

1 UNITED STATES PATENT AND TRADEMARK OFFICE
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD
3
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5 SAMSUNG DISPLAY CO., LTD.;)
6)
7 Petitioner,)
8)
9 vs.) Case No. IPR2024-01223
10) Patent No. 6,949,389
11 PICTIVA DISPLAYS)
12 INTERNATIONAL LTD.;)
13)
14 Patent Owner.)
15 _____)

16 REMOTE DEPOSITION OF
17 VIVEK SUBRAMANIAN, Ph.D.
18 Barberine, France
19 Thursday, October 31, 2025
20
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22

23 Reported by:
24 Lynda L. Fenn, CSR, RPR
25 CSR No. 12566
JOB No. 7682399

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16 REMOTE DEPOSITION of VIVEK SUBRAMANIAN,
17 Ph.D., taken on behalf of Patent Owner,
18 Barberine, France, at 11:01 a.m. and ending at
19 3:02 p.m., Thursday, October 31, 2025, reported
20 by Lynda L. Fenn, CSR No. 12566, Certified
21 Shorthand Reporter within and for the State of
22 California, pursuant to notice.
23
24
25

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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.

Dr. Subramanian, 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 MR. LINDSAY:

Q Could you please state your full name for the record?

A My full name is Vivek Subramanian.

Q This deposition today is going to be in

1 connection with IPR 2024-01223 relating to U.S.
2 Patent No. 6,949,389.

3 Is that your understanding as well?

4 A Well, I actually didn't know which one it
5 was going to be about, which IPR it was going to be,
6 but I'm happy to proceed under that understanding.

7 Q Okay. Yeah.

8 So that's the proceeding that this
9 deposition is directed towards.

10 And if I refer to the patent 6,949,389 as
11 the '389 patent, you'll understand which patent I'm
12 referring to?

13 A Yes, I will.

14 Q Okay.

15 And I may refer to this proceeding or the
16 1223 IPR and you'll understand that I mean IPR
17 2024-01223.

18 Okay?

19 A Yes, that's fine. Though, I will say that
20 you may have to remind me which grounds you are
21 referring to.

22 That's the way I've been sort of keeping
23 the IPRs in my head, not by the number.

24 Q That's fair. That's fair.

25 You sounds a little bit -- your volume

1 sounds a little bit low to me relative to other
2 speakers.

3 A I am bump it up.

4 MR. LINDSAY: Can the court reporter hear
5 you okay?

6 THE COURT REPORTER: Yes, so far. Thank
7 you.

8 THE WITNESS: I've turned it up a little.
9 Is that better?

10 MR. LINDSAY: That is a little bit better.
11 Thank you.

12 THE WITNESS: Sure.

13 BY MR. LINDSAY:

14 Q So, you submitted a declaration in
15 connection with this proceeding back in August of
16 2024; is that right?

17 A Yes. That sounds about right, yeah.

18 Q And I introduced that declaration which
19 was assigned Exhibit No. 1004 in the IPR.

20 (Exhibit 1004, previously marked, not
21 attached.)

22 BY MR. LINDSAY:

23 Q Are you able to pull that document up?

24 A I have a clean PDF, would it be okay if I
25 open that or do you want me to open up the one that

1 you've sent me?

2 Q Whatever is easiest for you.

3 A Okay. One second.

4 Okay. I have it opened.

5 Q Is this the declaration that you submitted
6 back in August of 2024 in connection with the 1223
7 IPR?

8 A Yes.

9 Q Okay.

10 And this is Exhibit No. 1004; correct?

11 A That's correct.

12 Q And then earlier this month, October 2025,
13 you submitted a second declaration in connection
14 with this same IPR, the 1223; is that right?

15 A Yes, it was in October. That's right.

16 Q And that document was assigned Exhibit
17 No. 1033.

18 (Exhibit 1033, previously marked, not
19 attached.)

20 BY MR. LINDSAY:

21 Q Is that your understanding?

22 A Yes.

23 Q So, if we refer to Exhibit No. 1004 as
24 your original declaration and Exhibit No. 1033 as
25 your reply declaration, will that be okay?

1 A Yes, that's fine.

2 Q Okay.

3 Do you have Exhibit No. 1003, your reply
4 declaration with you as well?

5 A It's Exhibit No. 1033. But other than
6 that, yes, I do have it.

7 Q Thank you. Yes, Exhibit No. 1033.

8 Why did you submit your reply declaration,
9 Exhibit No. 1033?

10 A Counsel asked me to submit a declaration
11 addressing certain issues, so I did.

12 Q And those issues that you addressed were
13 where did you -- what was your understanding of
14 those issues?

15 MR. GARR: Objection.

16 THE WITNESS: I'm not sure I understand
17 what you mean by that.

18 BY MR. LINDSAY:

19 Q Did you read certain documents that you
20 then developed opinions about, what was the basis
21 for identifying the issues?

22 A Yes. So specifically, I was asked to
23 respond to certain things that Mr. Humphrey had said
24 and what the patent owner had said and their
25 response, so I addressed those issues.

1 Q I see.

2 Did you cite to any new exhibits in your
3 reply declaration?

4 A You mean new compared to what I cited to
5 in my original declaration?

6 Q Correct.

7 A Yes, I believe so. I cited to certain
8 materials which I've called out within the
9 declaration, and I've identified them within the
10 body of the declaration and I have clearly
11 identified them throughout the declaration where I
12 referred to them.

13 Q So, these are new exhibits that were not
14 cited in your original declaration?

15 A I'm not sure what you mean by "exhibits."

16 But if you mean there are documents that I
17 cited to, the answer is yes. And there was at least
18 one, maybe a couple of them that I had not cited to
19 in my original declaration.

20 Q Can you identify which exhibits you are
21 referring to that you cited --

22 A Sure.

23 Q -- in your declaration?

24 A Absolutely.

25 So, in the declaration -- I don't remember

1 if it was in the declaration of Mr. Humphrey or in
2 the patent owner response.

3 But in those documents, one or both of
4 those documents, either Mr. Humphrey or the patent
5 owner made statements about the suitability of gold
6 with respect to the maximum temperature it could
7 handle -- or the maximum temperature of the process,
8 et cetera.

9 And in response to that -- and, in fact,
10 in those statements that they made, they pointed to
11 prior publications of mine.

12 So, I addressed those publications, which
13 I had not addressed in my original report, and in
14 addition I address the further publications that
15 were related to the same issue again from me.

16 Q Okay.

17 So, other than documents that were cited
18 by Mr. Humphrey or the patent owners, did you
19 identify and cite any new exhibits yourself in
20 support of your reply declaration?

21 A Yes.

22 Q And which were those?

23 A It's the same thing as I identified in
24 my -- in my previous answer.

25 Namely, either Mr. Humphrey or the patent

1 owner cited to certain prior publications of mine,
2 but they didn't cite to all the publications of mine
3 related to that issue.

4 And there were earlier publications
5 related to that issue that they conspicuously did
6 not cite to, and I brought those up to point out
7 that those issues had already been addressed by me
8 in previous publications.

9 Q Okay.

10 A And, for example, I point you
11 specifically, if you look to page 25 of Exhibit
12 No. 1033, you'll see that I point to the proceedings
13 of the Materials Research Society, spring 2002
14 meeting, that was -- that had not been brought up,
15 as far as I recall, by the patent owner or by
16 Mr. Humphrey, but I brought it up.

17 Q And that's -- and are you referring to
18 Exhibit No. 1031?

19 (Exhibit 1031, previously marked, not
20 attached.)

21 THE WITNESS: I don't have the exhibit
22 numbers. You are going to have to --

23 MR. LINDSAY: Well, I'm just looking at
24 page 25.

25 THE WITNESS: Oh, yes. Yes, at the bottom

1 it's 1031, yes, that's correct.

2 MR. LINDSAY: Okay.

3 BY MR. LINDSAY:

4 Q In your original declaration, did you
5 apply the meaning of "planarization layer" that you
6 believe a person of ordinary skill in the art would
7 generally assign to that term?

8 MR. GARR: Objection.

9 THE WITNESS: So, in my original
10 declaration, I applied the plain and ordinary
11 meaning, because I didn't offer any specific
12 construction with respect to the meaning of a
13 planarization layer.

14 But I believe in any reasonable
15 construction -- and the reason I use that is I
16 believe under any reasonable construction, the
17 grounds that I provided disclosed that layer.

18 BY MR. LINDSAY:

19 Q So, in your original declaration, you did
20 not apply any special or different meaning to the
21 term "planarization layer" based on, for example,
22 the specification?

23 MR. GARR: Objection.

24 THE WITNESS: So, obviously, I did review
25 the specification.

1 If you are asking me if I construed it in
2 some special way beyond the plain and ordinary
3 meaning based on the specification, then the answer
4 is, no, I did not.

5 I used the plain and ordinary meaning I
6 think that was appropriate.

7 And as I said earlier, in any reasonable
8 construction, that was disclosed within the grounds
9 that I cited.

10 MR. LINDSAY: Understood.

11 BY MR. LINDSAY:

12 Q And when you say "plain and ordinary
13 meaning," are you referring to the plain and
14 ordinary meaning that a person of ordinary skill in
15 the art would understand the term to mean?

16 A Yes.

17 Q Do you recall testifying in your first
18 deposition that your understanding of a
19 planarization layer, is a layer that increases the
20 planarization of the surface?

21 A I don't recall the specifics of my
22 testimony, so you would have to show me. No. I
23 don't doubt I might have said that, but you'd have
24 to show me. I don't remember.

25 Q Okay. Fair enough.

1 I've just added Exhibit No. 2020 to the --
2 to the share site.

3 (Exhibit 2020, previously marked, not
4 attached.)

5 BY MR. LINDSAY:

6 Q Can you see that or do you otherwise have
7 that document available?

8 A I do see it and I do have it available, so
9 I can open either one. It's up to you.

10 Q Okay.
11 Can you just, for the record, kind of
12 state what this document is?

13 A Yes, this appears to be -- well, based on
14 the title, this appears to be the transcript from
15 the first day of my deposition that was held in May
16 of 2025.

17 Q Right.
18 Can you turn to page 18 for me. I'll
19 direct your attention to lines -- to the testimony
20 starting -- or the questions and testimony starting
21 on line four and give you a moment to kind of
22 refresh your recollection.

23 A Okay. I've read it.

24 Q And the little bit of testimony goes
25 through around line 18.

1 A Yes, that's correct. I've read it.

2 Q Okay.

3 So, do you recall this testimony that your
4 understanding of a planarization layer is a layer
5 that increases the planarization of a surface?

6 A But to be clear, again, I said I didn't
7 construe it, but that's certainly a reasonable
8 description of it, that's a reasonable
9 characteristic of it.

10 Q Is that the understanding that you applied
11 in your original declaration?

12 A Well, yes, in that that's a reasonable
13 characteristic of it.

14 But as I said earlier, it is my opinion --
15 so I applied the plain and ordinary meaning. And
16 it's my opinion that under any reasonable
17 construction it was disclosed.

18 Q Right. I understand.

19 So is -- is this statement your
20 understanding of the plain and ordinary meaning of a
21 planarization layer as you address the issue in your
22 original declaration?

23 MR. GARR: Objection.

24 THE WITNESS: No, that's not what I said.
25 I said that's a reasonable characteristic of it.

1 So, in other words, if I'm looking at a
2 planarization layer, a characteristic that it will
3 have is it will -- it will be a layer that increases
4 the planarity of the surface relative to what it was
5 pre-imposition or below the planarization layer
6 before that planarization layer was deposited.

7 MR. LINDSAY: Okay.

8 BY MR. LINDSAY:

9 Q So, let's take a look at your reply
10 declaration for a moment, Exhibit No. 1033, and in
11 particular paragraph 12.

12 A I see that.

13 Q Okay.

14 Can you read the first sentence that --
15 just for the record so we have it.

16 A Sure.

17 Paragraph 12 starts, "A POSITA will have
18 understood from these teachings of Suzuki that its
19 organic barrier layer 20 does not follow the
20 underlying topology because Suzuki teaches that this
21 layer smooths out the irregular surface beneath it."

22 Q And then the second sentence, can you read
23 that as well?

24 A The second sentence of paragraph 12 is,
25 "Thus it does not follow the underlying topology --

1 topography."

2 Q So what do you mean by "smoothing out the
3 irregular surface"?

4 A I mean, at a high level what I mean in
5 that sentence is if you look at the -- the
6 irregularities or variations in the height of the
7 surface below it and you characterize it in terms of
8 its sharpness or the frequency distribution of the
9 topology underneath, it smooths it out which means
10 that, in general, it will tend to make it smoother.

11 If I were talking in terms of frequency,
12 what that means it would reduce the spatial
13 frequency of roughness.

14 Q So, smoothing out the irregular surface,
15 do you mean covering defects and pinholes then?

16 A I mean it's certainly true that that would
17 be a reasonable consequences or an expected
18 consequence of smoothing out. But that's not the
19 only thing that gets smoothed out.

20 You could have intentional topology or
21 topological variations and those would get smoothed
22 out as well.

23 Q So, is it fair for say, then, that by
24 virtue of Suzuki's barrier layer covering defects,
25 it would also not repeat or duplicate the

1 underlining topology of a surface below?

2 MR. GARR: Objection.

3 THE WITNESS: No, that's -- it's not that
4 one is a consequence of the other. It is, however,
5 true that it's possible that both of those are a
6 consequence of a characteristic of said layer.

7 In other words, if there is a layer that
8 smooths out, which is what the organic barrier layer
9 20 of Suzuki does, it may be the case that it will
10 cover defects by nature of the fact that it smooths
11 them out, including pinholes, and it may also be the
12 case that will cover and smooth out intentional
13 topological variations.

14 So, the first part of your question does
15 not cause the second part, but they both could
16 result from the same behavior of the layer.

17 MR. LINDSAY: I see.

18 BY MR. LINDSAY:

19 Q And so can you explain to me what you mean
20 by "intentional topography or topology"?

21 A Sure.

22 In my previous answer when I used that, I
23 was referring to the fact that you could have a
24 layer where there are steps in the layer that are a
25 consequence of previous deposition and/or etch

1 process steps.

2 And in a smoothing -- if you put a
3 smoothing layer on top of those steps, it may
4 either, depending on the thickness, completely
5 eliminate the underlying steps or make them more
6 rounded so that the steps would either not be as
7 high or they would not have as high of a spatial
8 frequency.

9 Q And in your view would a defect be a
10 characteristic of an intentional topography or an
11 unintentional?

12 A So, first, a defect is not a
13 characteristic of a topography, but I think I
14 understand your question.

15 So, in the way I was using "defect," and
16 certainly the way I use "defect" in paragraph 12 of
17 Exhibit No. 1033, that was not an intentional
18 topographical variation. That was a topographical
19 variation that resulted from a defect such as a
20 pinhole, et cetera, which was may be something that
21 you couldn't avoid, but it was certainly not
22 something that, during the fabrication, you intended
23 to have with respect to that answer -- or, sorry,
24 with respect to that paragraph.

25 Q Okay.

1 So, in your view defects and pinholes are
2 not intentional, but the topography of a surface
3 would be what is intended by the design in that
4 particular case?

5 A No, that's not a correct characterization
6 of what I said, so let me break it down.

7 I agree that, generally speaking, defects
8 such as pinholes are not intentional. They may be
9 unavoidable, but they are certainly not intended by
10 the practitioner to happen.

11 The topological variations would result
12 from defects -- or they could result from defects,
13 but they could also result from something that the
14 practitioner, during the fabrication or production
15 of that part, intended to happen.

