gets to -- when
9 it's in the general description of the preferred
10 embodiments, it points out that the layers can be
11 formed by, for example, in paragraph 34, this is
12 about the EL layer where it says, "The EL layer is
13 formed by employing the electric field application
14 method or the inkjet method."

15 So, I agree that the discussion in
16 embodiment one is about the electric application
17 method. But I would also point out that Yamazaki
18 does point out that they can be used with
19 alternatives to each other in certain parts of the
20 discussion of Yamazaki.

21 Q Well, embodiment number three specifically
22 calls out the inkjet printing method, right, but it
23 doesn't mention the electric field application
24 method; right? Take a look at paragraph 176 and
25 177.

1 A Yes, I agree. With respect to embodiment
2 three in paragraph 176 and 177, it only calls out
3 the inkjet method. I agree with that.

4 Q Okay.

5 So, the paragraph 34 is just saying that
6 for a different embodiment, they might be using
7 some -- one specific method?

8 A Not just for different embodiments, but
9 also for different layers.

10 The point is it's calling out that both
11 are possible to be used for different things. But
12 it's true, in the individual embodiments, it calls
13 out different ways of doing things.

14 Q Isn't it true -- why don't we take a look
15 in the abstract.

16 Yamazaki wants to use a same film depth
17 method to form the EL layer and the cover layer;
18 correct?

19 A You said in the abstract?

20 Q Yes.

21 A Okay.

22 I agree that is one thing it calls out.
23 In the abstract it says -- it also calls out an
24 advantage of doing that, specifically they can be
25 formed in the same multiple chamber in succession.

1 Q And if you look at paragraph 11, which is
2 summary of the invention, it again reemphasized the
3 point that it wants to use the same method for the
4 EL layer, the cover layer; correct?

5 A Yes. With respect to paragraph 11, it
6 says the same -- it says the multichamber, which is
7 a multiple chamber device or deposition system, is
8 used for following the EL layer and the cover layer.

9 But in this case it's saying it's the same
10 method and it says can be inkjet is one of the
11 examples and the electric field method or the
12 electric field application is the other. It calls
13 out both of them in paragraph 11.

14 Q Yeah.

15 But if you use inkjet printing, then you
16 use inkjet printing for both layers. If you use
17 electric field application method, then you use
18 electric field application method for both; correct?

19 A That certainly calls out a specific
20 advantage with respect to that. I agree that that
21 does call that out as an advantage of doing it that
22 way.

23 Q Now, are you aware of anyone actually
24 making an OLED device using inkjet printing for both
25 the EL layer and the encapsulation layer?

1 I'm not limited to the pre '389 period.
2 Any time sooner?

3 A Yeah, I -- I don't know. I mean, I don't
4 remember.

5 It's -- it's possible, but I -- I don't
6 know the -- given the number of people working in
7 this field and the thousands of papers that I've
8 read over the years or my own personal work, I
9 couldn't say.

10 I mean, I know that there are people who
11 have done inkjet of one and of the other.

12 Have there been any demonstrations of both
13 put together, I don't know.

14 Q So you are not aware of any such examples?

15 A That's fair. I think that's what I just
16 said.

17 Q Okay.

18 And are you aware of anyone who has --
19 using electric field application method for both the
20 EL layer and the cover layer or the organic layer of
21 the encapsulation layer?

22 A And again, just to be clear, you mean the
23 technique -- and putting aside what the techniques
24 are as taught in Yamazaki and anybody who's made a
25 physically implemented device before?

1 Q Yes, yes.

2 A Again, my answer would be the same. I
3 just don't know the literature by heart, so I
4 couldn't say one way or another.

5 Q Well, you just don't recall all the
6 literature that you have reviewed for the inkjet
7 over the years, you don't recall having seen
8 something like that; correct?

9 A That's fair.

10 Q And you consult in the industry; correct?

11 A Off and on, yes.

12 Q Okay.

13 For all your consulting job -- work, are
14 you aware of anyone actually trying to combine -- do
15 what Yamazaki is teaching?

16 A I couldn't tell you that because I would
17 have nondisclosure agreements with my consulting
18 clients.

19 I absolutely cannot answer that question
20 unless you are willing to sign under those
21 nondisclosure agreements.

22 That's an inappropriate question to ask
23 me.

24 Q I don't think it's inappropriate.

25 A As I understand, this is a -- these

1 proceedings are public.

2 How can I answer a questions and I don't
3 even have those --

4 Q Well, we can seal the transcript and file
5 them under seal.

6 A So, perhaps, you can comment.
7 Is that possible?

8 Q Yeah.

9 A Can counsel confirm that that would be the
10 case and that would happen here?

11 Q Yeah, you can -- so, Counsel, can you
12 confirm that?

13 MR. GARR: If there's a chance we need to
14 use confidential information, we should just go off
15 the record to talk about the logistics of that.

16 MS. ZHONG: Sure. We can go off the
17 record.

18 THE COURT REPORTER: Okay. We are off.
19 (Brief interruption in proceedings.)

20 MS. ZHONG: Back on the record. Okay.

21 BY MS. ZHONG:

22 Q So, in your consulting jobs, are you aware
23 of anyone who is trying to do what Yamazaki is
24 doing, which is to use the same inkjet printing or
25 electric field application method for both the OLED

1 and for the cover layer of the encapsulation
2 material? It's a yes-or-no question.

3 A So, with respect to the electric field
4 method, the answer would be no.

5 With respect to use of inkjet for both the
6 encapsulation and for the OLED stack, yes.

7 Q And when was that work?

8 A It would have been in the, probably 2010s
9 time frame.

10 Q Okay.

11 So it's after the -- so it's eight or nine
12 years after the '389 patent?

13 A Yes, that's fair. It was definitely not
14 in 2001. It would have been later than that.

15 Q Okay.

16 And then were they able to successfully
17 make a commercial products?

18 A I don't know. That's a good question.

19 Q Okay.

20 A So, yeah, I don't know the answer.

21 Q Were they able to make any prototype?

22 A Yes.

23 Q And was that prototype ever disclosed?

24 A I don't know.

25 Q Okay.

1 Now, in paragraph 17 through 19 you
2 mention that it's your position that the inkjet
3 printing method were known to form sufficiently
4 thick layers; correct?

5 A Just to be clear, you are talking about my
6 reply declaration?

7 Q Correct.

8 A Well, that's certainly one of the points I
9 address within those paragraphs, yes.

10 Q Okay.

11 So let's look at the references you cited
12 in those paragraphs.

13 The first piece of evidence you cite is
14 Exhibit No. 2023.

15 (Exhibit 2023, previously marked, not
16 attached.)

17 BY MS. ZHONG:

18 Q Correct?

19 A Yes, I cite that in paragraph 17. Yes.

20 Q Okay.

21 And Exhibit No. 2023 was published in
22 2003; is that correct?

23 A Please bear with me, I have to open that.

24 Q It's probably best if you look at it in
25 the drop box.

1 A Yeah, I'm going to copy -- download it
2 from the drop box and then I'll answer the question.

3 Yes, this was in the Proceedings of the
4 Materials Research Society and it was published in
5 2003.

6 Q And the filing date for the '389 patent
7 was May second of 2002; correct?

8 The '389 patent would be Exhibit No. 1001.
9 (Exhibit 1001, previously marked, not
10 attached.)

11 THE WITNESS: Yes, it was filed in 2002, I
12 agree.

13 MS. ZHONG: Okay.

14 BY MS. ZHONG:

15 Q So, Exhibit No. 2023 was after the filing
16 date of the '389 patent fair?

17 A Yes, that's fair.

18 Q Okay.

19 And the second piece of evidence you cited
20 is Exhibit No. 1028; correct?

21 A Yes.

22 (Exhibit 1028, previously marked, not
23 attached.)

24 BY MS. ZHONG:

25 Q And Exhibit No. 1028 was -- is a paper

1 published in 2004, actually December 2004; correct?

2 A Yes, that's correct.

3 Q Okay.

4 So it's also after the filing dates of the
5 '389 patent?

6 A Yes, that's true.

7 Q Okay.

8 And I think the third one that you have
9 cited is Exhibit No. 1029?

10 A Yes.

11 Q Okay.

12 (Exhibit 1029, previously marked, not
13 attached.)

14 BY MS. ZHONG:

15 Q Exhibit No. 1029, it's a -- it's SPIE,
16 volume 4809, published in 2002; correct?

17 A Correct.

18 Q Do you know when was that article
19 published, when in 2002 it was published?

20 A I could probably look it up. But looking
21 at this, it doesn't say. It just says 2002.

22 Q Okay.

23 So why don't you look in the drop box --

24 A Okay.

25 Q -- and there should be an article called

1 "Nanoscale Optics and Application," underscore,
2 "2002."

3 A I'm sorry, what is the exhibit number?

4 MR. GARR: It's at the very bottom, after
5 2100.

6 MS. ZHONG: Yeah. And let's call it
7 Exhibit No. 1 for ease of our discussion.

8 (Respondent's Exhibit 1 was marked for
9 identification by the Certified Shorthand Reporter
10 and is attached hereto.)

11 BY MS. ZHONG:

12 Q Do you have that?

13 A Okay.

14 I downloaded it.

15 Q Okay.

16 So, first of all, just -- can you verify
17 this is a volume for the article that you have
18 cited -- for Exhibit No. 1029 that you cited, that's
19 the same volume?

20 A Yes, it's volume 4809, I agree.

21 Q Okay.

22 And do you -- and I have printed this page
23 out from the web page and the link for that web page
24 is at lower-left corner of page number one.

25 So, if you want to clerk it, you can just

1 click on that link and it should take you to the web
2 page itself.

3 A Okay.

4 So do you want me to do that or do you
5 just --

6 Q Yeah, if you want to verify that, the
7 authenticity of this document.

8 A I'm happy to proceed based on your
9 representation.

10 Q Okay.

11 So, on page number one, do you see that in
12 the middle of it it says, "Volume Details"?

13 A Yes.

14 Q And it says, "Date published 4 November
15 2002."

16 Do you see that?

17 A Yes.

18 Q Do you have any reason to doubt the
19 information that's on that page?

20 A No.

21 Q Okay.

22 So, the SPIE dot-org publication page,
23 that's at the bottom of this exhibit, is that the
24 web page you clicked to go to grab paper from that
25 conference, if you want to look -- to get an

1 original -- a copy of that conference paper?

2 A You mean from the SPIE digital library?

3 Q Yeah, yeah.

4 A Yes, I've used the digital library many
5 times.

6 Q So, the link at the bottom is kind of --
7 looks familiar to you; right?

8 A Yes.

9 Q Okay.

10 So, you don't have any -- you are not
11 questioning the authenticity of the date that's
12 written here which was 4 November 2002, that's when
13 the proceeding was published; correct?

14 A That's correct.

15 Q Okay.

16 And that's also after May second, 2002,
17 which is the '389 filing date; correct?

18 A Yes, that's right.

19 Q Okay.

20 And you also mentioned that Suzuki --
21 Suzuki's thickness is specific to its device and
22 application; correct?

23 A I'm sorry, you said -- you mentioned it.

24 Could you point me to what you are
25 referring to, please?

1 Q So, in paragraph 15 you stated that Suzuki
2 thickness is based on the specific needs of Suzuki
3 and its device and application; correct?