16 Q Okay. So, I'm just trying to understand.

17 So, a Venn diagram, maybe it's easier to
18 characterize it that way, of the topology of a
19 surface. Within that circle, that topology would be
20 a subset which we could define as unintentional
21 defects, pinholes. But there would be other circles
22 within that that were not defects which still
23 represent the topology, let's call it intentional
24 topology of the surface.

25 Is that fair? Is that what you are

1 saying?

2 A Almost. I would just add one thing.

3 I wouldn't call it topology. I would call
4 it topological variations.

5 But other than that, yes, that's a
6 reasonable characterization.

7 Q So, in your view the topological
8 variations of surface include unintended --
9 unintentional defects and pinholes?

10 A They could if said defects caused
11 topological variations, absolutely.

12 Q And that's the understanding that you
13 applied in your analysis in your reply declaration?

14 A With respect to paragraph 12, yes, because
15 if you look at the third sentence of paragraph 12
16 that specifically addresses that.

17 Q How does that specifically address that?
18 Can you help me out?

19 A Sure.

20 The third sentence of paragraph 12 reads,
21 "Additionally, Suzuki teaches that this layer covers
22 defects, including pinholes, that may be formed in
23 the underlying layers."

24 Now, if you think about what a pinhole is,
25 I mean, at a high level, a pinhole would be a

1 discontinuity in a particular layer, such that
2 that's a penetrative structure going through that
3 layer, hence the term "pinhole."

4 In that example that would be a
5 topological variation. And specifically, if it was
6 not intended, it would be an unintended topological
7 variation. And Suzuki teaches that the layer covers
8 defects. So it's essentially covering the pinhole.

9 So that topological variation of
10 associated with said pinhole is being covered, so
11 it's being reduced or potentially even completely
12 eliminated.

13 Q Okay.

14 Can you go to paragraph 36 of your reply
15 declaration, same document for me. I'll let you
16 read through it to refresh your recollection.

17 A Okay. I've read it.

18 Q So, is it fair to say that in your view
19 Kijima's conductive sealing layer seven would not
20 have pinhole defects if it were made of gold?

21 A No, that's not true.

22 Q What part of that is not true?

23 A So, this -- the question I was asked was
24 -- so I remember this discussion and I remember the
25 deposition -- or I don't remember the specifics of

1 it, but I remember the deposition testimony that
2 this is referring to.

3 The question I was asked was not specific
4 to Kijima's conductive sealing film. It would be a
5 one micron thick layer of gold have defects. And in
6 my answer I was referring to, if I put down a
7 blanket one micron thick layer, it's highly unlikely
8 it would have pinholes.

9 But remember that when you have a
10 multilayer structure where you are putting one layer
11 on top of another layer on top of another layer it's
12 still possible for pinholes to propagate up.

13 So if I put a one micron thick gold layer
14 on a completely flat surface, I wouldn't expect it
15 to have pinholes. That's at least in the
16 hypothetical I was answering in my previous answer.

17 But if I'm putting a one micron thick
18 layer on top of other layers that have pinholes,
19 pinholes can propagate up. That's one of the
20 characteristics of pinholes.

21 Q You also mention in this paragraph another
22 type of defect that you call "buckling."

23 A Yeah.

24 Q Can you describe "buckling" for me?

25 A Sure.

1 So, again, this is referring back to the
2 previous answer that I gave, and I was specifically
3 identifying a phenomenon that we see. It happens in
4 all materials at some point. But, in particular, in
5 relatively soft metals, such as gold, as you expose
6 them to variations in temperature, the gold atoms
7 can move around. They diffuse within the layer
8 because of the thermal processes, and what that can
9 do is that can result in the layer developing
10 asperities or -- think of it, probably a good
11 description is if you imagine a wave on the surface
12 of water, that's kind of what a buckling defect
13 would like look.

14 Essentially, because the gold atoms moved
15 during the various terminal processes, they can
16 create creased or sharp points or asperities or
17 waves that go up or go down, so sort of crests or
18 troughs because of the movement of the gold and
19 that's what I was referring to there.

20 Q And so buckling is a type of defect that
21 you get particularly when you are depositing gold?

22 A It actually -- so it doesn't have to
23 happen. It depends on the details of the process.

24 But if you deposit a soft material, such
25 as gold, and you have thermal steps either during

1 the deposition or after the deposition that cause
2 the gold to move, it is certainly a type of defect
3 that you can have. It doesn't have to happen, but
4 if can happen.

5 Q I see.

6 And have you -- are you aware that the
7 district court rendered a construction of
8 planarization, planarization layer, specifically?

9 A Yes, but I don't remember it specifically.
10 You have to show me. But yes, I do remember. I
11 have read it before.

12 Q Is it your understanding that the district
13 court construed planarization layer to have two
14 separate prongs that must be satisfied, one that
15 requires the interruption of the propagation of
16 defects from one layer to another, and a second
17 prong being that the topography of the underlying
18 layer is not reproduced?

19 A I don't remember it specifically, but I
20 vaguely remember, yes, both those points being
21 within the scope of the construction.

22 Q Do you -- do you agree that that
23 construction should apply in this proceeding?

24 A I don't. I mean, that's a legal question.
25 So I don't know, it's certainly a

1 reasonable construction. And anyway, within the
2 scope of my -- of the grounds that I identified,
3 they would be applicable under that construction.

4 So, therefore, I didn't mean to make a
5 decision as to whether -- I didn't have to know
6 whether that is the construction to apply and
7 whether legally it should apply or not. I just
8 didn't have to address that.

9 Q That's fair. Let me ask it a different
10 way.

11 Do you agree with the district court's
12 construction for planarization layer?

13 A I hadn't really thought about it in
14 detail. It's reasonable. I don't have a
15 disagreement with it but, you know, it's -- I
16 don't -- I didn't have to adopt that specifically
17 for the purposes of my analysis.

18 Q Do you understand the district court's
19 construction as including two separate prongs, both
20 which must be satisfied to meet the construction?

21 A You would have to put the construction in
22 front of me, because, as I just told you when you
23 first introduced this, I said I don't remember it
24 specifically.

25 So now you've asked a very specific

1 question. I think I would need to see the
2 construction to answer it.

3 Q Okay. That's fair enough. Give me a
4 second. Okay. I just introduced Exhibit No. 2047.

5 (Exhibit 2047, previously marked, not
6 attached.)

7 BY MR. LINDSAY:

8 Q Can you open that up when you have it
9 available?

10 A Okay. I have it.

11 Q Can you go to page 49?

12 A Okay. I have that.

13 Q The table starts on page 48, and this is a
14 table containing all the court's constructions for
15 the disputed terms in the litigation.

16 Is that your understanding?

17 MR. GARR: Objection.

18 THE WITNESS: Well, it has multiple
19 patents that seem to be the subject of the
20 litigation, but certainly one of them is the '389
21 patent.

22 MR. LINDSAY: Right.

23 BY MR. LINDSAY:

24 Q And you see the court's construction for
25 the term "planarization layer" there at the top of

1 page 49?

2 A Yes.

3 Q Do you agree that the court's construction
4 has two separate prongs, one that requires that
5 defects from one layer to another be interrupted,
6 and the second being that the topography of the
7 underlying layer not be reproduced?

8 A So, if by that you mean that -- so the
9 construction is -- says what it says. In other
10 words, it says, "A layer of material that planarizes
11 such that." And then after the "such that," it has
12 two phrases that appear and I think that's what you
13 are referring to as prongs.

14 And the first one is "the propagation of
15 defects from one layer to another layer can be
16 interrupted." And then the second one, there is an
17 "and" that acts as the conjunction, "the topography
18 of the underlying layer is not reproduced."

19 So, let's see, so, therefore, if we
20 identify those as prongs, I agree that there are two
21 of them and I further agree that there's an "and"
22 between them which would indicate that both of those
23 would be properties of the -- those would be, I
24 guess, consequences of the planarization.

25 In other words a layer of material that

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1 planarizes such that.

2 Q So, I think we're saying the same thing.
3 I just want to make sure that we're on the same
4 page.

5 That in order for a layer of material to
6 be a planarization layer, it would have to satisfy
7 both of those prongs.

8 Is that your understanding?

9 A No, it has to satisfy the construction as
10 a whole. And the construction itself says that it's
11 a layer of material that planarizes such that it
12 lists what you are calling prongs, which I assume
13 you mean the consequences that follow that
14 planarization and, indeed, there are two of them and
15 I agree that there's an "and," so I would suspect
16 that both of those would be true.

17 Q So, you said, no, at the beginning of the
18 answer, but then you agreed with me; right?

19 A No, the reason I said, no is you only read
20 part of the construction.

21 But to satisfy the planarization layer it
22 has to satisfy the entire construction.

23 Q Right. Okay.

24 So I wasn't -- the question was, I think,
25 clear.

1 In order to be a planarization layer, you
2 have to satisfy both prongs. I didn't say that's
3 all you have to satisfy.

4 A I understand. Yeah, I think that's fair.

5 Q And below that you see another
6 construction from the court for selectively
7 depositing.

8 Do you see that?

9 A Yes.

10 Q Would you agree with that construction?

11 A Yeah, I think that's reasonable. It's
12 essentially spatially specific deposition. So,
13 yeah, I think that's -- that's reasonable. That's a
14 reasonable characteristic of selective deposition.

15 Q Would you -- would you think it's
16 incomplete, that it requires further explanation?

17 A I'm not sure I understand your question.
18 I mean, the construction is what it is. There may
19 be consequences of that.

20 But in terms of describing selectively
21 depositing, that's certainly a reasonable
22 description of it. It's depositing materials in
23 desired areas, so it's spatially specific
24 deposition.

25 Q I guess what I'm asking is if you were

1 explaining to somebody what selectively depositing
2 means in the context of the '389, would you feel it
3 necessary to provide more description than what the
4 court has in its construction?

5 MR. GARR: Objection.

6 THE WITNESS: I think I understand. It
7 would depend upon the context.

8 I mean, the construction is what it is and
9 I think it's a reasonable description of -- or a
10 reasonable construction for selective -- or
11 reasonable description of what selectively
12 depositing means.

13 If I were asked to provide further
14 details, I could. But, I mean, with respect to what
15 selectively depositing means, it's saying that it's
16 depositing a material in desired areas is a
17 reasonable description of it.

18 MR. LINDSAY: Okay. That's fair.

19 BY MR. LINDSAY:

20 Q I'm going to ask you to pull up your
21 original declaration, Exhibit No. 1004.

22 A Okay.

23 Q And I guess we can look at paragraph 59
24 and that section there that begins your discussion
25 of independent claim 34 under ground one.

1 A Okay.

2 Q Do you see that?

3 A Yes.

4 Q Okay.

5 So, the discussion that starts at
6 paragraph 59, is directed to the preamble of the
7 independent claim 34; correct?

8 A Yes.

9 Q And that's the method of encapsulating
10 plurality of devices fabricated on a substrate?

11 A No, fabricated upon a substrate.

12 Q And so for ground one you are relying on
13 Kijima's disclosure of a method for encapsulation to
14 satisfy the preamble of claim 34; is that fair?

15 A No, I'm -- so it's my opinion -- I'm
16 relying on Kijima. It's true that it's my opinion
17 that what Kijima discloses does disclose a method of
18 encapsulating a plurality of OLED pixel devices
19 which are fabricated upon the substrate, and that's
20 what I walk through as I go forward through that
21 section.

22 Q Okay.

23 So again, I just -- you started your
24 answer with no, but I just want to -- I just want to
25 make sure that I understand your answer, because

1 then you went on to agree with me.

2 All I'm asking you --

3 MR. GARR: Objection.

4 BY MR. LINDSAY:

5 Q -- you are relying on ground one, are you
6 relying on Kijima's disclosure of a method for
7 encapsulation to satisfy the preamble of independent
8 claim 34?

9 MR. GARR: Objection.

10 THE WITNESS: So the reason --

11 MR. GARR: Objection.

12 Go ahead.

13 THE WITNESS: So the reason I said no,
14 just to be clear, is, again, it's -- so it's my
15 opinion to the extent the preamble is limiting, it
16 is satisfied by Kijima.

17 And then I go on to address that,
18 specifically the method of encapsulating a plurality
19 of OLED pixel devices which are fabricated upon the
20 substrate.

21 MR. LINDSAY: I see.

22 BY MR. LINDSAY:

23 Q So your qualification was then carving out
24 in the eventuality that the preamble was not
25 limiting, you wouldn't need to be satisfied?

1 A That's fine. That's fair.

2 Q I see. Okay.

3 And I guess it's in paragraphs 59 through
4 65 that you set forth the basis for why you believe
5 ground one satisfies the preamble of claim 34 in the
6 event it is limiting?

7 A Yes, that's fair.

8 Q And so besides Kijima's disclosures, is
9 there anything else that you cite in your
10 declaration in support of your opinion that ground
11 one satisfies the method of encapsulating a
12 plurality of devices as recited in the preamble of
13 claim 34?

14 MR. GARR: Objection.

15 THE WITNESS: With respect to ground one,
16 which is my analysis for obviousness based on Kijima
17 and Suzuki, for what I cite to in specifically in
18 relation to the preamble of claim 34, the entirety
19 of what I cite to in my declaration falls within
20 paragraph 59 and paragraph 65, inclusive.

21 MR. LINDSAY: Okay. Yeah, understood.

22 BY MR. LINDSAY:

23 Q So, I guess I was just asking a more
24 specific question directed to what you rely on in
25 your analysis for satisfying the preamble.

1 And so the question more specifically was:
2 Besides Kijima's disclosure is there anything else
3 that you cite or rely on in your declaration in
4 support of your opinion that ground one satisfies
5 the preamble of claim 34 in the event it's limiting?

6 A I think I understand.

7 So, first, to be clear, as I pointed out,
8 this ground is an obviousness ground, which means
9 it's important to know how a POSITA would think.

10 And I do provide in the "Background"
11 section an overview of encapsulation of OLEDs, but
12 -- so that's certainly relevant to knowing what a
13 POSITA would think.

14 But with respect to the explicit sections
15 that covered this limitation or specifically this
16 preamble, I don't cite to anything -- I don't have
17 another section that I point to specifically in
18 relation to the preamble.

19 I think that's kind of what you asking.

20 Q Right.

21 So, it's Kijima's teachings that you are
22 identifying as -- as the part of your combination
23 that satisfies the preamble of claim 34.

24 A Assuming it's limiting. Yeah, I'm only
25 pointing to Kijima. If we look at what I'm pointing

1 to between paragraphs 59 and 65, I only point to
2 disclosures within Kijima itself.

3 Q And then going down to paragraph 66, this
4 begins your discussion of Element 34(a) under ground
5 one; is that correct?

6 A Yes.

7 Q And Element 34(a) recites, "Fabricating a
8 plurality of devices on a substrate"; right?

9 A Yes.

10 Q And your discussion here for 34(a) is, I
11 think, just paragraph 66; right?

12 A That's correct. Though, it does refer
13 back to what I said about the same issue in the
14 section on the preamble.

15 Q Right. Correct.

16 So for this element, Element 34(a) under
17 ground one, you are again relying on Kijima's
18 disclosure as satisfying the limitation?

19 A Yes, that's fair.

20 Q And if we could look at paragraph 67?

21 A Okay.

22 Q This begins your discussion under ground
23 one for element 34(b); is that correct?

24 A Yes.

25 Q And it your opinion that Kijima's

1 encapsulation approach entails selectively
2 depositing an insulating sealing layer upon the OLED
3 devices, as you state here?