4 A So, I say the specific thicknesses of
5 Suzuki's barrier layer relates to the specific needs
6 of Suzuki and its device and application and that is
7 the third complete sentence of paragraph 13.

8 Q Okay.

9 Do you know what would be the appropriate
10 thickness for -- so based on your experience, would
11 a ten nanometer thick organic resin be sufficient to
12 prevent moisture and oxygen permeation, if there is
13 a barrier layer deposited on top of it as in
14 Yamazaki?

15 A It would depend on the specifics. It
16 would depend on the properties of the polymer
17 layer -- of the polymer. It would depend on the
18 moisture sensitivity of the layers below it and it
19 would depend on the overall permeance of the stack
20 provided by the polymer with the inorganic layer on
21 top.

22 Q Okay.

23 Yamazaki doesn't really provide sufficient
24 information for you to determine whether the
25 preferred range of 10 to 300 nanometer would be

1 sufficient to prevent moisture permeation and dark
2 spot formation; correct?

3 A So, with respect to a specific choice of
4 thickness within the range that Yamazaki provides, I
5 couldn't tell you for sure.

6 But Yamazaki does make clear that it
7 provides -- for example, it tells us in paragraph
8 eight when it's talking about the background and it
9 talks about how it's used going on subsequently.

10 It says that, "By further forming a film"
11 -- so the permeation of moisture and oxygen to the
12 EL layer can be prevented, whereby the degradation
13 of the EL layer can be prevented and then it goes
14 on. That's in the paragraph in the "Background."

15 In discussing the preferred embodiments in
16 paragraph 33 it says, "It is to be noted that the
17 barrier layer is referred to as a passivation film
18 provided for the purpose of preventing moisture and
19 oxygen penetration."

20 So it doesn't related those statements to
21 a specific thickness value, but it does make clear
22 that that's what it's doing with these layers.

23 Q Okay.

24 And in paragraph seven, it's very specific
25 that it's the Epson -- the Seilco-Epson machine that

1 it's using is for the prototype organic EL
2 materials; right?

3 A I'm sorry, you said in paragraph seven?

4 Q Yes.

5 A I agree.

6 In paragraph seven it's specifically
7 saying it's a deposition technique for polymer type
8 organic electroluminescent materials, I agree.

9 Q And it doesn't say it's suitable, for
10 example, for small molecule EL materials; right, in
11 paragraph seven, at least?

12 A I understood what you said. Uh-huh. I
13 agree.

14 If we look at paragraph six it identifies
15 both types of materials, but in paragraph seven it
16 seems to only be addressing the polymer type. I
17 agree with that.

18 Q Okay.

19 And is the organic resin considered to be
20 a polymer type or it's more like small molecule?

21 A So, it depends on the resin -- I mean, the
22 resin is usually a mixture.

23 But certainly the backbone of the resin is
24 usually a polymer.

25 Q Isn't it -- you apply it as a monomer and

1 then you cure it once it's applied?

2 A It depends on the resin.

3 There are resins which are fully
4 polymerized -- that are partially polymerized and
5 some that are unpolymerized, so both exist.

6 Q Okay.

7 And in embodiment number three of
8 Yamazaki, both the EL material and the cover layer
9 be -- used the same printer head 1203; correct, take
10 a look at paragraph 179?

11 A Yes, I agree it says the same head 1203 is
12 used for the EL layer and the resin.

13 Q Okay.

14 So, in the example that you are aware of
15 in 2010 when people are trying to use inkjet
16 printing for both the EL and for the cover layer,
17 let's just -- for lack of a better name, just the
18 cover layer, would they be using the same printer
19 head or different printer setup?

20 A So it was the same printer. I don't
21 remember if it was the same head or not.

22 Q Okay.

23 And for figure 14, that's in connection
24 with embodiment number four; correct.

25 A Yes, I agree the figure 14 falls within

1 the discussion of embodiment number four.

2 Q And embodiment number four used the
3 electric filled application methods for both the
4 cover layer and the EL layer; correct?

5 A So, the EL layer is called out in
6 paragraph 188 as using the electric field
7 application method.

8 Q Look at paragraph 202, it mentions the
9 cover layer 1308 in 202 and 203, just take a look at
10 that?

11 A Yes, I agree the paragraph 202 says the
12 cover layer made of an organic resin film is
13 subsequently formed by the same method used for
14 forming the EL layer.

15 And, of course, we previously identified
16 -- or I previously identified that in this
17 embodiment, the EL layer was deposited using the
18 electric field application method.

19 Q And for figure 14, the same method would
20 be used. It's just the order of the cover layer and
21 the barrier layer is switched; correct?

22 A I'm sorry, now you said they are switched.
23 Switched to what?

24 Q Figure 13, the cover layer is below -- the
25 cover layer is above the barrier layer.

1 But figure 14, the cover layer is below
2 the barrier layer; correct?

3 A Yes, that's true. That's what's called
4 out in paragraph 203.

5 Q Yeah, but the methods of application would
6 be the same?

7 A There's certainly no discussion here
8 indicating that a different method would be used
9 since it's within the section of embodiment four
10 where the electric field application method is being
11 used.

12 I think it's a reasonable interpretation
13 that that's what's being used in both figure 13 and
14 figure 14.

15 Q Okay.

16 In paragraph 201 it discusses is how the
17 barrier layer 1307 is formed; correct?

18 A Yes.

19 Q And this one doesn't mention using
20 selective deposition method using a mask; correct?

21 MR. GARR: Objection.

22 THE WITNESS: Within this paragraph it
23 doesn't specifically discuss the use of a mask.

24 MS. ZHONG: Okay.

25 THE WITNESS: It calls out the technique.

1 These techniques could be used with masks.

2 But I agree that in this specific
3 paragraph it doesn't say that those techniques are
4 used with masks.

5 BY MS. ZHONG:

6 Q In contrast in paragraph 183, it does
7 specifically mention the use of a mask; correct?

8 A Yes, in paragraph 183 where it's talking
9 about the materials -- so sorry -- what was the
10 previous one I was comparing to?

11 Q 183.

12 A Sorry?

13 Q 183 was 201.

14 A Okay. Thank you. Okay.

15 So, if we look at 201, I've already said
16 while it calls out the techniques, it doesn't
17 explicitly say in 201 that a mask is used.

18 It does call out the same, or some of the
19 same materials in 183, as are in 201.

20 But here it further does go on to say it
21 is of note that the barrier layer 1106 is formed
22 selectively using a shadow mask.

23 Q Okay.

24 So, Yamazaki would call out selective
25 deposition where he performs selective deposition;

1 correct.

2 MR. GARR: Objection.

3 THE WITNESS: No, I don't think that
4 follows. I think that he's pointing out here that
5 it is a technique that can be used, and here he
6 calls out -- he says explicitly that it is used.

7 But the techniques that he's calling out
8 and specifically the materials that he's calling out
9 are the same across multiple embodiments.

10 I don't know that it means that he would,
11 therefore, only call out selectivity if he intended
12 and then not assumed that a POSITA reading this
13 would understand that, given that it's exactly the
14 same materials, could use it in other disclosures as
15 well.

16 BY MS. ZHONG:

17 Q Well, the specific reference to shadow
18 mask is absent in paragraph 201; correct?

19 A As I already answered with respect to your
20 previous question, so paragraph 201 calls out
21 materials, including the same materials that are
22 called out in paragraph 183, but here it does not
23 explicitly say in paragraph 201 that shadow mask is
24 used.

25 Q And the same in paragraph -- in embodiment

1 number one, it doesn't mention selective deposition
2 of the barrier layer either; correct, in paragraph
3 89 for example -- no, 89, 90?

4 A So with respect to the barrier layer
5 discussed in the section between paragraphs 89 and
6 90 of Yamazaki, I agree that in these paragraphs it
7 doesn't explicitly call out the use of a mask.

8 Q What about -- for embodiment material,
9 does it call out the use of selective deposition at
10 all for the barrier layer, paragraph 141, for
11 example?

12 A Well, specifically, if we look at the
13 paragraph itself, which is paragraph 141, it does
14 discuss the barrier layer 353 here.

15 But in this text it does not explicitly
16 say that a mask is used.

17 It calls out some of the same materials,
18 it calls out the use of sputtering, which it does
19 say in other areas can be used with a mask.

20 But I agree here it does not specifically
21 call out the use of a mask.

22 Q Okay.

23 So the only place where he specifically
24 calls out the use of the mask is in paragraph 183;
25 correct, of the four embodiments?

1 A And just to clarify, you are talking only
2 about the barrier?

3 Q Yeah.

4 A Because he does call out masks for other
5 things as well.

6 Q Yeah, for the barrier layer?

7 A With respect to the various sections that
8 discuss the barrier layer, and in many cases calling
9 out the same deposition -- same materials and the
10 same sets of deposition techniques, the only
11 paragraph where it explicitly calls out the use of a
12 shadow mask in the context of discussing the
13 deposition of a barrier layer is paragraph 183.

14 Q Now, the '389 patent's background mentions
15 the traditional way of doing -- of forming the PML
16 structures; correct?

17 A Could you point me to what you are
18 referring to, please?

19 Q Do you have the '389 patent?

20 A I do.

21 Q Okay.

22 In its "Background" section in the
23 invention, it mentions the traditional way of
24 depositing the -- of forming the PML structure;
25 correct? In column two, for example. If you take a

1 look, for example, the second full paragraph
2 starting column two, line 17 starting here.

3 A So, I see this. It doesn't use the word
4 "traditional."

5 So in this it's referring to the problem
6 with this PML technique, and it's referring back to
7 the first discussion of PML, which appears at the
8 previous paragraph.

9 So paragraph -- the second -- the first
10 full paragraph of column two, and it actually has
11 more discussion of PMLs on -- in column one.

12 So it doesn't use the word "traditional"
13 here, but it is referring to a specific discussion
14 of PMLs that appear in various places in the
15 background of the invention.

16 Q So, do PMLs inherently have planarization
17 layers?

18 A Inherently? So, I mean -- I guess given
19 the breadth of the question, which means I don't
20 know what the device it's being applied to. I
21 guess, I -- I don't know how to answer that
22 question.

23 But, I guess, conceptually it's possible
24 to have a PML where it doesn't have a planarization
25 layer. So, for example, both the polymer layer and

1 the -- the alternating inorganic layer would not be
2 planarizing in function.

3 Q Okay.

4 A But, I mean, that's -- given the breadth
5 of the question, which was about PMLs, in general.

6 Q So, but generally, at the time of the
7 invention, if someone says, "PML," would a person of
8 ordinary -- is it the understanding of a POSITA that
9 it contains a planarizing layer?

10 MR. GARR: Objection.

11 THE WITNESS: I don't know how to answer
12 that. I don't know -- I don't know the entire field
13 of every single description of PML.

14 So I just don't know how to answer that
15 question or I don't have the information to answer
16 that question.

17 BY MS. ZHONG:

18 Q Well, in the field of OLEDs, do PMLs
19 necessarily have a planarizing layer?

20 A Again, without the context of which -- I
21 mean, I don't know every single piece of literature
22 on OLEDs, so I can't answer such a broad question
23 because I just don't have the information.

24 Q So instead of inherently, what about
25 generally?

1 MR. GARR: Object to this question as
2 outside the scope.

3 THE WITNESS: Again, my answer would be
4 the same. I don't know how to give a general answer
5 to a question like that without looking at the
6 specific art you are referring to.

7 It's -- I don't know how the term "PML" is
8 used in every single piece of literature that exists
9 about OLED, so I just don't know how to answer that.
10 BY MS. ZHONG:

11 Q And if someone mentions the planarizing
12 layer, does that necessarily -- put it this way,
13 would that convey to a person of ordinary skilled in
14 the art at the time of the invention, that that
15 layer would have both the function of interrupting
16 the defect propagation and -- and not reproducing
17 the underlying topology?

18 A If it is a planarizing layer, that will be
19 a consequence of the nature of its planarization.

20 So, I think the answer would be if it's a
21 planarizing layer, a consequence of that would be
22 that it will have the property of interrupting
23 defects.

24 As I mentioned earlier, if you have, you
25 know, a meter called "defect," it clearly would

1 interrupt it. But at a general level it will have
2 the property of interrupting propagation of defects,
3 and by nature of planarization it would also not
4 reproduce the underlying topography. I mean, I
5 think that follows -- it's a consequence of the
6 planarization behavior.

7 Q So it's your position that planarizing
8 layer would necessarily have those two features or
9 generally would have those two features; is that
10 correct?

11 A Well, just to be clear, I didn't say
12 necessarily. I said it's a consequence, and I
13 didn't call them features. Again, I called them a
14 consequences.

15 But I think the nature of planarization,
16 at least as I've been discussing it with respect to
17 the art that I've been pointing to, is that the
18 planarizing layers would -- because they do -- they
19 are planarizing in their behavior, they will not
20 reproduce both unintentional topography and
21 intentional topography under them.

22 Unintentional topography in this case
23 would include defects.

24 Q And a material that has planarity, when
25 deposited necessarily form a planarizing layer?

1 A I don't understand that question.

2 Q So, if some material that has planarity,
3 when it's deposited would it necessarily form a
4 planarizing layer?

5 A So, again, you asked the same question and
6 I gave the same answer. I don't understand your
7 question.

8 I just don't know what you mean by
9 material that has planarity.

10 Q Well, isn't that what Yamazaki is
11 disclosing, it's material -- it's some material that
12 has planarity?

13 A Could you point me to what you are
14 referring to in Yamazaki, please?

15 Q Paragraph 178.

16 A So, just to be clear, this is -- it says
17 more than just that. It says, "As a material for
18 forming the cover layer 1105 made of an organic
19 resin, it is appropriate to use a material that has
20 a high degree of hardness, is unlikely to allow
21 substances such as moisture and oxygen to permeate
22 and has planarity."

23 So it gives a lot of information.

24 Q I'm asking you if the material has
25 planarity, does it necessarily form a layer -- a

1 planarizing layer?

2 A So, if you don't use it to form a layer
3 and you use it to form something other than a layer,
4 then the answer would be no.

5 Q Okay.

6 A But in the disclosure of Yamazaki, it's
7 specifically telling us it's a layer that has the
8 planarity, so this would be a planarizing layer.

9 Q So, I'm not debating with you on that.
10 Just answer my question.

11 If it's a material that has planarity and
12 its deposited as a layer, is the resulting layer
13 necessarily a planarizing layer?

14 A So, I couldn't say for a hypothetical,
15 because I don't have enough information to answer.

16 I will say if it's a system similar to
17 that that's discloses here in -- or a material
18 forming the layer similar to that that is disclosed
19 in Yamazaki, then yes, it will be a planarizing
20 layer.

21 Q So just because a material has planarity
22 and just because that material is deposited in a
23 layer, it does not necessarily form a planarizing
24 layer; is that fair?

25 A I don't have enough information to answer

1 that. That's not the analysis I did.

2 Again, my analysis, at least with respect
3 to this ground was specific to Yamazaki. And with
4 respect to the Yamazaki layer that we're talking
5 about, it is a planarizing layer.

6 Q Okay.

7 And if Yamazaki's material -- the
8 underlying device has no defects, there is not going
9 to be any defect propagation; correct?

10 A That's fair. If there's no defects,
11 clearly there's no defect propagation.

12 Q Okay.

13 MR. GARR: I'm going to need to take a
14 break sometime before 4:00, in the next fifteen
15 minutes, because my kids will be getting home and I
16 need to give a key to the baby-sitter.

17 MS. ZHONG: What time is it now?

18 MR. GARR: In the next fifteen minutes.

19 MS. ZHONG: We can take a break now if you
20 want to. Let's just take a break.

21 MR. GARR: Yeah, we've been going for a
22 while.

23 (Brief interruption in proceedings.)

24 BY MS. ZHONG:

25 Q Can you please go to paragraph 23 of your

1 reply declaration?

2 A Okay.

3 Q In paragraph 23 you discussed a reference,
4 Ghosh. Or at least you mentioned the reference
5 Ghosh.

6 A Yes.

7 Q And you are not asserting that Ghosh
8 discloses selective deposition of the barrier layer
9 here; correct?

10 A Just so I understand, you mean as opposed
11 to the first encapsulation layer 21?

12 Q Correct.

13 A I understand.

14 So with respect to this citation that I
15 point to in paragraph 23, this is in reference to
16 the first encapsulation layer being selectively
17 deposited. That's what this is referring to.

18 Q But you are not contending that Ghosh's
19 barrier layer is selectively deposited; correct?

20 A Sorry, I'll need to look at Ghosh.

21 Q Okay. Ghosh, I believe is Exhibit
22 No. 1007. Sorry, it's not Exhibit No. 1007. It's
23 Exhibit No. 1006.

24 (Exhibit 1006, previously marked, not
25 attached.)

1 BY MS. ZHONG:

2 Q So it's Exhibit No. 1006, paragraph 32.

3 A Paragraph 32 of Ghosh.

4 Q Uh-huh.

5 A So, if we look at the discussion in
6 paragraph 32 of Ghosh.

7 So, paragraph 32 of Ghosh refers to,
8 firstly, the encapsulation layer, which we've
9 already discussed, which is encapsulation layer 21,
10 and this is in reference to figure three.

11 And then it refers to --

12 Q The second encapsulation layer?

13 A There's a second encapsulation layer 22
14 which it calls out as an oxide. And then ultimately
15 has an optional third encapsulation layer 23.

16 And if we look at figure three, which this
17 is in reference to, 22 and 23 are shown with respect
18 to the individual devices spanning multiple devices.

19 Though, at the end, they are still
20 spatially specifically defined.

21 Q Okay.

22 Is 22 -- it's described here as a second
23 encapsulation, 22 is formed of one or more oxide
24 layers; correct? And it says, "The oxide layer 22
25 is formed over both the encapsulation layer 21 and

1 the exposed portions of the substrate 2."

2 Do you see that?

3 A No. Could you point me to where you are,
4 please? I didn't see where you were reading.

5 Q Okay. Paragraph 32.

6 A Yeah.

7 Q And do you see, "The second encapsulation
8 layer 22 in figure three is formed of one or more
9 oxide layers and is deposited by ALE or ALD."

10 Do you do see that sentence?

11 A Yes.

12 Q And then immediately after it says, "In
13 the second embodiment the oxide layer 22 is formed
14 over both the encapsulation layer 21 and the exposed
15 portion of the substrate 2."

16 Do you see that?

17 A I do.

18 Q Okay.

19 So, if you look at the final structure,
20 can you tell -- for example, if there are gaps, do
21 you know whether the gaps were formed while the
22 layers were being deposited or whether the gap was
23 formed after being -- formed was a blanket
24 deposition followed by patterned actual removal of
25 the materials.

1 Can you tell that?

2 A Yeah, I understand the question. Please
3 bear with me.

4 So, with respect to the layer 22, again,
5 I've addressed this at various places. And
6 specifically, I pointed to the prosecution history
7 of the '389 patent where this issue came up. And
8 specifically, the applicants argued -- and I show
9 this on the top of page 27 of my original
10 declaration, Exhibit No. 1003.

11 I said, "The applicants overcame this
12 rejection arguing that in Ghosh the second
13 encapsulation layer, in the office action, the
14 examiner refers to this layer as the barrier layer
15 is non-selectively deposited."

16 So that's the first place I address it.

17 Q And you did not disagree with that
18 characterization in your first declaration; correct?
19 At least I don't recall seeing it. Tell me if I'm
20 wrong.

21 A So, I agree I went through my original
22 declaration quickly and I agree that I did not
23 explicitly agree with that.

24 Ghosh is silent with respect to this,
25 other than identifying that the layer is deposited

1 by ALD and ALE.

2 For that second layer he does not
3 explicitly say that it is selectively deposited.

4 Q In fact, it says it's deposited over Ghosh
5 layer 21 and the exposed areas of the substrate;
6 correct?

7 A He does say that. But just to be clear,
8 if you look at figure three.

9 Q Uh-huh.

10 A If you look at figure three, let's say --
11 and we're talking about, of course, about layer 22.

12 At the edges of the overall substrate, the
13 two, it doesn't go all the way to the ends. But
14 it -- so it still meets the requirement of being
15 over the --

16 Q But, sir, you don't know whether the edge
17 was etched away later on or not; correct?

18 A I agree with that, and that's why I said
19 it's silent as to that. He doesn't say that
20 specifically.

21 Q And it says, basically, "The only
22 expressed disclosure is 32 is that it's deposited
23 over layers 21 and exposed area of the substrate
24 without limitation"; correct?

25 A I agree, that is the expressed disclosure.

1 But to be clear, that does not necessarily mean it's
2 not selective.

3 Q Okay.

4 A But I agree that that's the only expressed
5 disclosure.

6 Q Okay.

7 And we also agree that by looking at the
8 final structure, you cannot really tell whether it's
9 a blanket deposition or whether it's selective
10 deposition; correct?

11 So, if I just look at the figure in figure
12 three -- figure three, for example, I can't tell.

13 A POSITA looking at it would not know
14 whether the edge -- the materials being deposited on
15 the edge was removed at the deposition or whether
16 there is just no deposition in those areas in the
17 first instance; true?

18 A So, firstly, you don't look at the figure
19 on its own. You also look at the disclosure.

20 But if you look at the disclosure along
21 with the figures, he's silent.

22 If I were to look at this structure, the
23 fact that it has curved edges, actually would tend
24 to suggest to me that that's the extent of the
25 regions of deposition and that it was never

1 deposited past the edges and then etched back.

2 But having said that, it's true that he
3 never explicitly says that.

4 Q In fact, the only expressed disclosure he
5 says is deposited in the exposed areas of the
6 substrate, which would include the edge; correct?

7 A But that's not what he shows in figure
8 three. That's my point.

9 I mean, I just don't think he's -- that
10 he's silent as to what actually happens with respect
11 to these edges.

12 Looking at it -- the fact that it has sort
13 of curved deposition profiles suggests it probably
14 didn't deposit all the way to the edges.