4 A I think you are referring to the second
5 complete sentence in paragraph 67.

6 So, if that's what are you referring to,
7 yes, that's what I say.

8 Q Is that still your opinion today?

9 A Yes.

10 Q So, then, is it fair to say, you are
11 relying on Kijima's disclosure for the selectively
12 depositing limitation of element 34(b)?

13 If my question was confusing, I can
14 rephrase.

15 Is it your opinion that Kijima's
16 disclosure satisfies element 34(b)?

17 A Kijima on its own?

18 So, for this I point to -- this element is
19 obvious based on Kijima's in view of Suzuki, so I'm
20 doing a combination for it.

21 Q Right. That's fair.

22 So, for the requirement of 34(b) that
23 there be selective deposition, are you relying on
24 Kijima's disclosure for that aspect of it?

25 A I understand.

1 With respect to the specific disclosure of
2 performing the deposition selectively, I'm relying
3 on the disclosure of Kijima for the selective aspect
4 of it.

5 Q Okay. And for -- strike that.

6 And what are you relying on Suzuki for,
7 with respect to element 34(b)?

8 A So, actually, at a high level, I point out
9 what I'm relying off of -- what I'm using Suzuki for
10 in the bottom half of paragraph 67. I go into much
11 more detail later.

12 But basically what I'm relying on Suzuki
13 for is to point out that it would be obvious to
14 modify Kijima to include a selectively deposited
15 organic planarization layer in view of Suzuki's
16 teachings regarding a protective double layer made
17 of an organic barrier layer and an inorganic barrier
18 layer.

19 Q Okay.

20 So in the combination for ground one, you
21 are not proposing to change how Kijima's sealing
22 film eight is being selectively deposited; right,
23 that precedes the way Kijima discloses?

24 And if it's helpful, I think paragraphs
25 68, 69 may have some discussion.

1 MR. GARR: Counsel, I'm just going to
2 object based on scope to the extent that this
3 deposition is not directed to the reply declaration.

4 Can I just have the question repeated? I
5 don't quite remember what it was.

6 MR. LINDSAY: Lynda, can we have the
7 question back?

8 THE COURT REPORTER: Of course. One
9 moment.

10 (The record was read as follows:

11 "QUESTION: So in the combination for
12 ground one, you are not proposing to
13 change how Kijima's sealing film eight is
14 being selectively deposited; right, that
15 precedes the way Kijima discloses?")

16 MR. GARR: And I object to the form of the
17 question.

18 THE WITNESS: Okay.

19 So, specifically, I think I understand the
20 question and I address this in paragraph 83 of my
21 original declaration, Exhibit No. 1004, where I say,
22 "In my opinion, a POSITA would have appreciated that
23 the additional organic sealing layer, as I have
24 shown in the above modification of figure 12, could
25 be readily deposited using the same selective

1 deposition methods already used in Kijima, that is
2 masks arranged in a vacuum deposition device 11 was
3 depicted in figure four of Kijima using an
4 additional mask with openings sized appropriately
5 for the desired area of the organic layer."

6 BY MR. LINDSAY:

7 Q So, in the combination for ground, one
8 Kijima's sealing film eight is being selectively
9 deposited in accordance with the teachings of
10 Kijima, generally?

11 MR. GARR: Object to form.

12 THE WITNESS: So, certainly to a POSITA
13 that would have been an obvious thing to do, yes. I
14 mean, that's what I say in the paragraph that I just
15 read to you.

16 MR. LINDSAY: Yeah.

17 BY MR. LINDSAY:

18 Q And I guess what I'm getting at is: You
19 are not proposing a change to how Kijima's selective
20 deposition of sealing film eight is performed?

21 MR. GARR: Objection.

22 THE WITNESS: I'm not sure I understand.

23 If by that you -- just to be clear, I am
24 proposing a change in that I'm saying we're
25 modifying Kijima to bring in the additional organic

1 sealing layer.

2 But if you are asking me do we still
3 continue to have the inorganic sealing film of
4 Kijima eight and still using the selective
5 techniques taught by Kijima, for example, well, yes,
6 I've already said we can do that and that's what
7 I've said in paragraph -- I think it was 85 -- oh,
8 no, sorry, it was 83 where I pointed out that that
9 would have been obvious to a POSITA.

10 MR. LINDSAY: Right.

11 BY MR. LINDSAY:

12 Q So, I guess, just to clarify, I think a
13 moment ago you said, "inorganic sealing layer
14 eight," and I believe Kijima's sealing layer eight
15 is organic. And then the conductive sealing layer
16 seven would be in the inorganic sealing layer.

17 Is that -- is that your understanding?

18 A I apologize, if I said, "inorganic," I
19 actually meant insulating, because layer eight is
20 insulating.

21 So that's all I was referring to in my
22 previous answer.

23 Q Okay.

24 So, structurally there is a modification
25 of Kijima's teaching. But I'm just focusing right

1 now on the process. The manufacturing process that
2 Kijima describes for its sealing film eight and it's
3 conductive sealing layer seven.

4 Those are both deposited the same way that
5 Kijima otherwise already discloses.

6 Is that fair?

7 A Sorry, could I just have the question
8 again, please? I think I missed the last part.

9 THE COURT REPORTER: Sure.

10 (The record was read as follows:

11 "QUESTION: So, structurally there is
12 a modification of Kijima's teaching. But
13 I'm just focusing right now on the
14 process. The manufacturing process that
15 Kijima describes for its sealing film
16 eight and it's conductive sealing layer
17 seven. Those are both deposited the same
18 way that Kijima otherwise already
19 discloses. Is that fair?")

20 THE WITNESS: So, Kijima does have
21 disclosure on it.

22 I think, by the way, you had said
23 something in your previous answer that was
24 incorrect. Kijima does disclose using inorganic
25 sealing materials. It specifically discloses

1 silicon monoxide, silicon dioxide, alumina,
2 germanium dioxide and aluminum
3 nitride, just to be clear.

4 But other than that -- other than
5 correcting your previous question, I would point
6 out that -- I would agree that, yes, it's true that
7 the deposition techniques would generally follow
8 what Kijima discloses.

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

15 MR. LINDSAY: Okay. Yeah. Thank you.
16 That's helpful. And you are right, I wasn't trying
17 to -- I inadvertently -- I wasn't trying to limit
18 Kijima's sealing film eight to being organic.

19 I was just trying to distinguish the two,
20 you know, the layer eight from the layer seven and
21 the way it generally describes it in many cases.

22 Okay. Can we take maybe five minutes of a
23 break, if that's okay with everyone?

24 MR. GARR: Okay.

25 (Brief interruption in proceedings.)

1 MR. LINDSAY: Okay.

2 BY MR. LINDSAY:

3 Q Dr. Subramanian, I wanted to turn to
4 Kijima Exhibit No. 1010.

5 (Exhibit 1010, previously marked, not
6 attached.)

7 THE WITNESS: Okay. I have Kijima or the
8 translation of Kijima Exhibit No. 1010 open.

9 BY MR. LINDSAY:

10 Q So, Kijima describes four embodiments and
11 labels them embodiment one, embodiment two,
12 embodiment three, embodiment four; right?

13 A Yes, that's correct, among other things,
14 but yes, that is correct.

15 Q And so for each of its four embodiments,
16 Kijima describes a state of its organic element
17 after one month from production.

18 Is that your understanding as well?

19 A I don't remember.

20 Could you point me to what you are
21 referring to?

22 Q Sure.

23 So, for embodiment -- under the heading
24 embodiment one, which is the lengthiest description,
25 paragraph 54 is the paragraph that describes the

1 state of the organic EL element one month after
2 production.

3 Do you see that?

4 A Yes, I do.

5 Q And then embodiment two has a paragraph,
6 paragraph 64, that describes the same one-month time
7 frame.

8 Paragraph -- I'm sorry, embodiment three
9 is described in 68 -- paragraph 68 with respect to
10 the time frame of one month. And then paragraph 72
11 is for embodiment four.

12 I'll just let you look at all of those and
13 kind of -- so we're on the same page.

14 A I see them and I agree. There are similar
15 disclosures in the four paragraphs that you
16 identified all relating to the status for the
17 performance of the electroluminescent device one
18 month after application or one month after
19 production.

20 Q And in each case the organic element is
21 left in air for one month; right?

22 A Yes.

23 Q What is the significance of that to you?

24 MR. GARR: Objection.

25 THE WITNESS: Well, I mean this is

1 characterization that Kijima has performed to look
2 at how the device survives when left in air.

3 Now, it's being tested for one month,
4 that's the extent to which Kijima tested. And what
5 Kijima reports is the values obtained for
6 luminescence after one month sitting in air.

7 BY MR. LINDSAY:

8 Q So, I guess what I'm asking is: What's
9 the difference from the perspective of the organic
10 element being left in air versus being sealed or in
11 a vacuum?

12 A Oh, I think I understand.

13 So, in his testing, or in the testing done
14 by Kijima, by leaving it in air, as opposed to doing
15 it in vacuum, Kijima will get information related to
16 the survivability of the device when exposed to the
17 chemicals present in air which included various
18 elements, predominantly nitrogen, but oxygen,
19 moisture and a few other trace elements.

20 Sorry, trace elements, I meant trace
21 molecules.

22 Q So is it the case that the organic element
23 is going to experience a higher degree of
24 degradation when exposed to air, as opposed to being
25 in a vacuum?

1 A That's a reasonable expectation.

2 Generally, knowing what we know about
3 organic electroluminescence -- how material is used
4 in organic electroluminescence devices, it is true
5 that they tend to be oxygen and moisture sensitive.

6 So storing in vacuum means you are
7 dramatically limiting exposure to oxygen and
8 moisture. Whereas storing in air means you are
9 opening up the potential exposure to oxygen and
10 moisture.

11 Q What's your understanding of how oxygen
12 and moisture degrades or tends to degrade the
13 organic element?

14 A So the -- so generally what happens in
15 organic -- in the materials that I used in organic
16 electroluminescent devices is there's various
17 mechanisms by which oxygen and moisture can degrade
18 them.

19 Firstly, depending on the specifics of the
20 materials, oxygen and moisture can cause alteration
21 of the covalent bonding within the organic layers,
22 which generally reduces -- for example, it reduces
23 carrier lifetime. It reduces electroluminescent or
24 fluorescent or phosphorescent deficiency.

25 And additionally, the oxygen and moisture

1 can affect inorganic layers, in particular low work
2 function inorganic layers that might be used for the
3 cathode. Those tend to oxidize easily which then
4 increases their work function which means they are
5 less effective at injecting electrons into the
6 device.

7 Q I see.

8 And does this process begin as soon as the
9 element is exposed to air or is there some -- is
10 there some period of time where you really wouldn't
11 notice much oxidation before it starts to actually
12 have a measurable impact?

13 A It depends on the device structure. But
14 the ingress of oxygen and moisture is diffusive in
15 nature. It means it has to diffuse in.

16 So, depending on the structure, it can
17 have -- if you have a really poorly designed
18 structure, it can happen instantaneously.

19 But if you have a structure that is
20 designed well, it can last many, many years. In
21 fact, that's kind of why we have OLEDs that last
22 many, many years today.

23 Or you can have a device where it will
24 start degrading over the period of months because it
25 is diffusive in nature which means it's a time

1 dependent process.

2 Q All right.

3 I guess, when you say this is a well
4 designed device, what would make it well designed
5 versus one that, as you describe, is poorly
6 designed?

7 A Well, in the two extreme examples that I
8 gave you, a poorly designed device would be a device
9 where you don't encapsulate it. And that device
10 means oxygen and moistures would be able to achieve
11 ingress quickly, and particularly if the layers used
12 in the device are oxygen and moisture sensitive,
13 which in many such devices they are, you will start
14 seeing degradation almost immediately.

15 For example -- just to give you a personal
16 example, when my Ph.D. students built OLEDs, we
17 would test them initially inside a nitrogen glove
18 box and if we brought them outside, they would die
19 within minutes to hours. So, they die very quickly.

20 On the other hand, if you do a good job of
21 encapsulating, they can last years. And that's, in
22 fact, one of the reasons we like multilayer
23 encapsulation because it allows us to do that.

24 Q In that example you just described, that
25 you did with your students that was -- that device

1 did not have any sort of encapsulation; is that
2 right?

3 A Correct.

4 Q Okay.

5 So, for a device that doesn't have any
6 encapsulation, you would notice degradation
7 immediately, and within a few hours or days, it may
8 no longer even be functional?

9 A It could.

10 So, in the materials that we used in our
11 devices, they tended to be very oxygen and moisture
12 sensitive.

13 There are materials available that are
14 less sensitive. Or in some cases they are actually
15 able to survive long-term exposure to oxygen and
16 moisture.

17 So in the answer I gave you that was with
18 respect to something specifically that we did in my
19 lab and those materials were terrible for the oxygen
20 and moisture sensitivity .

21 Q Okay. Understood.

22 What about in Kijima's embodiments, the
23 materials that he uses, would you -- if he ran -- if
24 you ran your experiment using his -- his device
25 without encapsulation, what would you expect to see

1 in terms of timing of degradation?

2 A Without encapsulation?

3 Q Yes, without.

4 A Okay.

5 So if we -- so I'm going to answer with
6 respect to embodiment one, because that's the one
7 where there's a lot -- there's extensive disclosure
8 or it's at least the longest disclosure.

9 So, if we look at embodiment one for his
10 cathode, Kijima using a lithium-aluminum alloy.
11 I'll come back to that in a few minutes.

12 And for the organic stack, in other words,
13 the whole, an electron transport layer and the
14 emissive layer, he uses -- I'll use the short forms.
15 They are easier to say.

16 He uses TPD, he uses Alq3 and -- what's
17 the last one? And he used Alq3 also as the electron
18 transport layer. So he had TPD and Alq3 as the
19 organic materials.

20 And then for the anode he used indium tin
21 oxide. Now, indium tin oxide can handled oxygen and
22 moisture without a problem. It can survive forever
23 basically with oxygen and moisture exposure.

24 The lithium-aluminum alloy does start
25 oxidizing. The aluminum not so much. But the

1 lithium is very oxygen sensitive. And so what will
2 happen is the low work function of the material will
3 start getting higher. The material will also become
4 less conductive and so over time that hurts electron
5 injection. It doesn't happen immediately, but it
6 happens -- depending on the specifics of how much
7 lithium and aluminum you have, it will start
8 happening certainly in hours and within days you
9 will see it.

10 The TPD and Alq3 are -- particularly, the
11 Alq3 is quite -- if I remember right. Yeah, I'm
12 pretty sure Alq3 is quite moisture and oxygen
13 sensitive. And as I recall, so is TPD. Both of
14 them are reasonably oxygen and moisture sensitive.

15 In the device that I mentioned that we
16 built, we didn't use TPD. I don't remember what we
17 used as the old transport layer. But we did use
18 Alq3 and Alq3 in our device degraded very quickly.

19 Q I see. Okay.

20 In a commercial product -- so, if Kijima
21 then took its organic element encapsulated the way
22 it discloses, it wouldn't be exposed to air for, you
23 know, all that period of time. You would expect it
24 to have a much longer lifespan --

25 MR. GARR: Objection to form.

1 BY MR. LINDSAY:

2 Q -- without the encapsulation?

3 A Okay.

4 So, the comparison is between having no
5 encapsulation and having the encapsulation strategy
6 specifically disclosed by Kijima, for example, with
7 respect to embodiment one?