15 It did meet the requirements of the
16 expressed disclosure because in the regions between
17 the devices, he is depositing over the substrate --
18 over the exposed substrate. But he still doesn't go
19 all the way to the edges of substrate.

20 He doesn't really specifically express
21 that. He's silent.

22 Q Well, the exposed areas of the substrate
23 can include the edge; correct?

24 A I agree, they could. But that's not what
25 they do in figure three and this is why you read

1 everything together.

2 Q And let's be clear, nothing in your reply
3 declaration or the original declaration disagrees
4 with the examiner's -- the applicant's
5 characterization of Ghosh or the PTO's acceptance of
6 that characterization; correct?

7 A With respect to layer 22, yes, I agree.

8 Q Okay.

9 In paragraph 22 you mention that a POSITA
10 would use -- what do you call -- the batch
11 manufacturing process for basically the throughput
12 productivity and the manufacturing costs; right?

13 A With respect to the benefits that it
14 provides, yes.

15 Q Okay.

16 And what do you mean by "manufacturing
17 costs"?

18 A By "manufacturing costs"?

19 Q Yeah.

20 A Oh, so the costs -- the overall costs of
21 manufacturing which depends on several factors,
22 which includes tool utilization, cost of labor,
23 amortization of the tools, cost of consumables, cost
24 of the electricity.

25 But if you put all of that together, if

1 you can do batch manufacturing, you often will
2 reduce the overall manufacturing cost when you
3 define that as essentially the cost per units that
4 you are producing.

5 Q Okay.

6 And does Yamazaki mention that it's trying
7 to -- to do batch manufacturing?

8 A I don't believe Yamazaki specifically
9 refers to batch manufacturing.

10 Q Okay.

11 So, Yamazaki could be -- just be
12 describing a method that it is exploring for lab
13 purposes; correct, just to have one device per
14 substrate?

15 A I mean, I couldn't say. But it's
16 certainly clear that a POSITA looking at Yamazaki
17 would know, given the abundant disclosure, not just
18 in the literature outside of the three -- the patent
19 at issue.

20 But even in the background of the patent
21 at issue that there would be benefits to using
22 Yamazaki in a batch method.

23 Q Okay.

24 And you told me that the first -- your
25 first awareness of anyone who's trying to use inkjet

1 printing for both the EL layer and the encapsulation
2 layer was in 2010; correct?

3 A So, that's not quite right. You asked me
4 about general awareness and I said I had no idea.

5 Q Okay.

6 A Then you asked me with respect to my
7 consulting and then I said, yes, in 2010, or
8 approximately in 2010. I don't remember the exact
9 time frame.

10 Q Okay.

11 So the only recollection you have of
12 anyone trying to do it using the same ink jetting
13 method for both the EL and the cover layer is 2010?

14 A Around that time. Around that time,
15 that's true.

16 Q That's the only recollection you have
17 right now; correct?

18 A Correct.

19 Q Okay.

20 And do you consider yourself to be pretty
21 well versed in the development of the OLED field?

22 A Yes. I mean, this was an area that was
23 related to my own personal research for the better
24 part of two decades.

25 Q Okay.

1 A So, yeah, I would say so.

2 Q And even that 2010 one sounds like it's
3 more like prototyping and it's not really doing
4 commercialization; correct?

5 A No. The company was very much intending
6 to commercialize. I don't know -- I mean just
7 because I sort of moved on from that consulting
8 activity, I don't know what finally happened. But
9 they were very much working on commercialization.

10 Q Okay.

11 And were they using the Yamazaki method?

12 A I don't know what you mean by that.

13 Q Well, the method describing Yamazaki,
14 embodiment number three?

15 A I mean, in some ways, yes, in other ways,
16 no, because -- you know, there's a finite set of
17 materials that people use to build OLEDs. Some of
18 the materials are used in Yamazaki.

19 So, to that extend, yes, they were using
20 some of those materials.

21 They were certainly, as far as I can
22 recall, not using this electric field deposition
23 technique, but they were using inkjet.

24 Now, they are not using the heads that
25 Yamazaki called out. They were using other types of

1 heads, as far as I can remember.

2 Q And do they have a barrier layer over the
3 cover film, or whatever you call it?

4 A I don't recall for sure. I believe so,
5 but I'm not positive.

6 Q Okay.

7 And you are not aware of the work being
8 published; correct?

9 A Correct, I have no idea one way or
10 another.

11 Q And do you think that a POSITA would be
12 able to commercialize the process described in
13 Yamazaki in 2001 and 2002?

14 A I don't understand the question.

15 You are asking me could they are
16 commercialized it in 2001 and 2002? Or are you
17 asking me could they have commercialized after that
18 based on the disclosure in 2001 and 2002?

19 Q In 2001 and 2002.

20 A So, are you asking could they have
21 commercialized it in 2001 and 2002?

22 Q Correct.

23 A I mean, probably. You know, there's a lot
24 of reasons things fail in terms of products. But
25 that doesn't mean you couldn't try to commercialize

1 it.

2 There were a lot of people -- people
3 working on OLEDs in that time and even before of
4 that time, including printed OLEDs.

5 Q Okay.

6 And were you aware of anyone successfully
7 doing what Yamazaki was doing before 2010?

8 A By success, you mean commercial success?

9 Q Well, you are talking of manufacturing;
10 right?

11 A No, actually, you were talking about
12 manufacturing.

13 I was talking about Yamazaki which is --
14 it's a red herring if it's just limited to
15 manufacturing.

16 Q Well, paragraph 22 is talking about
17 manufacturing; correct?

18 A Actually, paragraph 22 is talking about
19 the benefits of batch fabrication with respect to
20 the manufacturing costs.

21 Q Okay.

22 A And the earlier, paragraph 22, was talking
23 about the manufacturing -- the process. But that's
24 not limiting it to large-scale commercial success.
25 I mean, costs matter even when you are developing

1 the process for commercial success.

2 Q Okay.

3 So, were you aware of anyone even
4 attempting such manufacturing process back in 2001
5 and 2002?

6 A My apologies, now I'm lost again. You
7 said "such," but I don't know what "such" means.

8 Q Yamazaki.

9 A The exact process of Yamazaki, no. As I
10 said, I don't know.

11 Q And much less that during Yamazaki --
12 trying to scale the Yamazaki process to multiple
13 devices on a substrate; right?

14 A Well, it's not that. It's much less just
15 given that I said I don't know if anybody was trying
16 to commercialize Yamazaki's process.

17 That would be equally true whether we're
18 talking about doing a single device or a batch case
19 production of multiple devices, my answer would be
20 the same.

21 Q Okay.

22 By the way, if you take a look at figure
23 14 of Yamazaki, can you tell whether there's a gap
24 between the -- the electrical pad and the rest of
25 the system, whether that's originally left uncovered

1 or there was blanket deposition and then being
2 etched away -- the barrier material then being
3 etched away.

4 Can you tell?

5 A I understand the question.

6 Q You don't understand?

7 A I said I understand the question.

8 Q Oh, sorry. Okay.

9 A So, I address this if you look at my --
10 and you are specifically talking about figure 14,
11 correct?

12 Q Correct.

13 A Not figure 11.

14 Just to confirm, Ms. Zhong, you are
15 talking about figure 14, not figure 11?

16 Q Correct.

17 A So, I address that in paragraphs 103 to
18 106 off my original declaration, Exhibit No. 1003.

19 So, in my opinion, a POSITA would view
20 that and would say, A, it is a deposition technique
21 and it specifically calls it out.

22 Just like the previous discussion for
23 figure 11, they would understand that it's
24 selectively deposited based on the shape that they
25 see.

1 Q How can you tell the shape? How do you
2 know the gap was not created afterwards or the
3 material was not removed?

4 A It doesn't say that. It doesn't say it
5 was removed.

6 The closest disclosure we have is that it
7 is deposited. In the previous discussion, it
8 explicitly -- for figure 11, it explicitly calls it
9 out as being done with a mask.

10 That's how a POSITA would read this.

11 Q Okay.

12 And the three other places it specifically
13 omits that reference, and for 183 it specifically
14 says it is noted that it's bound -- that in this
15 instance it was bound with a mask; correct?

16 A In line with what we discussed previously,
17 yes, I agree that there's one place where it
18 explicitly calls it out.

19 Q Okay.

20 And isn't it true that usually a POSITA,
21 when you read like that, it usually means this is
22 the exception rather than the rule.

23 The other three are basically bound
24 differently. That's why I want you to note in this
25 case it's done selectively.

1 A No, I completely disagree. That's an
2 incorrect way to interpret this.

3 Q Okay.

4 Do you have any evidence someone other
5 than you would take that read?

6 MR. GARR: Objection.

7 THE WITNESS: I don't know what that
8 means.

9 BY MS. ZHONG:

10 Q I'm asking you, do have any evidence that
11 someone other than you, a POSITA would interpret
12 Yamazaki's reference as you just did?

13 MR. GARR: Objection.

14 THE WITNESS: I still don't know what you
15 mean by that question.

16 MS. ZHONG: Okay.

17 BY MS. ZHONG:

18 Q So, you said you disagree with my
19 interpretation of how a POSITA would read Yamazaki.

20 So, my question to you is: What evidence
21 do you have, other than your own words?

22 A Oh, no, I mean, I'm responding to a
23 question you asked me, so I have nothing -- you
24 asked me a question, I gave you an answer. That's
25 my opinion.

1 Q Okay.

2 So it's your opinion of how you would
3 interpret Yamazaki; correct?

4 A Well, it is my opinion of how I would
5 interpret Yamazaki, but it's also my opinion of how
6 a POSITA would interpret Yamazaki.

7 Q But you haven't checked with a Samsung
8 engineer or another POSITA that that's how they
9 would interpret Yamazaki; correct?

10 A That's true, I have not.

11 Q Okay.

12 You have also discussed a reference called
13 "Palanisamy."

14 Do you recall that reference?

15 A Yes.

16 Q You never contend that Palanisamy's
17 passivation layer is planarization layer; correct?

18 A I need to look at Palanisamy, please.

19 Q Okay.

20 I want you to take a look at your
21 declaration and tell me where in your declaration I
22 would be opening, or the reply, you describe
23 Palanisamy's passivation layer as a planarization
24 layer?

25 A I understand, but it's okay for me to also

1 look at Palanisamy?

2 Q Yeah, that's fine, definitely.

3 Or let me put it this way: You have
4 submitted four declarations total in two
5 proceedings.

6 In none of those declarations you rely on
7 Palanisamy for supplying the planarization layer
8 imitation; correct?

9 A I understand the question.

10 Q Okay.

11 A Okay.

12 So I'll take it declaration by
13 declaration. And I don't have the declarations from
14 the other matter in front of me. So if you want me
15 to answer that, I'll need you to give me those.

16 But I do have the two declarations from
17 this matter in front of me. And it's true for --
18 from my reply declaration I do not contend that
19 Palanisamy teaches planarization with respect to the
20 layer in question.

21 And please bear with me for my original
22 declaration.

23 Q So the drop box should have those copies
24 -- both copies of the reply declaration. And I have
25 just put Exhibit No. 1004, which is your

1 declaration -- original declaration from the other
2 proceeding into the drop box.

3 A Okay.

4 (Exhibit 1004, previously marked, not
5 attached.)