8 Q Yes, correct.

9 A Okay. I understand.

10 So, in that situation, when you are doing
11 that comparison, yes, I think it's fair to say that
12 I would expect the encapsulated device to have a
13 better lifetime. I don't know exactly how much
14 better, but it would certainly be better than a
15 corresponding hypothetical identical but
16 unencapsulated version of said device.

17 Q Okay. That's fair.

18 So, in your view adding Suzuki's organic
19 barrier layer 20 between Kijima's existing
20 conductive sealing film seven and its insulating
21 sealing film eight, that would improve dark spot
22 reduction over Kijima's approach alone.

23 Is that a fair summary of that portion of
24 your opinion?

25 A Could you point me to what you are

1 referring to, please?

2 Q I was thinking generally, but I'm sure
3 it's here.

4 So in your reply declaration Exhibit
5 No. 1033, paragraph 37.

6 A Okay. Yeah, so given that context, it's
7 fair.

8 I do think -- and certainly a POSITA would
9 have known that using a multilayer encapsulation
10 will be better.

11 There's a reason that multilayer
12 encapsulation was accepted at that time and
13 continues to be today as an excellent strategy for
14 encapsulation for these type of devices.

15 Q Right.

16 So with respect to Kijima's existing
17 structure, which comprises the conductive sealing
18 film seven and the insulating sealing film eight,
19 the addition of Suzuki's barrier layer 20 between
20 those films, it's your opinion that that would
21 improve over Kijima's approach alone?

22 A I think I understand.

23 So, you are asking if I were to take
24 Kijima's device and essentially do what I'm
25 proposing to do in the combination which is add in

1 the additional layer from Suzuki, would it improve.
2 And, yes, it is my opinion that it would.

3 Q Right. I don't think that you were going
4 to disagree with that.

5 But my question is: How do we know, how
6 do -- what evidence have you provided and cited to
7 support that?

8 A So, what I point to is a few different
9 things.

10 First, I start out by -- in my original
11 declaration I provide sort of an overview, and in
12 the overview I point out what POSITAs know about
13 multilayer encapsulation.

14 And then within the specific discussion of
15 this combination in this ground where I'm bringing
16 in the teachings of Suzuki to Kijima, I point out,
17 for example, in paragraph -- I guess it starts at
18 paragraph 80, but I'll focus on paragraph 81,
19 specifically.

20 I point out a POSITA would have also
21 recognized that depositing such an organic film, a
22 sealing layer after Kijima's conductive sealing film
23 and before its inorganic insulating sealing film,
24 would be beneficial for the same reason that Suzuki
25 discusses for its organic barrier layer 20.

1 So, in other words, it provides the
2 benefit -- Suzuki itself introduces the benefits of
3 the multilayer encapsulation. One of skill would
4 know that. And it would, therefore, be obvious to a
5 POSITA or it would be motivating to a POSITA to do
6 this.

7 Q Okay. That's fair.

8 But besides Suzuki, is there anything else
9 that you've identified with respect to evidence to
10 support your opinion that adding Suzuki's organic
11 barrier layer 20 between Kijima's existing
12 conductive sealing film seven and insulating sealing
13 film eight would improve dark spot reduction over
14 Kijima's existing structure?

15 A Yes. So again, I refer back to the
16 introductory section where I point to what was
17 generally known to a POSITA.

18 I will point out at the end of this
19 section I also point to another reference which is
20 Komatsu, which is Exhibit No. 1017 to this IPR,
21 which also addresses the same issue. In other
22 words, a stacked, double-layer structure of organic
23 layer and inorganic layer.

24 And specifically, Komatsu uses an organic
25 material layer and a silicon oxynitride layer.

1 Q Does Komatsu disclose use of more than two
2 sealing layers or barrier layers?

3 A You mean greater than, do not include?

4 Q Right.

5 A I don't remember. I'd have to -- do you
6 have Komatsu? I don't have it in front of me.

7 Q It might take me a second. I'll grab it
8 on the next break.

9 A Okay.

10 Q How about Suzuki? Does Suzuki disclose
11 the use of more than two sealing or barrier layers?

12 A Again, the same thing. Do you have Suzuki
13 handy? I don't have it in front of me.

14 Q Okay.

15 A I can probably open it up. I can probably
16 find it. But I assume that you would want to
17 produce it for me.

18 Q Yeah, I can throw that in to the shared
19 site.

20 Okay. So I'm at Exhibit No. 1012, Suzuki.
21 (Exhibit 1012, previously marked, not
22 attached.)

23 THE WITNESS: Okay. I have Suzuki opened
24 now.

25 MR. LINDSAY: Okay.

1 BY MR. LINDSAY:

2 Q Does Suzuki disclose the use of more than
3 two sealing or barrier layers?

4 A Okay.

5 So with respect to Suzuki, it looks like
6 the -- if we look at the devices that were
7 disclosed, they were -- putting aside the layers
8 that make up the EL device itself, including the
9 anode and cathode, it uses a bilayer encapsulation
10 structure, so it has the organic layer and the
11 inorganic layer. And I don't think it discloses
12 anything more than the bilayer structure for those
13 layers.

14 Q Okay.

15 And in the meantime, I went ahead and put
16 Komatsu, Exhibit No. 1017 in the share site.

17 (Exhibit 1017, previously marked, not
18 attached.)

19 BY MR. LINDSAY:

20 Q If you could open that up and take a look
21 and same -- same question.

22 Specifically, does Komatsu disclose the
23 use of more than two sealing or barrier layers?

24 A So, with respect to the disclosure of
25 Komatsu, again putting aside the layers that are

1 under what Komatsu refers to as the protective film,
2 it says, for example, at column ten at line 14, "As
3 to the structure of the protective film, description
4 has been made of the stacked layer structure of
5 double layer."

6 So that disclosure is a two layer. It's
7 not more than two. And I think the same is true for
8 the other embodiments. It's certainly true for
9 embodiment four as well.

10 Q Okay. Yeah, that was my reading as well.

11 So, is it fair for say, then, that the
12 references cited by you in your original declaration
13 and reply declaration disclose, at most, a double
14 layer protective structure?

15 MR. GARR: Objection.

16 THE WITNESS: So, with respect to the
17 references that we're talking about -- and
18 specifically, I think we're talking about the Suzuki
19 reference and also sort of the -- as to show what
20 one of skill in the art would know, I also point to
21 the Komatsu reference. And then, of course, I have
22 a section on sort of what generally one would know.

23 At least with respect to Suzuki and
24 Komatsu, it's true that their disclosures with
25 respect to what they refer to -- while Komatsu

1 refers to it as a protective layer. I think Suzuki
2 also refers to it as a protective layer.

3 Those layers are only two layers with
4 respect to -- yeah, I think that's -- yeah, that
5 covers it. Yeah, with respect to those two.

6 BY MR. LINDSAY:

7 Q Have you -- have you seen other references
8 that describe more than two protective layers in an
9 OLED?

10 A Absolutely.

11 Q And from what time frame would you say
12 those references were from?

13 A I don't remember. Obviously, I didn't
14 cite them with respect to -- to the specific grounds
15 or the sections that we've discussed, so I -- I
16 don't remember.

17 But as a general answer to your question,
18 it's absolutely true that I've seen disclosure of
19 far more than two layers to form a barrier stack.

20 Q So, is it fair to say that you can't say
21 for sure that you've ever seen references describe
22 more than two protective layers before the date of
23 the invention?

24 A I certainly couldn't say one way or
25 another, not off the top of my head. And I haven't

1 cited to -- what I cited to with respect to this is
2 Suzuki and Komatsu specifically and those are
3 two-layer disclosures with respect to the
4 prospective layer stack.

5 Q Okay. I'm looking now at your reply
6 declaration, Exhibit No. 1033, paragraph 38.

7 A I see that.

8 Q And here in the second sentence you note
9 that "Suzuki and Kijima have significant variance
10 with respect to the materials used and structures
11 formed."

12 Do you see that sentence?

13 A Yes.

14 Q Did I read that correctly?

15 A I believe so.

16 Q What do you -- what do you mean? What
17 materials?

18 A So, if we look at the specific materials
19 called out by Suzuki and Kijima, there's
20 differences. Not all the materials are the same.

21 And then correspondingly, if we look at
22 the structure, they are also not the same. I mean,
23 what I mean is exactly what it says.

24 Q Okay.

25 What are the significant variances between

1 Suzuki and Kijima with respect to the structures
2 formed?

3 A So, I mean, the sort of the -- as I
4 pointed out, if we look at the structure of Kijima,
5 it has the bilayer stack of the organic and
6 inorganic.

7 If we look at the calling out of the
8 various layers, the layers that are called out are
9 not exactly the same. In fact they are different
10 materials that are called out.

11 And so that's what I was referring to.

12 Q And with respect to the materials, what
13 are the significant variances between the materials
14 used in Suzuki and Kijima?

15 A I think we've already discussed with
16 respect to embodiment one, Kijima had talked about
17 TPD. TPD is one of the transport layers called out
18 in Suzuki, but it also calls out others. It calls
19 out several other old transport layers, so there are
20 multiple sets of materials called out.

21 With respect to the emissive layer, again,
22 Alq3 is called out, but several other emissive
23 layers are also called out.

24 For the electron transport layer, Kijima
25 called out using Alq3 for the electron transport

1 layer. Suzuki actually calls out several other
2 electron transport layers, that are not mentioned in
3 Suzuki -- sorry, that are not mentioned in Kijima.

4 And then for the cathode, it calls out --
5 so Kijima, at least in the embodiment that we looked
6 at earlier, called out just a lithium-aluminum
7 alloy, but Suzuki calls out several different ones.
8 It does call out lithium-aluminum alloys, but it
9 also call out several other cathode choices.

10 So there's a big difference in the layers
11 that are called out. It turns out Suzuki does call
12 out all the layers that are in the example of
13 Kijima, but it also calls out several others.

14 Q So, what is the -- why is material
15 selection important here? Why is this statement
16 significant?

17 A Well, it depends. So, you -- I'm sorry,
18 which statement? Are you referring to the statement
19 in my declaration?

20 Q Correct. The second sentence in paragraph
21 38, you know, what's the significance of this and
22 why is it important that there are different
23 materials and structures?

24 A Oh, my point is simply that -- so, it's
25 actually related to the previous point.

1 Specifically, I note that comparing experiments and
2 results described as Suzuki and Kijima is at best of
3 limited value because we have differences in
4 materials and structures.

5 So that's what that is referring to.

6 Q So, I guess, I just want to kind of
7 understand that a little bit better, if you could
8 elaborate that?

9 A Sure.

10 Q So, Suzuki and Kijima have different
11 materials and structures, so you can't compare --
12 compare them or I'll let you fill in your thoughts
13 there?

14 A So, just to be clear, I'm not saying you
15 cannot compare them. It's just the comparison
16 should not be overstated.

17 In other words, just because Suzuki --
18 just because Kijima shows, for example, that its
19 devices seem to show stability up to one month,
20 doesn't mean they wouldn't benefit from the benefits
21 taught by Suzuki's structures, because Suzuki's
22 structures are characterized differently.

23 Kijima limited the testing to one month.
24 Suzuki did encapsulation with different -- over
25 different material structures focused on the

1 benefits of encapsulation.

2 So, there's a lot of differences, so to
3 just say, oh, Kijima's devices last for months, that
4 means they solved all the problems and they would
5 never look to Suzuki is not correct.

6 Q Right. And that's a specific example,
7 but, I mean, this is a more generic statement.

8 So, is it the case that you can't --
9 because of these differences of materials and
10 structures you can't extrapolate what one reference
11 says about what it can do and apply that to the
12 other reference?

13 A It depends on the specifics of the
14 extrapolation.

15 It is my opinion that some of the
16 extrapolations that Mr. Humphrey has attempted are
17 just wrong.

18 So certainly I will say that, yes, to a
19 certain degree. You cannot just blanket
20 extrapolate. I'm not going to say you can never
21 extrapolate. But I will say that many of the
22 extrapolations that Mr. Humphrey did were just
23 wrong.

24 I actually pointed that out in my first
25 deposition when we talked about some of the issues.

1 But that -- in other words, that was in relation to
2 Mr. Humphrey.

3 But counsel for -- I can't remember her
4 name, I'm sorry, Ms. Zhong. She had tried to
5 extrapolate and I pointed out what was wrong with
6 her extrapolations.

7 Q Okay.

8 So you can't blanket extrapolate from
9 Suzuki and Kijima and draw any conclusions about the
10 other. But you may be able to extrapolate in some
11 instances?

12 A That's fair. I mean, I'm not going down
13 in -- clearly, because I'm doing a combination, I'm
14 putting together information into two references to
15 draw a combined conclusion.

16 So, I think it is fair to say that it is
17 possible that information from one may be applicable
18 to another, but it's just you have to do it in the
19 correct way and through what a POSITA would know and
20 not make unreasonable, incorrect extrapolations.

21 Q You anticipated what my next question is.

22 How would a POSITA know when it was
23 reasonable to extrapolate information from or
24 teachings from one of Kijima and Suzuki and apply it
25 to the other?

1 A So, it's -- sorry, I mean, I don't have an
2 answer to the blanket question. But, I mean, the
3 short answer is it's base on the knowledge of a
4 POSITA. And, in particular, it's specifically in
5 the case of the benefits of multilayer encapsulation
6 and the use of bilayer encapsulation to put over a
7 device. That was very well known to a POSITA, so
8 they would know that you could take the benefits of
9 Suzuki and apply it to Kijima.

10 Q Right.

11 So, I understand, in your view, you
12 extrapolate Suzuki's use of its organic barrier
13 layer 20 and apply that to the structure of Kijima.

14 Is there anything else that a POSITA would
15 look at in terms of Suzuki and think it's reasonable
16 to extrapolate into Kijima, for example?

17 A So, with respect to this ground -- I'm
18 using this ground to bring in the -- to bring in the
19 teachings of Suzuki or how a POSITA would interpret
20 the teachings of Suzuki which would then result in
21 the insertion of an organic layer as I discussed on
22 this ground.

23 So that's what I'm using it for. That's
24 not to say -- but, I mean, to put it more generally,
25 Suzuki does talk about the benefits more generally

1 of the bilayer stack versus the individual single
2 layers. In fact, has charts and plots to show the
3 same thing.

4 Q Okay.

5 With respect to Kijima, was Kijima
6 concerned with oxidation after the manufacturing
7 process?

8 A So, to the extent that Kijima tested for a
9 month, he was clearly looking at performance
10 degradation up to one month.

11 Now, Kijima does not specifically call out
12 -- and he tested in air, in all fairness. What
13 Kijima does not call out is how much -- you know,
14 what is the relative importance of oxidation during
15 manufacturing and the inclusion of oxygen that gets
16 in at the time, versus additional oxygen that gets
17 in from outside.

18 So, I think Kijima, like most POSITAs,
19 would recognize that oxidation in these devices is
20 an issue. He tested for a month in air, so I'm not
21 going to say that he had no concern with oxidative
22 effects over the course of a month.

23 But in the scheme of things a month is not
24 very long for these type of devices and is not
25 indicative that you wouldn't benefit from more

1 robust encapsulation such as that taught by Suzuki.

2 Q Sure. Sure.

3 Let's take a look at -- maybe Kijima would
4 be helpful, instead of abstract.

5 So I'm looking at paragraph 97 under the
6 heading "Function and Effects of the Invention."

7 Do you see that?

8 A Yes.

9 Q And then about halfway down it says,
10 "Therefore, the present invention prevents oxidation
11 of the electrode due to the atmosphere, and also
12 prevents degradation of the organic layer due to
13 radiant heat during formation of the insulating
14 sealing film on the conductive sealing film."

15 And then it goes on to say, "Therefore, it
16 is possible to provide an optical element that
17 exhibits good stability even in air and that has a
18 long life."

19 Do you see that passage?

20 A I do.

21 Q So, with that in mind, you know, putting
22 aside the experimental conditions that he chose, my
23 question is just more general: Was Kijima concerned
24 with oxidation after the manufacturing process?

25 A So, I mean, I'll give the same answer that

1 I gave to your previous question, which is it's
2 certainly true that he did consider it because he
3 tested for a month in air. But that doesn't mean
4 that he, and more specifically a POSITA, looking at
5 it wouldn't know that you can still benefit from a
6 more robust encapsulation such as taught by Suzuki.

7 Q Right. I don't think my question is
8 implying that improvement is impossible.

9 My question was just generally -- for
10 example, in the last sentence I just read, it talks
11 about providing an optical element that has a long
12 life.

13 And he talks before that about preventing
14 oxidation due to the atmosphere.

15 So in the context of what he believed --
16 again, putting aside, I'm not saying he was perfect,
17 but he was concerned with oxidation after the
18 manufacturing process, not just during the
19 manufacturing process is the question?

20 A Yes, I agree he certainly had concerns and
21 that's one of the reasons he tested for a month --
22 or he exposed it for a month in air and then tested
23 it. I agree with that.

24 Q And then if we can look at paragraph 26, I
25 wanted you to help me out with something he says

1 there.

2 So paragraph 26 kind of spans the bottom
3 of one column and the top of the second column on, I
4 guess, it's page three.

5 Do you see that?

6 A Yes.

7 Q And here at the top of the right column it
8 talks about, "the effects of moisture and oxygen
9 contamination during production, and peeling of the
10 organic layer due to oxidation of the cathode
11 electrode."

12 What does that mean, "peeling of the
13 organic layer due to oxidation"?

14 A So that is one of -- what he's referring
15 to is one of the consequences of oxidation of the
16 cathode. And to be clear, the cathode is a low work
17 function material.

18 So, it's a the low work function material
19 which means it tends to oxidize relatively easily.
20 The specific example that Kijima provides is
21 lithium-aluminum alloys. And lithium is a very low
22 work function metal.

23 So what happens is when it oxidizes --
24 what he calls out here is when it oxidizes, the
25 interface essentially separates so that the organic

1 layer that's on top of -- let's say, we have a
2 device where the organic layer is put below the
3 cathode. What will happen is the two with separate
4 from each other and that's what he's talking about
5 when he says "peeling."

6 Q I see.

7 So, peeling of the organic layer is a
8 separation from -- of the organic layer from the
9 cathode as the cathode oxidizes?

10 A Yes. And specifically, it's not any
11 organic layer. In this device structure it is the
12 electron transport layer.

13 So the electron transport layer is what is
14 in contact with the cathode material and essentially
15 there's mechanical separation between those two.

16 Q Sure.

17 And when would you expect to see that
18 peeling effect?

19 A It depends on the rate of oxidation. It
20 depends on how mechanically stable the device is.

21 It could -- I mean, it's -- he says
22 that -- so since he says that in his devices over
23 the course of a month they are not degrading, it's
24 not showing significant peeling over the course of a
25 month, that much we can say in his devices.

1 Q And this interface -- the interface
2 between the organic layer and the cathode, that's
3 not impacted by any barrier layer that may get
4 applied to the device later, or is it?

5 MR. GARR: Objection.

6 THE WITNESS: Yeah, I'm not sure I
7 understand the question.

8 BY MR. LINDSAY:

9 Q So, the effect that he's talking about in
10 terms of the peeling of the organic layer due to
11 oxidation of the cathode, would that occur at a rate
12 that is independent of whether there is a barrier
13 layer over the device or not?

14 A I understand.

15 So, it depends. If the oxygen source that
16 is driving -- the oxygen and moisture sources that
17 are driving the oxidation at that interface are
18 coming from outside the device, then the barrier
19 doesn't make a difference because it will limit
20 oxygen ingress or moisture ingress.

21 There is an additional benefit which is
22 the addition of a barrier layer can provide some
23 mechanical stabilization. In other words, it will
24 hold the film in place and prevent mechanical
25 separation.

1 Q I see. Okay. Okay. Still looking at
2 Kijima in paragraph 76 through, I guess, 81
3 describes what Kijima refers to as "Comparative
4 Example 2."

5 Do you see that?

6 A I do.

7 Q Did you consider this example in your
8 analysis?

9 A Yes, of course. I read all of Kijima
10 before I performed my analysis.

11 Q But you didn't cite to this example or to
12 these paragraphs from what I can tell, did you?

13 A I don't know. I don't -- I haven't
14 memorized my declaration, so I don't know whether I
15 cited to it or not.

16 And if you want to indicate to me that I
17 didn't, I have no specific reason to agree or
18 disagree.

19 Q Okay.

20 I couldn't find it, but putting that
21 aside, what is your understanding of what is going
22 on in this example?

23 A Okay.

24 So, in this example -- and this is in
25 comparison to embodiment one. What Kijima does is

1 he makes one specific change to the fabrication
2 process and then uses this example to look at the
3 impact on the device.

4 And so what he does in this particular
5 example is during the deposition process,
6 specifically between the deposition of the cathode
7 material and the gold that goes on top of it, he
8 briefly brings the device up to atmospheric pressure
9 and then evacuates it again.

10 So he says the device is -- in paragraph
11 77 he says, "The device -- the deposition device was
12 temporarily returned from vacuum to atmospheric
13 pressure, and then the device was again evacuated to
14 a vacuum."

15 And then he looks at what happens and he
16 points out that -- in paragraph 80 and 81, he points
17 out that this device was actually degraded. In
18 other words, what he's saying is if by doing this
19 particular process where you allow some oxygen
20 and/or moisture ingress during the device
21 fabrication, the device can get degraded because
22 there's no oxygen and moisture that is essentially,
23 to put it loosely, hidden inside the device before
24 you encapsulate it.

25 Q I see.

1 And he concludes, and I'll just read from
2 paragraph 80 at the end there, that "the results
3 were greatly degraded from the result measured
4 immediately after the element was produced.
5 Furthermore, a large number of dark spots were
6 observed."

7 And that degradation is a result -- and
8 this is a question: Is that degradation a result of
9 exposing the light-emitting layer three briefly to
10 atmospheric conditions before he applied the
11 conductive layer seven?

12 A So, I couldn't necessarily -- I don't
13 think he says -- anyway, he does not say that it's
14 necessary the light-emitting layer that's being
15 exposed.

16 So, it's -- the exposure is done between
17 the cathode deposition step and the gold deposition
18 step. Now, of course, when you have the cathode,
19 you've already got the light-emitting layer below
20 it.

21 So, he doesn't specifically say in this
22 experiment whether it's degradation of the
23 light-emitting layer or oxidation of the cathode or
24 degradation of any of the other layers.

25 But it is certainly true that he's

1 pointing out in these paragraphs -- and this is sort
2 of the control or the split in his experiment.

3 What he is doing is he is looking at what
4 happens if you expose the device briefly to oxygen
5 and moisture during fabrication and then see what it
6 does.

7 And he is basically positing here that you
8 get degradation if some oxygen and moisture exposure
9 happens during the device fab, even if afterwards
10 you encapsulate the device.

11 Q Okay. Right. You are right.

12 I didn't mean to imply that it was on
13 light-emitting layer itself. It's just at some
14 point before application of the conductive layer
15 seven, the device is exposed to atmospheric
16 conditions.

17 Are we reading that the same way?

18 A I think so, yes.

19 Q And so, I guess in 81 he concludes the
20 adverse effects of exposing the element to the
21 atmosphere before the formation of the conductive
22 sealing film seven were evident, proving the
23 importance of also forming the conductive sealing
24 film seven under vacuum conditions."

25 Did I read that right in paragraph 81?

1 A Yes, I believe so.

2 Q So, is it fair to say that Kijima's
3 conductive sealing film seven, then, is providing
4 some protection from exposure to atmospheric
5 conditions?

6 A I don't think that's what he's saying --
7 well, that's not what he's saying. That's not to
8 say that it couldn't be providing some benefit, but
9 that's not what he's saying here.

10 Because what he's saying -- the comparison
11 to this experiment -- and this is why this is called
12 the comparative example, is simply what happens if
13 you have exposure before you put that film on.

14 Because, remember, he puts that film on
15 and then he goes on to put the insulating sealing
16 film on top of that. So this control does not
17 address -- the control of this experiment -- or the
18 comparison of this experiment does not address that
19 specifically, because what are you changing here is
20 entirely happening before those films are put down.

21 Q I mean, his conclusion in 81 is that there
22 are adverse effects to atmospheric exposure to the
23 element if that occurs before the conductive sealing
24 film seven is applied.

25 Is that not a plain reading of this?

1 A So, what you said is correct, but how you
2 interpret it, I don't think that's what he's saying.
3 And he wouldn't be saying that because that's not
4 what the comparison is.

5 The comparison is quite simple. You look
6 at what he's changing. What he's changing is
7 exposure earlier in the process.

8 So that's the change that are you able to
9 -- that you can comment on. And he is pointing out
10 that earlier in the process -- and that includes up
11 to the point where you put the vacuum -- you put the
12 conductive sealing film on, you want to avoid
13 exposure to atmosphere and that's his statement.
14 And that is the only statement he can make based on
15 the comparison that he's done here.

16 And by the way, I would add to that that
17 you get evidence that the conductive sealing film on
18 its own is not good enough because if you look at
19 paragraph 87 he does sort of a similar comparison,
20 but now he's doing it -- he's talking about what
21 happens when you look at the insulating sealing film
22 and he says again, "proving the importance of
23 forming all of the films under vacuum conditions."

24 So his point is quite simply while you are
25 doing the fab of the device before you got it fully

1 encapsulated, you need to be careful about oxygen
2 exposure.

3 Q Right. So let's talk about Comparative
4 Example 3 then.

5 What's the difference between Comparative
6 Example 2 and Comparative Example 3?

7 A So, the difference between Comparative
8 Example 2 and Comparative Example 3 is when he does
9 the exposure to -- the brief exposure to atmospheric
10 conditions.

11 And in Comparative Example 2, it's done
12 before he puts down the gold sealing layer. In
13 Comparative Example 3, it's done before he puts down
14 the -- the insulating sealing layer, which when in
15 particular example is silicon dioxide.

16 Q Right.

17 And so in example three there was
18 degradation as well that resulted from that
19 exposure; is that right?

20 A Yes.

21 And he says that in paragraph 86 and then
22 concludes from that in paragraph 87. So, I mean,
23 this shows that the gold layer on its own is not
24 providing sufficient or adequate protection. That's
25 very clear from this, the comparison of Comparative

1 Example 2 and Comparative Example 3.

2 Q So in Comparative Example 2 -- I'm not
3 disputing that, but in Comparative Example 2 he says
4 at the bottom of paragraph 80, "A large number of
5 dark spots were observed."

6 And then in Comparative Example 3 at the
7 end of 86 he says, "There was also an increase in
8 dark spots."

9 A Correct.

10 Q Wouldn't a POSITA recognize that
11 Comparative Example 3 provided flawed but still
12 superior results than Comparative Example 2?

13 A I don't think he's making -- there's no
14 comparison he's making on the dark spots between two
15 and three.

16 It is true that if you look at the data,
17 the sentence right before that have, the -- oh,
18 actually you couldn't say that.

19 He -- I apologize let me rephrase.

20 He doesn't make any comparison of the dark
21 spots, because he's not giving us any quantification
22 on the dark spots.

23 Both of them say there's an increase. He
24 says large number in one. And then he says also an
25 increase of dark spots. This "also" would probably

1 be referring back -- in other words, he's saying
2 it's similar to what he observed in Comparative
3 Example 2.

4 Having said that, there is a difference in
5 the luminescence. I mean in Comparative Example 2,
6 he had 500 candela per meter square and in
7 Comparative Example 3, he had 900 candela per meter
8 square.

9 So they are not identical, but both of
10 them are unacceptable.

11 Q No, no, that's fair.

12 But so, there is some data we can -- we
13 can look at.

14 So, in example two, he's only able to
15 achieve 500 candelas per meter square at 13 volts.
16 Whereas, in Comparative Example 3, he's able to
17 increase that to 900 with only nine volts.

18 So, objectively speaking, if you only had
19 a choice of building Comparative Example 2 or
20 Comparative Example 3, isn't it fair that
21 Comparative Example 3 is the superior product?

22 A I mean, if we're looking just at -- so,
23 again, for whatever reason he's characterized them
24 at different voltages. I'm not clear why he did
25 that because that's not how you would typically do

1 this comparison.

2 But it is true that if you look at just
3 the raw numbers, that Comparative Example 2 seems to
4 be less luminous than Comparative Example 3 in terms
5 of the absolute number.

6 Now, unfortunately, what he doesn't
7 provide us in either of these comparative examples
8 is what the number was for these comparative
9 examples immediately after production.

10 So, there's always device-to-device
11 variation, so we don't know the relative degradation
12 of the two devices, so we -- which I can't really
13 comment on that and neither could he.

14 But what you can say and what he does say
15 is in both of these he makes an unequivocal
16 statement, but these results were a -- showed
17 degradation. He says that very clearly in both
18 Comparative Example 2 and in Comparative Example 3.

19 Q No, I agree. We'll come back to that.

20 I'm just trying to -- trying to see what
21 your thoughts are with respect to the fact that the
22 difference between these two comparative examples is
23 when the device was exposed to the atmosphere,
24 right.

25 In Comparative Example 2, it's before

1 conductive layer seven is applied. In Comparative
2 Example 3, it's after conductive layer seven is
3 applied.

4 Is that if --

5 A But if -- or if the inorganic sealing
6 layer eight is applied in Comparative Example 3, so
7 you didn't complete the example.

8 So in Comparative Example 2, it's before
9 -- both of them have the full -- the full two-layer
10 system that he proposes with the -- well, actually
11 the multilayer system that he proposes when the last
12 two layers that he talks about are conductive -- the
13 conductive film -- conductive sealing film seven and
14 the insulating sealing film eight, both of them have
15 that.

16 But in the Comparative Example 2, the
17 atmospheric exposure is done before the conductive
18 sealing film seven. And in Comparative Example 3,
19 the atmospheric exposure is done after conductive
20 sealing film seven but before conductive sealing
21 film eight.

22 The one thing we can say, because the
23 numbers are not the same, the testing conditions are
24 not the same and he never gives the initial results,
25 but what we can say is both show degradation.

1 So both are not good enough.

2 Q Yeah. Right.

3 But we can also say something about their
4 relative degradation based on the luminescence he
5 was able to achieve in the two examples.

6 Wouldn't that -- wouldn't that also be the
7 case?

8 A That's probably true, but I can't say
9 that. And the reason I can't say that is he doesn't
10 give numbers for what the initial luminescence was,
11 right.

12 He says the luminescence was found to be
13 -- in Comparative Example 2 he says, "The
14 luminescence was found to be about 500 candela per
15 meter square," and he gives the voltage, which is 13
16 volts and he says the results were greatly degraded
17 from the result measured immediately after the
18 element was produced, but he doesn't tell us what
19 that value was.

20 And you are making a statement about
21 degradation. He doesn't tell us, therefore, since
22 we don't know what it was when it was first built,
23 we can't -- we don't know how to do a comparison
24 between those two in terms of the numbers.