6 THE WITNESS: So with respect to Exhibit
7 No. 1003, for this matter --

8 MS. ZHONG: Uh-huh.

9 THE WITNESS: -- I do not specifically use
10 any teachings of Palanisamy to claim that Palanisamy
11 is teaching planarization.

12 MS. ZHONG: Okay.

13 THE WITNESS: I use it for other reasons
14 related to selective deposition, et cetera.

15 MS. ZHONG: Okay.

16 THE WITNESS: And then let me go to --
17 sorry you said --

18 MS. ZHONG: Exhibit No. 1004, and I
19 believe your reply declaration for the other matter
20 is Exhibit No. 1033.

21 (Exhibit 1033, previously marked, not
22 attached.)

23 MS. ZHONG: They both should be in the
24 drop box.

25 THE WITNESS: Okay.

1 Okay. So now I'm looking at Exhibit
2 No. 1033 from IPR 2024-01223.

3 MS. ZHONG: Correct.

4 THE WITNESS: I do not mention Palanisamy
5 in Exhibit No. 1033 of IPR 2024-01223. And I
6 mention Palanisamy in Exhibit No. 1004 of IPR
7 2024-01223, but in the substantive mention of it,
8 I'm only pointing to it for the selective deposition
9 being known and commonly used, including screen
10 printing and other inkjet printing, et cetera, which
11 shows up on the bottom of page seven and the top of
12 page eight of the initial declaration that I
13 submitted for the other matter.

14 MS. ZHONG: Let's go back to your
15 declaration, paragraph 17.

16 BY MS. ZHONG:

17 Q In paragraph 17 you mention that in your
18 lab you have used inkjet printing to build layers
19 that are many microns thick.

20 Do you see that?

21 A Yeah.

22 Q That's not for encapsulation layers, is
23 it?

24 A No. That particular work was not for
25 encapsulation. That was for multilayer

1 interconnects.

2 Q Okay.

3 A Actually, I should rephrase that.

4 It was for encapsulation but not for
5 OLEDs. It was for encapsulation of interconnects.

6 Q Okay.

7 This is not for OLED encapsulation?

8 A That's fair.

9 Q And it is not for OLED planarization
10 encapsulation?

11 A That's also fair. This work was not about
12 OLEDs.

13 Q And let's look at Exhibit No. 1028. I
14 don't think that has anything to do with the
15 planarization layer for OLEDs either; correct?

16 A That's true as well.

17 Q Okay.

18 And Exhibit No. 1029, the SPIE reference?

19 A Oh, the SPIE reference by Hayes?

20 Q I think so.

21 Exhibit No. 1029.

22 A Please bear with me.

23 So, Exhibit No. 1029 does explicitly talk
24 about OLED displays and specifically PLED displays.

25 Q Uh-huh.

1 A But Exhibit No. 1029, I'm really just
2 pointing to it for the use of ganged heads, showing
3 that you could put multiple heads in parallel to get
4 high speed printing.

5 And it specifically does talk about
6 polymer LED display printing in section seven, which
7 is on the second to last page of Exhibit No. 1029.

8 Q And is it used for the encapsulation
9 layer?

10 A So, with respect to what he shows here, I
11 think he's only using it for the light-emitting
12 polymer layer, not for encapsulation.

13 That's what these figures are. These
14 figures are -- specifically figure 17. And then
15 figure 18 is an analysis of figure 17. That's
16 light-emitting polymer print, not encapsulation.

17 Q Okay.

18 So at the time of '389, is it fair to say
19 that the only reference in the two OLED proceedings,
20 the only reference that he used inkjet printing for
21 OLED encapsulation is the Yamazaki.

22 That's the only reference; right?

23 A Sorry, I couldn't answer that without
24 looking at each reference.

25 It is true it is in Yamazaki. I just

1 don't remember every reference by heart, so I'm not
2 able to answer it without going through each one.

3 Q Okay.

4 So why don't you look at the references
5 that you have cited for inkjet printing. It's
6 Palanisamy, right. There's Sturm. Palanisamy is
7 for passivation layer, that done mention
8 planarization layer; correct?

9 A Yes, I already agreed that I cite to this
10 for selective deposition and it does talk about
11 passivation layer. But I do not site to it for
12 planarization.

13 Q Okay.

14 And Sturm is using inkjet printing for EL
15 layer; right?

16 A It's for the basic OLED stack itself,
17 correct. Specifically, the luminescent layer, not
18 for encapsulation.

19 Q And the same for Duthaler?

20 A Sorry, I don't remember it.

21 Q Okay.

22 So Duthaler is Exhibit No. 1060.

23 (Exhibit 1060, previously marked, not
24 attached.)

25 THE WITNESS: So, in paragraph -- on page

1 two at line 13 it says, "In another embodiment the
2 method includes printing an encapsulate for
3 protecting a portion of the addressing device."

4 Now, the addressing device is not the OLED
5 itself, but it's part of the display.

6 BY MS. ZHONG:

7 Q It's not the OLED; right, the addressing
8 device is not the OLED?

9 A I agree, the addressing device in this
10 situation would be a transistor device, not the OLED
11 itself, but it's on the same substrate.

12 Q And it's usually less sensitive than
13 OLEDs?

14 A That may be true. That doesn't
15 necessarily follow.

16 I mean, there are some materials where
17 that's true, but there's others where that's not.

18 It's certainly true that there are
19 examples of OLED materials that are more air
20 sensitive than the corresponding examples of
21 transistor materials.

22 Q Okay.

23 But Duthaler doesn't really use inkjet
24 printing for the OLED portion.

25 It's for some other circuits; right? That

1 we agree.

2 A Given that Duthaler is really focused on
3 the circuit elements that control the display, not
4 on the light-emittance elements itself.

5 And in certainly looking at the figures,
6 that appears to be true.

7 Q Okay.

8 I don't recall you citing any other
9 references for inkjet printing, do you?

10 A Well, I'd have to go through. But off the
11 top of my head, no, not specifically.

12 Q Okay.

13 And can you please take a look at
14 paragraph 18 of your reply declaration?

15 A Okay.

16 Q You said -- it's the second sentence. You
17 said, "As an additional matter, Strum disclosures
18 relate to forming OLED layers rather than
19 encapsulation layers."

20 Do you see that?

21 A Yes.

22 Q Why do you say that? What's the
23 significance of this statement?

24 A Well, it's just that -- I mean, if you
25 look at Strum's disclosures, it's about the OLED

1 stack itself, the intrinsic device. That's all.
2 That's just what I'm pointing out, that's just what
3 his disclosures are.

4 Q So is the inkjet printing requirements or
5 properties different for those two layers?

6 A Well, actually, the specific properties
7 are different for -- it depends on the specific
8 thicknesses and the properties of the ink.

9 That doesn't mean that one of skill
10 wouldn't know how to tune those parameters.

11 But yes, I mean, I agree if you are doing
12 a very thin layer with a very dilute ink, the
13 specific inkjet printing parameters will be
14 different.

15 But that's relatively straightforward and
16 one of skill would certainly know how to tune those
17 parameters.

18 Q And have you done inkjet printing of the
19 -- a planarization layer of OLEDs?

20 A Within my lab -- well, so just -- within
21 my lab personally, I don't recall doing it. Not for
22 OLEDs.

23 We did planarization over thin-film
24 transistors. I don't recall doing planarization by
25 inkjet over OLEDs.

1 And that's, of course, putting aside the
2 consulting activity that I mentioned previously,
3 obviously.

4 Q And for those inkjet printing work, was
5 that after 2002?

6 A No. I mean, we started that work, so I
7 set up my lab in 2000 and we started doing work on
8 OLEDs and TFTs, both of them, right when I started.
9 So we were building OLEDs within the first year of
10 my lab being in operation. And my lab went into
11 operation July first of 2000, I believe.

12 Q I thought you said you did not do
13 encapsulation -- inkjet printing encapsulation for
14 OLEDs; is that correct?

15 A I said I don't recall doing it. I don't
16 think we did, that's fair.

17 Q Okay.

18 So whatever you did on July first, 2000,
19 that has nothing to do with inkjet printing of the
20 encapsulation layer for the OLEDs; right?

21 A For OLEDs, yes, I would agree.

22 I mean, we started working on inkjet
23 printed transistors right at that time and very
24 early on we were already working on encapsulation,
25 but not -- I don't recall specifically doing it for

1 OLEDs.

2 Q And you did not publish your work in 2003
3 for those inkjet printed one?

4 A I think we had some conference papers in
5 2002.

6 Q Do you cite them here?

7 A I think in the other matter we did. I
8 think in the other matter we did cite the papers for
9 2002. But I think the first journal paper that came
10 out was in 2003.

11 Q But even that work is not about OLEDs;
12 right?

13 A That's correct, that work was not about
14 OLEDs.

15 Q In paragraph 19 you said, "The primary
16 limit and position of printing in inkjet is simply
17 the position limits enclosed by droplets injection
18 from the nozzle itself."

19 Do you see that sentence?

20 A Yes.

21 Q Are you referring to the position limit
22 for a single pass? Multiple passes? What are you
23 referring to?

24 A It actually turns out it's the same issue
25 no matter how many passes you are doing.

1 Q Okay.

2 A The primary limitation on positional
3 accuracy on inkjet is if you shoot a million drops
4 out of an inkjet printer, they don't all hit exactly
5 the same spot.

6 So, that sets the precision limit. And
7 that doesn't -- whether you are printing on a tiny
8 one-centimeter substrate or a three-meter large,
9 multi-display substrate that doesn't change. That
10 number stays the same.

11 Q Okay.

12 Does it matter that you have to do
13 multiple passes back and forth?

14 A No, no. The placement accuracy is not
15 related to what's on the substrate. It's actually
16 related to the physics of how droplets come out of
17 the nozzle.

18 Q And did you cite a paper to support that?

19 A No, not here. That's well-known. I've
20 certainly published on it and so have others.

21 But yes, you are right, I did not cite a
22 paper.

23 Q Okay.

24 We agree that Yamazaki does not disclose
25 encapsulating multiple devices; correct? You are

1 looking to Ghosh and the applicants of the admitted
2 prior art for this imitation; isn't that true?

3 A So, I address this on -- for example, if
4 you go to my original declaration on page 37 at
5 paragraph 74, I say that, "Although Yamazaki does
6 not expressly discuss encapsulating a plurality of
7 such OLED display panel devices, in my opinion it
8 would be obvious to a POSITA," and I go on from
9 there.

10 So I agree there's no express disclosure
11 of that, but I do believe it would be obvious.

12 Q And it is not inherent, though; right?

13 A Correct. It's not in --

14 Q It's not inherent?

15 A Correct, I'm not arguing inherency here.

16 Q And is the figure on page 11 of your reply
17 declaration and paragraph 21, is that -- are those
18 new figures?

19 MR. GARR: What page was it?

20 MS. ZHONG: Page 11, paragraph 21.

21 THE WITNESS: I don't know what you mean
22 by "new." Do you mean as opposed to being in my
23 original declaration?

24 MS. ZHONG: Correct.

25 THE WITNESS: I don't believe so. I think

1 the same figure shows up on page 44, under paragraph
2 84.

3 MS. ZHONG: Okay.

4 BY MS. ZHONG:

5 Q Page 44 of the original declaration?

6 A Yes, under paragraph 84, correct. I think
7 it's the same figure.

8 Q And for purposes of this combination for
9 Yamazaki you are relying on APA and Ghosh for
10 encapsulation of multiple devices; is that right?

11 A You mean for the plurality of devices,
12 just to be precise.

13 Q Correct.

14 A Yes, specifically for the plurality of
15 devices limitation, I believe it will be obvious --
16 either based on one of skill would know in light of
17 the acknowledged prior art or from Ghosh. Both of
18 those would make that abundantly obvious.

19 Q And unlike Yamazaki, that one of the
20 design principles is to use the same method for EL
21 and the cover layer, '389 patent does not have that
22 restriction; correct?

23 MR. GARR: Objection.

24 THE WITNESS: So far as Yamazaki does say
25 that there's advantages to that. But that does not

1 mean that he's saying that it has to be done that
2 way, but I do agree that he does call it out as
3 advantage.

4 MS. ZHONG: Okay.

5 THE WITNESS: And now let me answer the
6 second part of your question which would require me
7 to go the '389, please bear with me.

8 So, in fact, the '389 patent really
9 doesn't give any details in how the layers of the
10 OLED itself are fabricated.

11 So to that extent it really doesn't
12 specifically limit it or offer any comment in that
13 regard which would allow us to say it's limiting it
14 to exactly the same deposition processes as used for
15 the planarization layers or not.

16 BY MS. ZHONG:

17 Q So basically the '389 is indifferent to
18 how the EL layer is formed; correct?

19 A I really wouldn't call it indifferent. I
20 would call it sparse. It doesn't provide much
21 detail at all.

22 Q Basically, it says its method is suitable
23 for work with any kind of OLED devices almost;
24 right?

25 A Could you point me to where it says that?

1 I don't recall specifically seeing where it says
2 that.

3 Q So, if you look at column three, lines --
4 the last paragraph up in the left-hand column?

5 A It doesn't say it's indifferent. It's
6 actually saying it can be used for different
7 applications. But that doesn't mean it's
8 indifferent to how the OLED is being built.

9 This is a statement that it could be for
10 OLED displays for different applications, whether
11 they are active matrix, passive matrix, et cetera.
12 But not in terms of how they are being built.

13 Now, he does say these OLED devices could
14 have some structures, patterns of the OLED substrate
15 and he points out separators when you are using
16 inkjet confinement banks in an inkjet printed OLED.

17 But this statement does not support what
18 you said in the question that you asked. In other
19 words, that he's indifferent.

20 Q So the '389 patent, unlike Yamazaki's
21 embodiment three and four that use the same method
22 for organic OLED layer and the cover layer, the '389
23 patent has no such restriction; correct?

24 MR. GARR: Objection.

25 THE WITNESS: So that's not entirely true.

1 I mean, there was one description which is the same,
2 right. For example, in the very section that you
3 pointed me to which is column three, roughly at line
4 65 it specifically talks about inkjet printed OLEDs.
5 And as we've said the '389 patent does talk about
6 inkjet printing for the planarization layer.

7 So at least as far as that is concerned,
8 it does identify a situation where both use the same
9 technique.

10 BY MS. ZHONG:

11 Q They can using the same thing, but they
12 are not required to use the same thing unlike the
13 Yamazaki embodiment three and four that's
14 specifically described as using the same method;
15 fair?

16 A So I disagree with that characterization
17 for the following reason: I agree that Yamazaki
18 does call out using the same technique and it
19 identifies an advantage with it.

20 However, I don't think that means that
21 it's a requirement. One of -- a POSITA reading that
22 would say, oh, that's a good benefit. In fact, he
23 specifically calls it out as such.

24 It doesn't mean it wouldn't be obvious to
25 a POSITA or apparent to a POSITA to do it some other

1 way.

2 Q Okay.

3 You are not suggesting modifying
4 embodiment three or four of Yamazaki, are you?

5 A Well, I am with respect to doing a
6 plurality of devices.

7 Q But not anything else; right?

8 A The disclosure in Yamazaki --

9 Q Okay.

10 A -- to a person skilled in the art is
11 abundantly clear.

12 Q Okay.

13 You are not suggesting modifying
14 Yamazaki's method of making the EL layer or the
15 cover layer; correct?

16 A So, I point -- well, with respect to the
17 individual steps, I point out I use the disclosures
18 as they are called out in the various places without
19 modification, in that it discloses both the use of
20 inkjet printing and the use of their -- the electric
21 field technique.

22 And it also calls out using the electric
23 field technique, for example, with -- through a
24 mask.

25 So I take all of those disclosures as they

1 are written.

2 Q So other than applying to multiple
3 devices, you are not suggesting modifying embodiment
4 number three with embodiment number four; correct?

5 A I don't understand what that means.

6 So, if you are asking me am I proposing
7 that we need to change something with respect to the
8 individual steps beyond what's disclosed, with
9 respect to what I'm using them for in my
10 combinations, the answer is no.

11 I point out exactly how I use them in the
12 combination.

13 Q Okay.

14 And you use figure 11 made -- according to
15 the method in embodiment three and figure 14 made in
16 embodiment four; correct, specifically?

17 A In the relative --

18 MR. GARR: Objection.

19 THE WITNESS: -- figures, it's correct
20 that the disclosure associated with those is
21 respectively with respect to embodiment three and
22 embodiment four.

23 MS. ZHONG: Okay.

24 BY MS. ZHONG:

25 Q And you have not shown that any deviation

1 from the embodiment number three and embodiment
2 number four would yield those structures; right, you
3 have not shown that?

4 A I don't know what you mean by that
5 question.

6 Q Well, you are relying on figure 11 and
7 figure 14?

8 A Among other things, but yes.

9 Q Okay.

10 And for those specific disclosures, those
11 structures, you have not shown that modification of
12 the -- a mix and match of different parts of
13 Yamazaki is going to yield you that same structure;
14 right. You are just taking whatever Yamazaki is
15 disclosing as they are; fair?

16 A Okay.

17 So with respect to the ground based on
18 Yamazaki or the grounds based on Yamazaki, first, to
19 be clear, the claims don't -- the claims at issue,
20 there's no limitations that specifically relates to
21 the structure -- the detailed structure of the OLED
22 stack itself.

23 It's fabricating a plurality of devices on
24 the substrate, which I say Yamazaki does, and then
25 go on to talk about the two layers --

1 Q Stop right there. Stop right there.

2 You say Yamazaki discloses fabricating
3 multiple devices. I thought you were relying on
4 Ghosh and APA?

5 A Fair enough. That's correct. I should
6 apologize.

7 Q Okay.

8 A I spoke too fast.

9 So, Yamazaki has -- so for the plurality
10 part of that, I'm bringing in what would be obvious
11 based on the acknowledged prior art or Ghosh, that's
12 true.

13 But putting that aside, with respect to
14 the devices themselves, it just says OLEDs. It
15 doesn't put a specific requirement or we don't need
16 to go into the details of how the devices are built
17 to practice that element, because the element simply
18 requires fabricating a plurality of devices on a
19 substrate, whether you build them using the
20 techniques of figure 11 or some other techniques.
21 Or, for example, figure 14 or some other techniques.

22 But I specifically cite to that structure
23 in figure 11, which I point to on page 46 of my
24 opening declaration, and figure 14, which I cite to
25 on page 47 of my opening declaration.

1 Then for the remaining limitations, again,
2 I cite to the disclosure and the associated figures
3 for figure 11 and figure 14.

4 And obviously, I show how they would be
5 impacted by doing the plurality of devices.

6 But other than that, I'm using the
7 disclosure of Yamazaki itself.

8 Q Okay.

9 Does Yamazaki show any example where there
10 is -- where the EL layer and cover layer are not
11 using the same method?

12 A I don't recall specifically. But
13 certainly at least with respect to the three
14 embodiments that we discuss in --

15 Q Four embodiments; right?

16 A Right, the four embodiments that we
17 discussed in our previous questions and answers, I
18 think all of them used the -- or at least they
19 called out an advantage of using the multichamber
20 system so that the same process was used for the EL
21 layer and the planarization layer.

22 Q And, in fact, the abstract -- we have
23 looked at the abstract of Yamazaki. It specifically
24 says using the same film deposition method to form
25 the EL layer and the cover layer; right?

1 A It does say that, yeah.

2 MR. GARR: We've been going a little over
3 an hour. I would suggest a break when you get to a
4 stopping point.

5 MS. ZHONG: Sure. Do you want to take a
6 break now?

7 THE WITNESS: Sure. If we could take a
8 short break, I wouldn't the mind that.

9 MS. ZHONG: How long do you want it to be?
10 We let's get off the record and we'll discuss.

11 THE COURT REPORTER: Thank you. We're off
12 the record.

13 (Brief interruption in proceedings.)

14 MS. ZHONG: Okay. Back on the record.

15 BY MS. ZHONG:

16 Q Let's talk about the Weaver reference a
17 little bit.

18 Do you have that reference, which is
19 Exhibit No. 1008.

20 (Exhibit 1008, previously marked, not
21 attached.)

22 BY MS. ZHONG:

23 Do you have that reference?

24 THE COURT REPORTER: Doctor --

25 MS. ZHONG: Your microphone is off.

1 THE COURT REPORTER: Thank you.

2 You are on mute.

3 THE WITNESS: I apologize.

4 Yes, yes, I have the reference.

5 MS. ZHONG: I'm sorry.

6 BY MS. ZHONG:

7 Q So, let's go to paragraph 254 to 258.

8 Actually, 1259. Those are the paragraphs describing
9 figure eight's process; right?

10 A Yes, that's correct.

11 Q Okay. And 54 saying, "The formation of
12 planarizing and high-density layers over a substrate
13 material will now be discussed in connection with
14 figures 4a to 4g, figure eight and figure nine";
15 correct?

16 A Yes.

17 Q What is substrate material?

18 A So, it depends on the specific figure,
19 because this sentence refers to multiple figures.

20 In figure four or figures four, the
21 substrate material is 110 in the figure.

22 And in figure eight, the substrate
23 material is a web of substrates 210, so it's a roll
24 -- or a continuous roll of material.

25 Q Figure eight doesn't show any devices on

1 it, does it?

2 A I think I understand. You mean actually
3 -- like showing individual OLED devices?

4 Q Yeah.

5 A I agree, this is a schematic and the
6 figure itself is not a level of granularity to show
7 the individual devices.

8 Q Okay.

9 A But the discussion of figure eight or, in
10 fact, that whole section is very much about -- so,
11 for example, in the section that we talked about --
12 in the paragraph immediately before paragraph 54
13 where you read the first sentence, it specifically
14 talks about why you would need to do this with
15 respect to protecting OLED devices.

16 Q Okay.

17 I think your answer was nonresponsive, but
18 I will let you go.

19 On substrate 110, the device must -- the
20 depositing on substrate 110; correct?

21 Let me put it this way: Figures 4a to 4g,
22 there are no planarizing and high-density layers
23 over the device itself; correct?

24 A I think I understand what you mean.

25 So if we look at figure 4g, the discussion

1 of that is actually provided in paragraph 56 of
2 Weaver.