25 I think what we can say is both of them

1 are degraded, and I think that's the point he's
2 making, both are degraded.

3 Q Yeah.

4 So both are degraded and not sufficient is
5 his point.

6 But on a relative basis, wouldn't a POSITA
7 conclude that application of the conductive sealing
8 film seven before atmospheric exposure improved or
9 at least, let's say, decreased the degree of
10 degradation that was otherwise experienced before
11 the final sealing layer was applied?

12 A I don't know that they can say that. As I
13 said, because he doesn't -- because you are making a
14 statement about degradation, we would need to see
15 degradation numbers.

16 He doesn't provide that. He just says
17 both degrade a lot.

18 Q Okay. Let's take a look at Suzuki for a
19 moment, and I'm looking at paragraph five around
20 line 51 or so.

21 A Sorry, you said Suzuki, you mean column
22 five, correct?

23 Q Yes, sorry.

24 So, Suzuki column five, line 51 or so
25 there's a discussion that I believe you cite to in

1 your declaration.

2 I'll let you have a moment to take a look
3 at that.

4 A I've read it.

5 Q So, here Suzuki is talking about foreign
6 matter that is inevitably deposited on the
7 electroluminescence unit U, right, during the course
8 of fabrication.

9 So what part of the electroluminescent
10 unit U is Suzuki referring to here? Where is that
11 foreign matter being deposited? And we may look at
12 the figures to figure that out.

13 A So, if we look at figure one, which is
14 what he's describing in this section, the
15 electroluminescent unit U is what he points to.
16 That is the -- it's the series of layers that
17 together form the electroluminescent device.

18 So that would go up to -- it goes all the
19 way from the bottom up to layer 18 and that's the
20 electroluminescent device. That's the OLED, so to
21 speak.

22 And then what he says in that paragraph,
23 which is column five at approximately line 51, he
24 says that, "The protective layer P includes two
25 layers including an organic barrier layer 20

1 covering defects or pinholes inevitably formed
2 particularly in the uppermost cathode layer 18, and
3 an inorganic barrier layer 22. It will be noted
4 that defects are mainly caused by foreign matter
5 inevitably deposited on the electroluminescent unit
6 U during the course of the fabrication thereof under
7 very severely controlled conditions."

8 So, what he's saying is during the
9 fabrication U, which is all of those layers, you get
10 defects that come from -- and one of the sources of
11 defects that he identifies is foreign matter.

12 Now, the foreign matter that could be
13 deposited on top of the top layer, but it could also
14 be deposited on the lower layers and then what
15 happens is when you have it on a on lower layer, it
16 creates a pinhole above.

17 And that's what I was talking about
18 earlier when I said pinholes tend to propagate.

19 So, it would be -- it's certainly true
20 that it could be on the topmost layer. But it can
21 also be on other layers and then that would result
22 in propagation up through the stack.

23 Q I see.

24 So, are you saying that Suzuki envisions
25 foreign matter being deposited on the organic layers

1 as well?

2 A He doesn't say that. He doesn't
3 specifically address which layers he's talking about
4 because he's talking about the electroluminescent
5 unit U as a whole.

6 Now, the language that he uses is really
7 to point out that this would be the source of the
8 defects, and the defects he's referring to are the
9 ones that he identifies above.

10 But he doesn't tell us explicitly which
11 layer of the electroluminescent unit U is the one
12 that is the biggest source of defects or is the only
13 source of defects.

14 He just describes it as a whole, as the
15 electroluminescent unit U which has multiple layers
16 as we have discussed.

17 Q Okay.

18 But -- I mean, in that sentence he talks
19 about pinholes and defects being formed,
20 particularly in the uppermost cathode layer 18.

21 Isn't it fair to interpret that sentence
22 as being that the next sentence referring to defects
23 caused by foreign matter is similarly talking about
24 the cathode layer?

25 A No.

1 It's certainly true that if the defect
2 is -- if the defect he's referring to is the foreign
3 matter on top of the cathode, that is very much a
4 defect.

5 But the previous sentence also points out
6 pinholes. And a pinhole forms when you have a
7 defect.

8 Or one way you can form pinholes is if you
9 have foreign matter on the layer below it that
10 propagates up as a pinhole.

11 So given that he's identified defects or
12 pinholes, if I put a defect on top -- like if I put
13 foreign matter on top of the cathode layer, it will
14 not cause a pinhole in the cathode layer.

15 Q Right.

16 So, I'm just trying to read this sentence
17 just from a grammar perspective. He's talking about
18 an organic barrier layer 20 covering defects or
19 pinholes inevitably formed, particularly in the
20 uppermost cathode layer 18.

21 I read that as meaning that the defects
22 and pinholes he's referring to are both inevitably
23 -- or either are inevitably formed in the cathode.

24 Is that not the way you read it?

25 A I agree. But just to be clear, he's not

1 saying that -- he says particularly the uppermost
2 cathode. But I do agree that he's clearly
3 identifying that as a problem.

4 But that doesn't mean that the foreign
5 matter that he's talking about is only on the top
6 layer. Because if you have foreign matter below,
7 that is what will actually result in a pinhole.

8 That's, in fact, one of the ways you can
9 form pinholes, is you have foreign matter below and
10 then above it where you put the next layer, it tends
11 to form a pinhole.

12 Q Okay. Fair enough.

13 But let's take a look at figure one. He's
14 labeled U there; right?

15 A Yes.

16 Q And that's the -- what he calls the
17 electroluminescent unit U; right?

18 A Correct.

19 Q That's the same U that we were just
20 reading in paragraph -- I'm sorry, in column five,
21 line 56; right, where he talks about 55 and 56
22 foreign matter inevitably being deposited on
23 electroluminescent unit U.

24 So we see that what that is in figure one?

25 A I agree.

1 Q Okay.

2 And then in that same sentence he says
3 that the foreign matter in question is being
4 deposited on the electroluminescent unit U, not in
5 or under.

6 I mean, isn't the plain reading of that
7 that he's talking about the exterior surface of
8 electroluminescent unit U.

9 A That is certainly one way to read it, but
10 the fact that he points out that there are pinholes
11 would indicate that there's also defects that are
12 propagating up from layers below, because he says
13 specifically there are pinholes in the top layer,
14 which I think was layer 18.

15 And if there are pinholes in layer 18
16 resulting from foreign matter, putting foreign
17 matter on top of 18 does not form pinholes in 18.

18 Q Right. Okay.

19 And then I suppose maybe that's explained
20 by the portion of that sentence after the comma
21 where he says, "and an inorganic barrier layer 22,"
22 or does that not -- does that not help your --

23 A No, that's just -- I mean, it's kind of
24 awkward phraseology, so to speak.

25 He's just pointing out that you have -- it

1 includes two layers. The organic barrier layer and
2 the inorganic barrier layer.

3 And it's weird that -- I mean, that's not
4 how I would write the sentence. I like to think
5 that my English is a little better than that. But
6 that's kind of what he's pointing out here.

7 Q Okay. Yeah, that's fair enough.

8 Okay. So, we're talking about Suzuki's
9 inorganic barrier layer 22.

10 Is it your understanding that Suzuki's
11 inorganic barrier layer 22 is part of its protective
12 double layer structure?

13 A So, specifically, he said -- if we look at
14 the same section we were looking at at column five,
15 roughly line 50 he says, "The protective layer P
16 includes two layers and one of them is the organic
17 layer 20 and the other is the organic barrier layer
18 22."

19 So to that extent, yes, it's part of the
20 two layer -- protective layer P in this particular
21 example of figure one.

22 Q So the double layer structure is made up
23 of the organic barrier layer 20 and the inorganic
24 barrier layer 22.

25 I think, we're saying that; is that

1 correct?

2 A With respect to this particular
3 discussion, yes, I agree.

4 Q And does Suzuki teach its benefits flow
5 from a combination of its organic barrier layer 20
6 and inorganic barrier layer 22?

7 A There is certainly teaching with respect
8 to that.

9 For example, if you look at figure three.
10 Figure three shows that he uses a metric for
11 degradation which is the average diameter of dark
12 spots. And he shows, specifically, if you compare
13 an unprotected device or a device with only an
14 organic barrier layer and a device with only an
15 inorganic barrier layer, all of those are worse than
16 the device of the invention which has both.

17 Q Right. Okay.

18 So, in his graphic here a device with only
19 the organic barrier layer is actually not much
20 better than no protective layer at all, according to
21 his -- his data here?

22 A Well, relative to the barrier device, I
23 agree. I mean, it does appear to be slightly
24 better, but yes, it's not much better. It's
25 certainly not acceptable.

1 Q It's not acceptable.

2 So Suzuki's protective organic barrier
3 layer 20 by itself is not an acceptable structure?

4 A I agree with that and that's why he's
5 pointing -- I mean, he is teaching that you really
6 want a two-layer stack that has an organic layer and
7 an inorganic layer.

8 In fact, in my combination that's what you
9 get, because if you take the organic layer and you
10 combine it with the inorganic sealing layer of
11 Kijima, you have a two-layer stack.

12 Q Understood.

13 And then I guess same question for the
14 structure that's only an inorganic barrier layer.

15 There's some improvement performance
16 there, but would you agree that that's also not an
17 acceptable device if it included only the inorganic
18 barrier layer?

19 A I agree.

20 It's seems to show slight improvement, but
21 yes, it's not acceptable.

22 Q And so it's the combination of these two
23 layers is how Suzuki is able to achieve what he
24 shows at the bottom of figure three which is on a
25 relative basis very low occurrence of diameter of

1 dark spots over a period of time?

2 A I agree.

3 In Suzuki -- I mean, Suzuki's point, which
4 is well shown in this slide, is you really want two
5 layers. You want an organic barrier layer and an
6 inorganic barrier layer.

7 I agree.

8 Q Okay.

9 A And that's one of the reasons I say the
10 teaching of Suzuki would motivate you to do the
11 combination that I did with Kijima.

12 Q And Suzuki's diagram for figure three here
13 where he's doing this comparative analysis goes out
14 to -- it looks like a hundred hours.

15 What would a person of ordinary skill in
16 the art understand why he completed his measurements
17 at one hundred hours?

18 MR. GARR: Objection.

19 THE WITNESS: Okay.

20 So he actually provides information about
21 this.

22 So essentially he's doing what's called
23 accelerated lifetime testing. It's very common to
24 do this and very good -- you don't want to wait ten
25 years to figure out if a particular encapsulation is

1 good enough.

2 So what you do is you do testing in really
3 bad conditions. And the way you do that is you do
4 it in an elevated temperature and a very high
5 relative humidity. And he says that exactly. He
6 says the conditions that we use for testing -- and
7 he shows that on -- he describes that in paragraph
8 -- in column eight at line 31 where he says more
9 particularly, "Each device were placed under
10 conditions of 40 degrees Celsius," so quite hot,
11 "and 90 degrees relative humidity," so he's putting
12 it in a test chamber where it's exposed to really
13 bad conditions over a hundred hours and then he
14 looks at the degradation.

15 So, this is a very classic way of doing
16 so-called accelerated lifetime testing, where you
17 put it in really bad conditions. You don't just
18 leave it lying around in the room. You put it in
19 really bad conditions so that it's really going to
20 degrade fast and then you do a comparison so you
21 compare things to each other without having to wait
22 years to see if it's good enough.

23 MR. LINDSAY: I see.

24 BY MR. LINDSAY:

25 Q So, is that common when you are testing

1 things that have lifespans on the order of years
2 that you would use these elevated conditions to
3 simulate degradation that would otherwise occur over
4 a longer period of time, you can measure it in a
5 shorter period of time.

6 Is that what's going on?

7 A Certainly accelerated lifetime testing is
8 a common thing. It's -- you do it by kind of doing
9 what Suzuki did, which is you put it in really bad
10 conditions, much worse than you would normally
11 expect to see and that way you would get the
12 degradation much faster.

13 It's a very standard practice in the
14 industry.

15 Q And so going back to -- so Suzuki's
16 barrier layer 20, that's the organic barrier layer
17 that we see in figure three and he describes
18 throughout the specification.

19 Would you consider that to be a protective
20 layer?

21 A It's part of his protective layer in that
22 he's basically pointing out that the protective or
23 sealing layer P is formed with the two layers.

24 One is the organic barrier layer 20 and
25 other is the inorganic barrier layer 20.

1 What he's really pushing, in order to say
2 the benefit, is to do a two-layer stack.

3 Q Okay.

4 MR. LINDSAY: We can go off the record for
5 a moment.

6 MR. GARR: Sounds good.

7 THE COURT REPORTER: Okay. We're off.

8 (Brief interruption in proceedings.)

9 MR. LINDSAY: Okay.

10 BY MR. LINDSAY:

11 Q So, Dr. Subramanian, I want to go back to
12 Kijima and revisit our discussion earlier about the
13 Comparative Example 2 and 3 because I'm still hung
14 up on one thing, if you'll indulge me.

15 A Remind me of what exhibit.

16 Q Exhibit No. 1010.

17 A I have it.

18 Q So, we were discussing Comparative Example
19 2 and Comparative Example 3?

20 A Yes.

21 Q And, in particular, we were talking about
22 the luminescence that was achieved in those two
23 cases.

24 Do you recall that?

25 A I do.

1 Q So, I understand your point that we don't
2 know the degree of degradation because we don't know
3 what the final -- what the final measurement was ?

4 Is that -- that's your -- that's your
5 point about we can't quantify the degradation?

6 A No, no, we know what the final value is at
7 or we know what the value is after a month because
8 that's the number he provides.

9 What we don't know, because he doesn't
10 provide it, is for these devices what was the number
11 at time zero.

12 Q I see.

13 So on an absolute basis we know that
14 Comparative Example 2 produced 500 candela per
15 square meter. We know that Comparative Example 3
16 produced luminescence of 900 candela per square
17 meter at a lower voltage.

18 But you are saying we can't compare those
19 two devices?

20 A No, I'm saying that we cannot make
21 conclusions just based on those numbers. And he
22 doesn't make conclusions just based on those
23 numbers, he's saying both of them degrade.

24 So he's not saying that either of them is
25 acceptable.

1 Q All right. No, I agree with that.

2 So, would you agree that the luminescence
3 barriers he gives are of the final product after it
4 has been left for one month after production?

5 A Yes.

6 Q So he -- you know, he turns on Comparative
7 Example 2, however he did that and he got a
8 luminescence of 500 candela per square meter?

9 A After a month of letting it sit, yes.

10 Q After a month of letting it sit by
11 applying 13 volts?

12 A Using that measurement, yes.

13 Q And then after a month of letting the
14 device of Comparative Example 3 sit for a month
15 after production, he turns it on, applies nine volts
16 and gets 900 candela per square meter?

17 A So just to be clear turning it on is the
18 application of nine volts.

19 But yes, other than that I agree. So you
20 are turning it on by applying nine volts.

21 Q Okay.

22 So he aggrieved a higher luminescence in
23 Comparative Example 3 than he achieved with his
24 Comparative Example 2.

25 A At that time I agree, yes.

1 Q And in terms of the composition that he
2 describes for Comparative Example 2 and Comparative
3 Example 3, the aluminum alloy content, the cathode
4 thickness, Comparative Example 2 and Comparative
5 Example 3 are the same.

6 Is that fair?

7 A I agree.

8 I think the only difference that he's at
9 least pointed out between these examples is when the
10 oxygen exposure or when the atmospheric exposure
11 takes place.