3 Q Yeah.

4 A Where it says, "After deposition of the
5 desired number of planarizing and high-density
6 layers," in parenthesis, "three pairs are shown," an
7 OLED 140 is then provided on the now-covered
8 substrate using known techniques as shown in figure
9 4g."

10 And then it says, "An additional barrier
11 region 150 is then adhered to the substrate via
12 adhesive region 130 in this embodiment."

13 So if we're looking at, with respect to
14 the planarizing and high-density layers that were in
15 the earlier figures before 4g, it's true the OLED is
16 above those layers.

17 Q Okay.

18 And those alternating, planarizing and
19 high-density layers in 4a to 4g, they cover the
20 substrate, not the device?

21 A With respect to that disclosure, I agree
22 because the OLEDs are put on in the next step, 4g.

23 Q And figure eight is showing you how you
24 can get the structure 120; right?

25 A Sorry, in figure eight?

1 Q Figure eight is showing how you can get
2 the progressively larger structures 120; right, look
3 at paragraph 57?

4 A So, paragraph 57 does not call out
5 specifically the layer -- or the structure 120.

6 It more generally calls out the deposition
7 of progressively larger cooperative barrier layers.

8 Q Okay.

9 Of which 120 is an example; correct?

10 A 120 is an example with respect to previous
11 figures. Not with respect to figure eight.

12 Q Can you go to 58?

13 It says, "An arrow indicates the direction
14 of the substrate 210 movement within apparatus 200.
15 Deposition source 221a, is first used to deposit
16 first planarizing material layer 121a."

17 Do you see that?

18 A Yes.

19 Q And that's talking about figure eight,
20 right, using figure eight to deposit planarizing
21 material layer 121a through 121b, et cetera,
22 et cetera; right?

23 A That's correct.

24 Q Okay.

25 So figure eight is -- actually, you have

1 to read in context. It's describing the deposition
2 of planarizing material 121a and then deposition of
3 the -- 121b, et cetera and the one -- I'm sorry.

4 So figure eight reading in combination of
5 paragraphs 57 through 59 seems to be describing
6 using deposition sources 221a to 222a, et cetera, to
7 deposit layers 121a, 122a, 121b, 122b, et cetera,
8 et cetera; is that correct?

9 A I agree. What you read is basically what
10 is described in paragraph 58.

11 Q Okay.

12 So, Weaver does not expressly connect
13 figure eight with layer 150; correct?

14 A I don't understand what you mean by that
15 question.

16 Q Okay.

17 So, we have just established, based on the
18 description in Weaver, 57 to 58, figure eight is
19 describing the formation of the layer structure 120;
20 correct?

21 A No, it does not call out 120. But it
22 calls out the component layers that were previously
23 described when talking about a separate figure that
24 had a layer 120.

25 Q Okay.

1 So let's look at figure six.

2 In figure six, structure 120 with layers
3 121 and 122, those are the layers that's covering
4 the substrate but below the device; correct?

5 A In figure six, yes, I agree.

6 Q Okay.

7 And the same in figure five and figure
8 seven and figure four; correct?

9 A Correct.

10 Q Okay.

11 Let's look at figures -- sorry, I need to
12 close my PDF.

13 And similarly, in figures 1a, 1b, two and
14 three of structure 120 with layers 121 and 122,
15 those are also only covering the substrate but not
16 the device.

17 A Sorry, in which figures, I apologize?

18 Q Figures one, 1a, 1b, two and three.

19 A I agree.

20 Q So, in Weaver, are the figures, right?
21 Where 120 is concerned, those are the structures
22 that cover the substrate but below the device;
23 correct?

24 A With respect to the figures we've
25 discussed which are specifically calling out the

1 layers.

2 Q 121, 122?

3 A Yeah, the layers -- they are calling out
4 the various layers, 121 and 122, I agree. And in
5 the figures that we've discussed, those are all
6 providing -- they are below the device on the
7 substrate.

8 Q Okay.

9 So those are not the layers that
10 encapsulate the device?

11 A And specifically, they don't encapsulate
12 over the device.

13 Q The OLED device?

14 A They are not over the OLED device to
15 encapsulate it in those figures, I agree. They are
16 under the device.

17 Q Okay.

18 And in Weaver the structure that is used
19 to encapsulate the device is referenced as structure
20 150; correct? Take a look at figures five --
21 figures six, seven and 4G, for example. Also figure
22 three.

23 A So, with respect to figure six, it calls
24 in an additional barrier region 150 consisting of an
25 alternating series of planarizing layers 151 and

1 high-density layers 152.

2 Sorry, what is the next figure, besides
3 figure six?

4 Q Seven.

5 A Okay. With respect to figure seven, it's
6 pointing to an additional barrier layer 160.

7 Q Which is also below the device; right?
8 The layer that is actually encapsulating the device
9 is layer 150; correct, figure seven?

10 A My apologies, I'm looking for the
11 discussion of figure seven. Please bear with me.

12 Yes, if we look at the structures that are
13 above the device, I agree. That's the set of layers
14 that correspond to 150 which means 151 and 152.

15 Q Okay.

16 Then if you look at figures three, 4g and
17 ten, those look to me as traditional glass
18 encapsulating structures?

19 A Three, 4g and --

20 Q And ten?

21 A -- and ten.

22 So, I agree. Certainly, one way to read
23 them, is because it does say it's an adhered top
24 layer, which I agree, that's certainly one way that
25 would be done, could be with a traditional glass

1 encapsulation technique where you sandwich another
2 layer of glass over the device.

3 Q But my point is that layer that's
4 described as encapsulating the device is always
5 described as layer 150 or structure 150; correct, in
6 Weaver?

7 A With respect to the figures that we've
8 looked at, I agree.

9 The set of layers that are over the device
10 to provide the over device encapsulation are
11 identified with respect to those figures as the set
12 of layers that correspond to 150.

13 Q Okay.

14 The same in figure 1b; right, the layer
15 that's over the device is 150?

16 A Yes, I agree.

17 Q Okay.

18 And as expressly disclosed by Weaver,
19 however, figure eight is only describing using the
20 various deposition forces to deposit layers 121 and
21 122; correct, 57, 58 and 59?

22 MR. GARR: Objection.

23 THE WITNESS: Sorry, can you repeat the
24 question, please?

25 MS. ZHONG: Okay.

1 BY MS. ZHONG:

2 Q As expressly disclosed by Weaver, figure
3 eight is describing using deposition sources 221a
4 through c and 222a through c to deposit layers 121a
5 through c and 122a through c; correct?

6 A I understand the question.

7 I actually addressed this on page 105 of
8 my original declaration Exhibit No. 1003. Actually,
9 it's in the footnote where I specifically address
10 this point. I say, "Although paragraph 58 of Weaver
11 describes depositing planarizing layers 121a through
12 c and high-density layers 122a through c, a POSITA
13 would have appreciated that this description is
14 equally applicable to the planarizing layers 151a
15 through c and high-density layers 152a through c of
16 the additional barrier region 150, which likewise
17 constitute progressively larger barrier layers."

18 Q Okay. You have not answered my question.
19 I'm asking you, as expressly disclosed,
20 figure eight is not describing forming the 150
21 layer; correct?

22 A Actually, I did answer your question
23 because at the very first part of that I said, while
24 it does not say that, so to that extent I did
25 specifically address it.

1 But yes, having said that -- given what I
2 just told you, it is true that the expressed
3 disclosure is for the lower layers. But one of
4 skill would know it's equally applicable to the
5 upper layers.

6 Q Okay.

7 The upper layer includes the -- the upper
8 layer includes the device itself; right?

9 A I don't know.

10 Q The upper -- so when 120 is deposited on
11 the substrate there's no OLED devices; correct?

12 A That's true.

13 Q Okay.

14 When the 150 is used to encapsulate the
15 OLED devices; true?

16 A Correct.

17 Q Okay.

18 Does Weaver say anywhere that it will be
19 -- used the same method for forming layer 150 as for
20 layer 120?

21 A So, it doesn't -- there's nowhere where it
22 explicitly says that the same exact process steps
23 are used for the layers 120 and the layers 150.

24 But it does make a general statement at
25 the top of paragraph 54 where it says, "The

1 formation of planarizing and high-density layers
2 over a substrate material will now be discussed in
3 connection with" the figures we've been discussing.

4 And, of course, it does say that the
5 layers 120 and 150 are the layers within -- 120 and
6 150 are respectively planarizing and high-density
7 layers.

8 Q Okay.

9 54 is talking about forming those layers
10 over a substrate material; correct?

11 A I agree.

12 Q It doesn't say over a device; correct?

13 A It does not in those sentences -- I mean,
14 in that sentence, I agree.

15 Q And you didn't point out anywhere else in
16 Weaver that says apply the same methodology to
17 figures eight, nine or figures 4a to 4g G to the
18 layers over the -- over the OLED devices; right?

19 A I do not point out anywhere where that
20 exclusively appears, I agree.

21 Q Okay.

22 A I addressed that in the footnote that we
23 discussed in my previous answer.

24 Q Did you review Dr. Antoniadis deposition
25 testimony?

1 A It's "Antoniadis," I think you mean.

2 Q "Antoniadis," yeah.

3 A I did previously, yes. I believe so.

4 Q You did not address that in your reply
5 declaration; correct?

6 A Actually, I don't remember. So I have not
7 reviewed it in a while. I would have to look at the
8 materials considered.

9 It's not something -- it's certainly not
10 something I've reviewed in the last few weeks.

11 Q Okay.

12 So the deposition would have been taken
13 long after your original declaration.

14 So if you have addressed it, it would be
15 in the reply declaration. I don't see it. I just
16 wanted to make sure that I did not miss it.

17 A Okay. Then that's fair. Then I did not.

18 This is Homer Antoniadis, correct?

19 Q Yes.

20 Do you know him?

21 A Yes, I met him before, but it's been
22 probably two decades.

23 Q Okay.

24 Do you consider him to be an expert in the
25 OLED field?

1 A I honestly don't remember his background.
2 I know he was active in OLEDs for a long time.

3 Q Okay.

4 A But I couldn't say for sure. I just
5 haven't kept up with what he's been doing.

6 Q Now, I think Exhibit No. 2023, which is a
7 paper by you.

8 You were discussing how to eliminate the
9 coffee ring effects.

10 A In Exhibit No. 2023?

11 Q Yeah.

12 A Exhibit No. 2023, sorry.

13 Q Two, zero, two, three.

14 A Yes, that's one of the -- that paper
15 addresses various things.

16 But yes, one of the things it does discuss
17 is elimination of the coffee-ring effect.

18 Q And was the coffee-ring effect known at
19 the time of the '389 patent?

20 A Oh, for sure the coffee-ring effect was
21 described, I don't remember when, but many years
22 before that.

23 Q Okay.

24 And so before you, were there papers
25 addressing how to eliminate the coffee-ring effect?

1 A I would think so. I mean, we proposed a
2 specific way of addressing the coffee-ring effect.
3 But there were other ways to address the coffee-ring
4 effect that were know before this paper, for sure.

5 Q But you did not cite any of those here?

6 A That's right, I did not, yeah.

7 Q Okay.

8 And if I remember correctly, the way you
9 did it is basically you have to heat the substrate
10 up to a certain temperature.

11 Is that -- as well as using specific ink
12 so it won't evaporate too fast?

13 A That's not exactly right. It's not but --
14 so it's true a key process parameter that we used
15 was we used elevated temperature. It doesn't have
16 to get very hot, but you have to heat it a little.

17 What that does is that causes convective
18 vortices within the ink which then sort of reverse
19 the convective flows that cause the coffee-ring
20 effect.

21 Q Okay.

22 And the temperature, if I remember that
23 you used for the -- to eliminate the coffee-ring
24 effect, the substrate temperature is above 130, 150?

25 A So we've done it -- it depends, but yeah.

1 So we were doing this on a very common
2 plastic substrate called PET, polyethylene
3 terephthalate, which is a very popular flexible
4 substrate.

5 And so we demonstrated coffee-ring
6 elimination by about 130 degrees Celsius.

7 Q Okay.

8 And if you look at figure six, those seem
9 to be the temperature ranging between 160 and 220;
10 right?

11 A Correct.

12 Q And OLEDs are usually more temperature
13 sensitive than the gold materials, for example;
14 correct?

15 A Yes, but these temperature ranges are
16 compatible with OLEDs.

17 In fact, OLEDs have been made using
18 materials that can easy handle 150 to 170 C, even
19 200 C for a long time. That's -- these temperatures
20 are not -- I mean, they have been plenty of OLED
21 materials available which are completely compatible
22 with these temperatures and since well before this
23 work.

24 Q You do not cite any of those evidence;
25 correct?

1 A I thought I did. I thought I cited a
2 paper on TPD. Let me check be.

3 Could you point me to where the discussion
4 of coffee ring was in this -- that you are
5 addressing in your question?

6 Q In your declaration?

7 A Sure.

8 Q You just mentioned Exhibit No. 2023, so I
9 was just asking.

10 A Okay. Yeah, it looks like here, the only
11 thing I cited was Exhibit No. 2023, that's fair.

12 Q Okay.

13 Now, does Weaver mention defects?

14 A Weaver doesn't specifically use the words
15 "defects."

16 He does say in paragraph 35, "By
17 planarizing material is meant a material that forms
18 a smooth planar surface upon application, rather
19 than forming a surface that reflects irregular
20 contours of the underlying surface."

21 So that would cover both intentional and
22 unintentional topography, including defects.

23 But it's true that he doesn't specifically
24 use the word "defects" here.

25 Q Does "irregular contours" necessarily mean

1 there was a defect?

2 A No. But as I said it would cover both
3 intentional and unintentional irregularities.

4 Q And are Weaver's OLEDs made by the same
5 methodology, or by the same process as Suzuki's?

6 A I'm not sure I understand what you mean by
7 that.

8 Q So, I'm just asking you, are Weaver's
9 OLEDs made using the same materials and processes as
10 Suzuki?

11 A Well, they could be.

12 I mean, in fact, he says in paragraph 46
13 of Weaver, "The OLED structure can be any OLED
14 structure known in the art."

15 He's not -- he's certainly not limiting it
16 to Suzuki's OLED structure.

17 Q Suzuki never has the 120 structures to it;
18 correct?

19 A Please bear with me. I have to open up
20 Suzuki again.

21 Yes, I agree if we look at Suzuki there's
22 certainly no explicit disclosure of the multiple
23 layer barriers between the OLED device and the
24 substrate underneath.

25 Q Okay.

1 (Exhibit 2100, previously marked, not
2 attached.)

3 BY MS. ZHONG:

4 Q Did you review Exhibit No. 2100, that's
5 submitted with the POR which is a presentation by
6 Kateeva?

7 A Is this -- I believe so. I think that you
8 may have even shown it to me during my previous
9 deposition; correct.

10 Q Correct.

11 And you did not address this one in your
12 reply declaration; correct?

13 A That appears to be correct. I did not
14 explicitly address it here.

15 Q And Weaver's web process is also called
16 roll-to-roll process?

17 A It doesn't have to be. But it is
18 certainly true that one way of describing -- one way
19 of implementing a web-based process is roll-to-roll.
20 Not all web-based processes are necessarily
21 roll-to-roll.

22 Q What about the steps shown in figure eight
23 is that roll-to-roll?

24 A It appears to be. It doesn't show it
25 completely, because it doesn't show the input and

1 output, so to speak.

2 Q Yeah.

3 A But it certainly would be consistent with
4 a roll-to-roll process.

5 Q Okay.

6 Are you aware of people using Weaver's
7 process in actual manufacturing or even prototyping?

8 A I couldn't say one way or another. I
9 don't know.

10 I certainly cannot specifically call out a
11 real manufacturing device that I know uses such a
12 process.

13 Q And you are not aware of any actual device
14 that's made using Yamazaki's process; correct?

15 A Let me go back to Yamazaki. We haven't
16 been talking about that.

17 Q Yamazaki was the inkjet printing method?

18 A Or the electric field method.

19 Q Yeah.

20 A So I mean that's not in --

21 Q Let's limit it first to embodiment three
22 of Yamazaki.

23 Are you aware of any actual device maybe
24 using that method?

25 A I'll have to open Yamazaki. Please bear

1 with me.

2 What was Yamazaki's exhibit number?

3 Q I believe -- sorry, if you'll let me grab
4 my copy. It's Exhibit No. 1005.

5 (Exhibit 1005, previously marked, not
6 attached.)

7 THE WITNESS: Oh, yeah. Thank you.

8 I'm sorry, could I have your question
9 again, please?

10 BY MS. ZHONG:

11 Q Are you aware of any actual device --
12 publicly disclosed device that is made using
13 Yamazaki's method?

14 A No, I don't know one way or another.

15 Q Okay.

16 What about not publicly disclosed, but
17 just in private? Privately made?

18 A Well, not necessarily. I couldn't say for
19 sure with respect to the specific materials and
20 layer thicknesses and sequences called out in
21 Yamazaki.

22 But more generally with respect, as we
23 discussed in a previous answer, I am aware of
24 commercial attempts to make devices that use inkjet
25 for both the electroluminescent layers offered OLED

1 and encapsulation. Not at that time, they were
2 later.

3 Q Yeah.

4 But you don't recall whether there is a
5 barrier layer over the cover layer; correct?

6 A That's fair. I just don't remember one
7 way or another.

8 Q And in the Weaver structure, there are
9 multiple stacked planarization layer, high-density
10 layer, planarization layer, high-density layer?

11 A Yes, that is called -- sorry, I apologize.

12 Q Go ahead. Go ahead.

13 A I said, yes, that is shown -- Weaver shows
14 multiple stacks of them in the figures and it says
15 that you can do as many or several iterations, but
16 it shows a specific number in the figures.

17 Q Okay.

18 Are you aware of any actual structure
19 where the barrier is made of gold, then another an
20 organic layer and then a kind of dialectic
21 insulating barrier layer?

22 A I understand.

23 So now you are asking a specific question,
24 it's not just alternating organic, inorganic?

25 Q Yes.

1 A Gold organic, some other inorganic?

2 Q Yes.

3 For OLEDs?

4 A I understand.

5 No, not specifically one way or another.

6 I don't know.

7 Q Okay. You have to -- we have to be off in
8 about ten minutes; correct?

9 A I think so. I think that's what you
10 indicated.

11 Q Okay. Let me go through my notes.

12 I have one clarification that I want to
13 ask you about in paragraph 16 of your declaration.

14 A Okay.

15 Q When you say, "as I have previously
16 explained," is that referring to your original
17 declaration or earlier paragraphs?

18 A So, I think actually I was referring to
19 both my original declaration and my deposition
20 testimony because this is in my reply report, so I
21 was also referring back to the things that I said in
22 deposition.

23 And by my deposition testimony, I mean the
24 previous deposition that I had after submitting my
25 original declaration.

1 Q And I also want you to take a look at the
2 '389 patent --

3 A Okay.

4 Q -- at column four, lines 37 through 41.

5 A Okay.

6 Q Is that sentence, "It is generally
7 desirable that the organic layer be deposited in
8 sufficient quantity so that any such layer is no
9 longer conformal to the point defect, i.e., any
10 point defects are not geometrically projected
11 upwards into layers deposited above."

12 That is talking about interrupting
13 propagation of the defects; correct?

14 A Generally, yes. I agree that's sort of
15 what the -- this seems to be associated with that.

16 I mean, certainly the phenomenon it's
17 describing where any point defects are geometrically
18 projected upwards would correspond to propagation of
19 defects.

20 Q Okay.

21 And this appears in the detailed
22 description of the invention; correct?

23 A It does.

24 Q Sorry, I didn't hear.

25 A Oh, I said, "It does."

1 Q Oh, okay.

2 I think these are all the questions I
3 have. Thank you very much for your time.

4 A Thank you.

5 MR. GARR: Let's just go off the record
6 for a few minutes.

7 THE COURT REPORTER: Okay. We're off.
8 (Brief interruption in proceedings.)

9 MR. GARR: Okay. No questions from our
10 end.

11 MS. ZHONG: Okay.

12 (Deposition ended at 2:57 p.m.)

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CSR No. 12566

1 Vivek Subramanian, Ph.D.

2 November 5, 2025

3 RE: Samsung Display Co., LTD. v. Pictiva Displays International
4 10/31/2025, Vivek Subramanian, Ph.D. (#7682406)

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Date Published: 4 November 2002
Contents: 5 Sessions, 31 Papers, 0 Presentations
Conference: International Symposium on Optical Science and Technology 2002
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Table of Contents



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Session 2



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Brenden Carlson, Xuezhong Jiang, Alex K.Y. Jen, et al.

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Alex K. Y. Jen, Jingdong Luo, Hong Ma, et al.

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Asanga B. Padmaperuma, Patrick J. Case, Aaron W. Harper

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Donald J. Hayes, Michael E. Grove, David B. Wallace, et al.

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Shang Li, Hans Feindt, George Giannaras, et al.

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Session 3

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Herman A. Lopez, Prasad Narasimha, Xiangxin Bi

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Stephen M. Kuebler, Kevin Braun, Wenhui Zhou, et al.

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Session 4

^

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Derek R. Oliver, Anle Pu, Douglas J. Thomson, et al.

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Mojtaba Joodaki, Pawel Janus, Teodor Gotszalk, et al.

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Thomas D. Raymond, Daniel R. Neal, Daniel M. Topa, et al.

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Laszlo B. Kish, Cecilia Penetta, Zoltan Gingl

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Poster Session



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Steven J. Limmer, Tammy P. Chou, Guozhong Cao

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Kirk Lennstrom, Steven J. Limmer, Guozhong Cao

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Functionalized, hierarchically structured mesoporous silica by sol electrophoresis and self-assembly
Tammy P. Chou, Steven J. Limmer, Guozhong Cao

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Session 4



Photonic crystals fabricated from gold-silica core-shell nanoparticles
Yu Lu, Yadong Yin, Younan Xia

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Poster Session



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Aleksandr Noy, Abigail E. Miller, Jennifer Emily Klare, et al.

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Session 3



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[Yuka Yoshioka](#), [Ghassan E. Jabbour](#), [Paul D. Calvert](#)

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