12 Q Right.

13 And so just to be clear, the only
14 difference between Comparative Example 2 and
15 Comparative Example 3 is that the device of
16 Comparative Example 2 is exposed to the atmosphere
17 before the conductive sealing layer seven is
18 applied. And Comparative Example 3 the device is
19 exposed to the atmosphere after conductive sealing
20 layer seven is applied?

21 A But before the inorganic sealing film
22 eight is applied.

23 We're adding that extra point on, yes, I
24 agree that's the difference between these two.

25 Q Right.

1 And in both cases the sealing layer eight
2 was applied.

3 A That's my -- that's my understanding.
4 Sorry, I spoke over you.

5 Could you repeat what you said?

6 Q Yeah.

7 I was just focusing on the difference
8 between the comparative examples. They both get the
9 sealing layer eight applied from what we understand
10 in the same manner.

11 A Yes, that's fair.

12 In fact, they are specifically called out,
13 because we can see paragraph 79 and paragraph 85
14 call that out.

15 Q Okay.

16 I think we're on the same page there.

17 So I want to talk about inkjet printing
18 for a moment.

19 So is it your opinion that a person of
20 ordinary skill in the art at the time of invention
21 would have known and been motivated to use inkjet
22 printing to deposit encapsulation layers?

23 A That certainly would be within -- I mean,
24 the specific ways I bring in inkjet printing is
25 pointed out within my declarations, with respect to

1 the specific grounds where I used them for the
2 relevant claims.

3 But it is certainly true that one skilled
4 in the art would have known how to do that at that
5 time.

6 Q Okay.

7 And I guess what I want to -- I want to
8 find out is what evidence do you rely on, when you
9 say that, how do we know that's true?

10 A So, I mean, I provide it specifically with
11 respect to the particular claims in which I address
12 it which were in my -- in the relevant parts of the
13 relevant declarations.

14 Q Okay.

15 So, I'm just -- I guess I want to be as
16 specific as we can be on this topic, so that the
17 board is clear on what evidence it can look at.

18 You know, what do you want the board to
19 consider. When you say that a POSITA would have
20 used inkjet printing to deposit encapsulation
21 layers.

22 If you were standing in front of the board
23 what would you point to, to support that opinion?

24 A So, specifically, with respect to the use
25 of inkjet printing -- and let's focus on the ground

1 we've been talking about, which is the ground of
2 Kijima in view of Suzuki.

3 I address the inkjet printing -- an inkjet
4 printing claim in the next ground where you use
5 Kijima in view of Suzuki and Sturm and I point to
6 Sturm for that.

7 And then also within that discussion I
8 point out that this was well-known. I point to what
9 the '389 patent itself says about inkjet printing.
10 I point to that in paragraph 103 of my original
11 declaration, Exhibit No. 1004.

12 And I point to Duthaler which is Exhibit
13 No. 1016 to talk about that further.

14 So I point out that this was extremely
15 well-known at the time and that's specifically -- at
16 least with respect to this claim, that's what I
17 point to.

18 Q Okay.

19 So Duthaler, Sturm and then the '389
20 disclosure, are those the three pieces of evidence
21 that you've cited to in support of the idea that it
22 would have been obvious to use inkjet printing to
23 deposit encapsulation layers?

24 MR. GARR: Objection.

25 THE WITNESS: So with respect to this

1 ground, which is the ground -- the specific ground
2 that I mentioned right now, which is for claim 35.
3 And to be clear, claim 35 is a dependent claim that
4 specifically calls out at least one planarization
5 layer that further comprises depositing by inkjet a
6 further organic layer.

7 So with respect to that organic layer, I
8 point to the three things that I mentioned
9 previously. In other words, I point to Sturm, I
10 point to what the '389 patent itself acknowledges
11 and I point to Duthaler. But the ground itself is
12 based on Sturm and I use what the '389 says and
13 Duthaler to point out that a POSITA would have known
14 how to do this or to support the idea that a POSITA
15 would have known how to do this.

16 MR. LINDSAY: I see.

17 BY MR. LINDSAY:

18 Q So, the specific teaching that comprises
19 the ground would come from Sturm. And then Duthaler
20 and the '389 would be evidence of what was generally
21 known.

22 I do have that right?

23 A Not exactly.

24 So with respect to the secondary reference
25 that I use, it's Sturm.

1 Now, Sturm talks about -- specifically
2 talks about inkjet printing and it talks about
3 printing organic layers for an OLED.

4 And then I point out -- and then that's
5 what I discuss in paragraph 102 of my original
6 declaration, Exhibit No. 1004.

7 I then point out in the subsequent
8 paragraphs that -- so specifically in paragraph 104,
9 I point out that Sturm discloses it when talking
10 about the -- he talks about it to create selectively
11 deposited islands of organic electroluminescent
12 material, patterned OLED, top contacts of OLEDs and
13 patterned insulators so -- so he's specifically
14 pointing out various ways that inkjet printing can
15 be used.

16 And then I go on to talk about how a
17 POSITA would use this information, and specifically
18 I point out given what a POSITA would know as
19 evidence from the background of the '389 patent
20 itself and, for example, Duthaler, a POSITA would
21 find it obvious to practice claim 35 through the --
22 through Kijima in view of Suzuki and Sturm.

23 Q Does Sturm disclose the use of inkjet
24 printing for encapsulation layers, specifically?

25 A Could I have Sturm, please? I don't have

1 it here.

2 Q Sorry, give me one second.

3 I'm going to describe a couple of
4 different things while I'm here.

5 Okay. You should see Sturm Exhibit
6 No. 1013 shortly.

7 (Exhibit 1013, previously marked, not
8 attached.)

9 THE WITNESS: Yes, let me download it.

10 Okay. I have Sturm opened. And your
11 question was -- could you repeat your question,
12 please?

13 MR. LINDSAY: Sure.

14 BY MR. LINDSAY:

15 Q Does Sturm Exhibit No. 1013 disclose the
16 use of inkjet printing for encapsulation layers,
17 specifically?

18 A I don't believe so.

19 So, Sturm does talk about inkjet printing
20 of patterned insulators, but doesn't specifically
21 say that those are used for encapsulation. But he
22 does generally teach about inkjet printing of
23 insulators, which is, of course -- and specifically
24 organic insulators, which is, of course, what we are
25 using the teaching for in this combination.

1 Q Can you point to me where you -- what you
2 mean by what you are referring to regarding the
3 insulators?

4 A Sure.

5 So, specifically, the discussion of
6 patterned insulators that I was referring to and
7 that I cited to in the section of paragraph 104 of
8 my original declaration shows up in Sturm in column
9 seven where he calls out the printing of insulators.

10 So, he shows insulator 130, 134 and he
11 talks about the patterned insulator 130 and 134.
12 And those are not -- he's not calling them out
13 explicitly as encapsulants, but he is clearly making
14 clear that you can print insulators using inkjet.

15 Q And what's the difference between an
16 insulator and encapsulating layer?

17 A So, not all insulators are used for
18 encapsulation, is the short answer. You can use
19 insulators for encapsulation, but not all insulators
20 are used for encapsulation.

21 Q What else might they be used for?

22 A So, it depends on the specific device, but
23 in the case of thin film transistors, which is what
24 he's discussing further up in this section. They
25 are used, for example, for gate dielectric.

1 In inkjet they can be used to make
2 capacitors. They can be the dielectric for
3 capacitors. They are used for a lot of different
4 applications. One of which is for encapsulation.

5 Q I see.

6 But Sturm uses them for, you said a moment
7 ago?

8 A Well, in the previous -- in higher up when
9 he's talking about printing a transistor, I believe,
10 he uses them to make the dielectric for the gate.

11 Q Okay.

12 A But specifically in paragraph -- in column
13 seven, the insulator is also used to confine the
14 OLEDs to a specific portion.

15 So, he says the patterned insulator 132,
16 134 also restricts the OLED. So this is essentially
17 used to the set the size of the OLED in this
18 particular example.

19 Q Okay.

20 And I also added the Duthaler -- I'm
21 probably mispronouncing that, Exhibit No. 1016
22 already.

23 (Exhibit 1016, previously marked, not
24 attached.)

25 //

1 BY MR. LINDSAY:

2 Q If you wouldn't mind pulling that up?

3 A I'm waiting. It's just sitting there and
4 not doing anything right now on the Exhibit Share.

5 MR. LINDSAY: Are you able to open it,
6 David?

7 MR. GARR: I'll double-check. I have it
8 in paper form.

9 THE WITNESS: I mean, if you would like,
10 rather than waiting, I probably have a copy, but it
11 would be in a different directory so I have to go
12 find it, which I don't mind doing. But I want to
13 make sure you are okay with me doing that.

14 MR. LINDSAY: Yeah, I'm fine.

15 MR. GARR: Yeah, it's not showing up in
16 Exhibit Share for me either.

17 THE WITNESS: Yeah. Okay.

18 But I found a copy. Just let me -- it's
19 in a zip file, so I'll need to extract it. Give me
20 a second here, please.

21 Yeah, I think the Exhibit Share kind of
22 seems to have slowed down or frozen up. But anyway,
23 I have Duthaler now. It's Exhibit No. 1016.

24 MR. LINDSAY: All right. I re-added it
25 so -- I mean, I want David do have a chance to

1 see -- have it too available.

2 MR. GARR: I have a printed copy.

3 MR. LINDSAY: Oh, okay.

4 THE WITNESS: I have a copy of Exhibit
5 No. 1016 opened.

6 MR. LINDSAY: Okay.

7 MR. GARR: Thanks. You don't need to hold
8 off on my account.

9 MR. LINDSAY: Okay.

10 MR. GARR: Also, I can -- I see it on
11 Exhibit Share, too.

12 MR. LINDSAY: Yeah, I re-added it, so it
13 was probably a user error on my part.

14 BY MR. LINDSAY:

15 Q Exhibit No. 1016, the Duthaler reference,
16 does this document disclose the use of inkjet
17 printing to deposit encapsulation layers?

18 A So, specifically, with respect to -- to
19 encapsulation, there is extensive disclosure of
20 printing encapsulation in Duthaler. For example, in
21 column two -- sorry, page two at roughly line 13 it
22 says, "The method includes printing and
23 encapsulation."

24 Then as another example -- at page ten,
25 line 23 it says, "Also, we described a preferred

1 architecture in which a field effect transistor is
2 buried underneath an encapsulation layer and a pixel
3 electrode, each deposited using all-additive
4 printing techniques."

5 So there is extensive disclosure of the
6 use of printed for encapsulation and specifically in
7 the section that I cited to in my declaration I
8 pointed out that it specifically cited to inkjet,
9 for example, in the abstract.

10 And that shows up in my declaration -- and
11 this is my first declaration, Exhibit No. 1004 at
12 paragraph 103 where Duthaler explains there were a
13 number of known printing techniques and it
14 specifically did call out inkjet at -- in the
15 abstract, and at column fifteen, line six through
16 eight, et cetera.

17 Q When it talks about printing you just read
18 a couple of examples.

19 Is it talking about screen printing or
20 inkjet printing?

21 A So there it just says printing. It's not
22 limiting it to a particular printing technique. But
23 it does say all-additive printing technique.

24 Now, it does call out inkjet in other
25 places. But I agree in those specific sections, it

1 just uses the word "printing."

2 Q Why didn't you rely on Exhibit No. 1016,
3 Duthaler as part of the combination if it discloses
4 inkjet printing in an encapsulation layer?

5 A I mean, I don't know how to answer that
6 question.

7 I thought Sturm disclosed it sufficiently
8 and so I used Sturm. But I'm using Duthaler in this
9 particular ground just to give an idea or to provide
10 some understanding of what one of skill would know.

11 I think -- I probably could have used
12 Duthaler, but in the ground I used -- for this
13 particular ground I used Sturm. I thought Sturm was
14 fantastic.

15 Q But it doesn't disclose inkjet printing
16 encapsulation layers; right?

17 A But it does explicitly disclose inkjet
18 printing and insulator. And one of the uses of
19 insulators is to use it for encapsulation.

20 And so a POSITA looking at that would say
21 I could use this in the ground to inkjet print the
22 encapsulation.

23 Q Does Duthaler have more explicit
24 disclosure on inkjet printing encapsulation layers
25 than Sturm?

1 MR. GARR: Objection.

2 THE WITNESS: I don't know how to compare
3 that.

4 I mean, it's -- I already pointed out that
5 Duthaler does explicitly say you can print the
6 encapsulation.

7 But it doesn't go in the sections where it
8 talks about printing the encapsulation. It says
9 printing. It doesn't specify the exact printing
10 technique.

11 Though in other areas it does call out
12 inkjet as one of the printing techniques that
13 Duthaler identifies.

14 BY MR. LINDSAY:

15 Q So, I think maybe during your last
16 deposition you mentioned the idea of inkjet printing
17 under nitrogen using an evaporator.

18 Do you recall that?

19 A No, I think you are mixing things up.

20 So it's true I mentioned inkjet printing
21 under nitrogen, but not under an evaporator. In a
22 glove box. That's a known technique for decades.

23 Q Yeah, I think you said an evaporator
24 connected to glove box?

25 A Yeah, but an inkjet printer is not an

1 evaporator, just to be clear. The inkjet printer is
2 in the glove box.

3 I said Sturm had an evaporator connected
4 to a glove box. I happen to know that. In fact, it
5 was very common practice in the late 1990s, to early
6 2000s. In my own lab I had a similar setup. I mean,
7 we did this all the time.

8 Q Yeah, so you mentioned Sturm.

9 Can you help me out with respect to
10 Sturm's disclosure on that point?

11 MR. GARR: Objection.

12 BY MR. LINDSAY:

13 Q Can you show me what you're -- when you
14 say Sturm discloses inkjet printing under nitrogen?

15 A I never said Sturm discloses inkjet
16 printing under nitrogen.

17 I said that was well-known and it
18 certainly was possible. That's all I said --

19 Q Oh, I see. I misunderstood.

20 A -- in the previous deposition.

21 Q Okay. I misheard you just now.

22 So you are not contending that Sturm
23 discloses inkjet printing under nitrogen?

24 A No, I don't think the word "nitrogen" even
25 appears in Sturm that I could find.

1 Q And it doesn't mention a glove box?

2 A That's true.

3 Q You are not contenting that Kijima
4 discloses inkjet printing under nitrogen, either;
5 right?

6 A No. I don't think so, no.

7 Q And Kijima doesn't disclose the use of the
8 glove box?

9 A That's a good question. I don't know.
10 Let me check.

11 Yeah, that's fair. I did a quick search
12 for "glove" and it doesn't say that.

13 Q So, did you -- what evidence do we have
14 other than your testimony, last time and today, that
15 inkjet printing being done under nitrogen using, as
16 you said, a glove box, was well-known?

17 A Well, just to be clear, there's nothing in
18 the claims that require inkjet printing under
19 nitrogen.

20 So this whole discussion came up with
21 response to a different question. So given that it
22 is a question from counsel and is not a requirement
23 of the ground, there is nothing that requires me to
24 have evidence that shows that.

25 She asked me a question, I gave an answer.

1 I've been working in this field for many decades.

2 Q Right. No, I -- yeah, I have no reason to
3 disbelieve you.

4 But I see in your reply declaration you
5 mention this again. Paragraph 48, you talk about
6 inkjet printing routinely done under nitrogen,
7 including inside a glove box.

8 Do you see that at paragraph 48?

9 A Yes.

10 Q And I don't see any citation, so I'm just
11 trying to -- you know, at the end of the day this is
12 a case about evidence and I just want to understand,
13 so that we don't misstate anything, you don't have
14 any evidence that inkjet printing was done, was
15 known before '389 to be done under nitrogen in any
16 form, let alone inside a glove box.

17 There's no evidence and that's all I'm
18 asking?

19 A I think that's fair. Like even here, I
20 don't cite to a specific -- to a specific piece of
21 literature or patent that says that.

22 But, I mean, this was in response to a
23 question. There's nothing in the ground -- in the
24 claims that require that the printing been done
25 under nitrogen.

1 So, therefore, there's no reason for me to
2 cite to anything that specifically says inkjet is
3 done under nitrogen.

4 This was in response to a question because
5 Mr. Humphrey argued that inkjet would not be
6 suitable for encapsulation layers.

7 In a question I was asked in the previous
8 deposition, I was asked, you couldn't do it --
9 whether you could do it under nitrogen and I said,
10 yes, in fact, we've been doing it this way for a
11 long time.

12 I know Jim Sturm was doing it this way
13 because I actually visited his lab many years ago
14 and saw his printers in glove boxes and mine were in
15 glove boxes at the same time.

16 But again, that's not a requirement of the
17 claim.

18 Q Understood.

19 So, in your reply declaration, it's
20 paragraph 50, you discuss this paper and you
21 describe it as being published by and presented by
22 April 2002?

23 A Correct.

24 Q Okay.

25 And if I understand this correctly, what

1 are you saying is Exhibit No. 2025 is the work that
2 you have described in Exhibit No. 1031.

3 (Exhibit 2025, previously marked, not
4 attached.)

5 BY MR. LINDSAY:

6 Q Is that -- is that what the point is here?

7 A No, no. I mean, that statement is true,
8 but that's not the point here.

9 The point is the following: The -- we had
10 already presented -- so, Mr. Humphrey seems to argue
11 that based on a paper that my students and I
12 published in 2003, he seems to treat that as saying
13 that until 2003 nanoparticles could not be sintered
14 below 200 degrees Celsius.

15 And I said, no, he's misinterpreting. The
16 paper is pointing out -- is not saying at the time
17 of publication, because the publication process
18 takes years.

19 It's when we started the work and, in
20 fact, by 2002 we had already said in public and it
21 had published in the Proceedings of the Materials
22 Research Society that we could achieve nanoparticle
23 sintering of gold below 150 degrees Celsius.

24 So it's just pointing out that he
25 misinterpreted the statement in Exhibit No. 2025 and

1 as evidence in the record for that based on Exhibit
2 No. 1031.

3 Q I see.

4 So, you are not saying that Exhibit
5 No. 2025 is a later version of the same work that
6 was done in -- earlier in Exhibit No. 1031?

7 A No, the relationship between those two, as
8 is pretty common in this field, to present the work
9 at a conference with a small proceeding. And then
10 write-up a more detailed version of the work in a
11 journal paper and that's the relationship between
12 those two.

13 And Exhibit No. 2025 was a journal paper
14 published in the Journal of the Electrochemical
15 Society, but we had previously already presented
16 that work that showed up in the proceedings in 2002
17 and that was Exhibit No. 1031.

18 It's very common in this field to send
19 your students to conferences, have them present and
20 then you do a more complete version or a more
21 detailed version of the paper with lots of figures
22 and lots of detail in -- in a journal.

23 Q Yeah, I understand.

24 So let's take a look at Exhibit No. 1031.
25 I'm going to add that.

1 A Okay.

2 I'm going to -- my Exhibit Share is still
3 not responding. Let me reopen it please. Just give
4 me a --

5 Q Okay. Okay.

6 A I'm back in now. I can look at the
7 exhibits.

8 Q Okay. Okay. So I added Exhibit No. 1031
9 to it.

10 Let me know if you can pull that up okay.

11 A Yes, I have it.

12 Q Okay.

13 So, can you walk me through the dates and
14 the content that you are relying on here for -- for
15 what you said in your paragraph that we were just
16 talking about, paragraph 50.

17 A Sure.

18 So if you look at the dates -- the date
19 given on the first page are the dates of the actual
20 conference.

21 So, this is when we -- the different
22 speakers which in this case was my student, Daniel
23 Wong actually presents the work. So it's between
24 April second and April fourth is when the session
25 runs.

1 If you just give me a second to find the
2 specifics.

3 So in the footnote that I put on page 25
4 of my reply declaration, Exhibit No. 1033, I point
5 out that an archived web capture of the online
6 meeting program explains that the PDF version of the
7 abstracts, specifically that is what Exhibit
8 No. 1031 is, was posted on March sixth, 2002.

9 I should note that, in fact, the reality
10 is it's given to the attendees and it's a public
11 conference. Anyone can attend if they pay the
12 registration fee.

13 It's given to the attendees and when they
14 attend the conference, the first day you get this.
15 But what we're counting on is the fact that the PDF
16 was available online at that time.

17 And the specific paper, I have to find it,
18 please bear with me. So the specific paper that I'm
19 talking about is on -- it's on PDF page nine, which
20 is page 161 of the proceedings. And page 161 of the
21 proceedings is the abstract that we provided that
22 showed up in the proceedings that I just mentioned,
23 so it was available on April sixth and this -- this
24 is called -- the title of the talk was "Inkjet Gold
25 Conductors for Electronics on Plastics." And it was

1 two of my students along with me.

2 And specifically, it points out that we
3 were able to -- that we were able to achieve plastic
4 compatible gold nanoparticle sintering and
5 specifically call out that we were heating to
6 temperatures below 150 degrees Celsius fully
7 compatible conventional plastic substrates.

8 And it's -- specifically the sentence
9 reads, "Low resistance gold conductors can be
10 produced by ink jetting the screening printing gold
11 clusters on arbitrary substrates and heating to
12 temperatures below 150 degrees Celsius fully
13 compatible with conventional plastic substrates."

14 Q Right I see.

15 But this work didn't relate to the barrier
16 layers.

17 This is just referring to conductors?

18 A Yes, this is printing of gold, I agree.
19 This is not -- this work was not for barrier layers,
20 that I agree.

21 Q And are you -- I guess, are you aware of
22 any publication that predates the '389 which
23 discloses inkjet printing at gold barrier layer?

24 A Gold barrier layer. Inkjet printing of
25 gold barrier layer, no, not specifically. That's

1 fair, I don't think I'm aware of that specifically.

2 Q So I also tried to introduce Fujimori, but
3 let me check if it's in there. Maybe not. No, not
4 yet. Okay. I'm going to introduce Exhibit
5 No. 1014, the Fujimori reference.

6 (Exhibit 1014, previously marked, not
7 attached.)

8 THE WITNESS: I still don't see it.

9 MR. LINDSAY: I know. I'm still working
10 on it.

11 Okay. There. You are faster than I am.

12 BY MR. LINDSAY:

13 Q Let me know when -- it should be there
14 now?

15 A Yeah, I'm just opening it up. Okay. I
16 have it.

17 By the way, just because I have a lot of
18 PDFs open, are we done with all the others, can I
19 close those?

20 Q Yes. You might want to leave open the
21 original declaration, I'll just foreshadow here.

22 You can leave open your original
23 declaration. Fujimori, you have now and you are
24 probably okay closing the rest.

25 A Okay. I have few in front much me.

1 Q Okay. Do you recall this reference,
2 Exhibit No. 1014?

3 A Yes, I think so. Yeah, I do.

4 Q Does Fujimori disclose the use of a
5 magnetized mask for depositing encapsulation layers?

6 A I don't believe Fujimori specifically
7 talks about encapsulation.

8 So to that extent there's certainly no
9 explicit disclosure of calling out encapsulation
10 using it. But of course one of skill would know how
11 to use the teachings of Fujimori related to a mask
12 exactly as I point out in this ground.

13 Q Do you recall ever seeing a reference
14 describing a magnetized mask used for depositing
15 encapsulation layers before the date of the '389
16 patent?

17 A I don't recall one way or another.
18 Certainly I didn't cite to it in my declaration.

19 Q Could we, as I promised, look at your
20 original declaration now paragraph maybe 60.

21 A Okay.

22 Q Let me know when you are there.

23 A Okay. I'm there.

24 Q So, again, this is the section that
25 discusses the preamble for element 34; correct?

1 A Yes.

2 Q And the preamble for claim 34 recites the
3 substrate; correct?

4 A Yes.

5 Q And is it fair that you've annotated
6 figure 12 of Kijima, paragraph 61 to show the
7 substrate there in beige?

8 A In beige, you mean as opposed to the pure
9 yellow? Is that what you are using beige to --

10 Q Yeah.

11 So there's the word "substrate" next to it
12 and then an arrow pointing towards --

13 A It's kind of saffron to me, but it's okay,
14 fine, we can call it beige.

15 Q Well, yeah, my wife says I'm colored
16 blind. I don't know. Maybe I am.

17 So it's the structure that's labeled six
18 and it's called -- labeled "Substrate."

19 A Yes.

20 Q Okay.

21 And that's the structure that your relying
22 on for Kijima's disclosure of the substrate recited
23 in the preamble of claim 34; is that -- do I
24 understand that correctly?

25 A With respect to what I point to in the

1 preamble, putting aside whether it's limiting or
2 not, it's true that that's what I point to as the
3 corresponding identification of a substrate in the
4 figure of Kijima.

5 Q Okay.

6 And is it fair to say that Kijima
7 discloses the use of a glass substrate?

8 A Yes, I think in that particular figure on
9 the right side, I think it says -- I'm sorry, I lost
10 the page.

11 Which page were we on?

12 Q Well, now I think page 28 will give you
13 the figure that --

14 A Yeah. Thank you. I found it.

15 So, yeah. So, to continue my previous
16 answer, yes, could you mind -- in this figure, which
17 I've -- which is figure one that I've annotated
18 points to item eight which I identify as a
19 substrate. It calls it specifically a glass
20 substrate.

21 Q Okay. And I apologize, I think we might
22 have to go to Kijima for this.

23 I was going to ask you with respect to the
24 embodiment of figure 12, is it the case that the
25 substrate there is also described by Kijima as being

1 a glass substrate?

2 A I apologize, I'm opening up Kijima.
3 Please bear with me.

4 Q Yeah.

5 And to short-circuit the search there, I
6 direct your attention to -- well, I guess it would
7 be paragraph 97 of Kijima's a very long paragraph
8 that includes the description of the drawings.

9 At the end of that section, which is on
10 the labeled page eight of Kijima, there is a
11 description of referential numerals and codes.

12 Do you see that?

13 A Yes.

14 Q Okay.

15 And is it fair to say that those
16 referential numerals and codes referring to
17 reference numbers used throughout all of the
18 figures?

19 A It seems to be the case, yes, I agree.

20 Q And again, back to my question, it was:
21 Is it your understanding that figure 12 of Kijima at
22 the substrate labeled six would also be a glass
23 substrate. Or at least would be understood by a
24 POSITA to be a glass substrate?

25 A With respect to this disclosure, yes, I

1 agree.

2 Q Okay.

3 MR. LINDSAY: I'll pass the witness.

4 MR. GARR: Can we take a five-minute
5 break?

6 MR. LINDSAY: Sure.

7 MR. GARR: Okay. Thanks.

8 (Brief interruption in proceedings.)

9 MR. GARR: Okay.

10

11 EXAMINATION

12 BY MR. GARR:

13 Q Dr. Subramanian, during the deposition do
14 you recall counsel asking you about whether you were
15 aware of prior art disclosures of multilayer
16 encapsulation and, in particular, encapsulation of
17 more than two layers?

18 A I recall.

19 MR. LINDSAY: Objection.

20 THE WITNESS: Sorry, I recall a series of
21 questions related to that.

22 MR. GARR: And what's the objection?

23 MR. LINDSAY: Form.

24 MR. GARR: Sorry, what's the basis?

25 MR. LINDSAY: It's a form objection.

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1 MR. GARR: Okay.

2 And what was the issue that gave rise to
3 the form objection or what's the basis for it?

4 MR. LINDSAY: It was conflating two
5 different areas of questioning.

6 MR. GARR: I'm not following you.

7 MR. LINDSAY: The objection stands.

8 You can move on.

9 MR. GARR: Okay. I just -- if I can cure
10 the objection, I would like to have the opportunity
11 to do so.

12 BY MR. GARR:

13 Q Dr. Subramanian, do you recall addressing
14 other prior art to the '389 patent in the parallel
15 matter?

16 A Yes.

17 Q And is the Weaver reference, Exhibit
18 No. 1008, one of those references?

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

21 THE WITNESS: Yes.

22 MR. LINDSAY: Objection; this is beyond
23 the scope of cross-examination.

24 BY MR. GARR:

25 Q Does the Weaver reference bear on the

1 question counsel asked you about the existence of
2 prior art multilayer encapsulation of more than two
3 layers?

4 A Yes. As I recall, Weaver is -- so Weaver
5 is prior art and it does have more than two layers
6 in a multilayer encapsulation stack.

7 Q Okay.

8 In particular, what do you mean by more
9 than two layers?

10 A So, it repeats alternating layer stacks
11 many times and it shows that in figures and in the
12 disclosure.

13 Q Do you also recall in a parallel matter
14 offering or citing to admitted prior art in the '389
15 patent?

16 A Yes.

17 Q And that includes the discussion -- is the
18 '389 patent, is that in the Exhibit Share?

19 A I don't think so, but I have a copy of it.

20 Q Okay.

21 Do you recall generally where in the '389
22 patent the -- an admitted prior art discussion
23 appears?

24 A Yes, I believe it's in the background of
25 the invention section which is columns one and two

1 of the '389 patent.

2 Q Okay.

3 And is there any information in that
4 discussion that bears on the question of whether
5 multilayer more than two layers encapsulation was in
6 the prior art.

7 A Yes, if we look at the background of the
8 invention, so it talks about what it calls PML
9 structures which are polymer multilayer structures
10 comprising alternate and repeating layers of an
11 organic in the barrier layer.

12 That's roughly at line -- column one, line
13 20 to 22. And then it goes on to say specifically
14 at column one around line 43, "This entire PML
15 structure may be repeated possibly several times for
16 additional encapsulation of the entire OLED device."

17 In other words, in the background -- in
18 the admitted prior art of the '389 itself it says
19 that multilayer -- more than two layer encapsulation
20 stacks were known.

21 Q Okay.

22 MR. GARR: I cut out there for a second.
23 Was that just me or was that -- did the court
24 reporter get the answer to that?

25 THE COURT REPORTER: It was probably just

1 you.

2 MR. GARR: Okay.

3 THE WITNESS: Your screen froze, but I
4 think everybody else was moving.

5 MR. GARR: Okay. Could I ask you to read
6 the answer to the question?

7 THE COURT REPORTER: I'll do my best.

8 (The record was read as follows:

9 "ANSWER: Yes, if we look at the
10 background of the invention, so it talks
11 about what it calls PML structures which
12 are polymer multilayer structures
13 comprising alternate and repeating layers
14 of an organic in the barrier layer.
15 That's roughly at line -- column one, line
16 20 to 22. And then it goes on to say
17 specifically at column one around line 43,
18 'This entire PML structure may be repeated
19 possibly several times for additional
20 encapsulation of the entire OLED device.'
21 In other words, in the background -- in
22 the admitted prior art of the '389 itself
23 it says that multilayer -- more than two
24 layer encapsulation stacks were known.")

25 MR. GARR: Thank you very much.

1 BY MR. GARR:

2 Q And, Dr. Subramanian, do you recall just
3 before the last break discussing or answering
4 questions about a glass substrate in one of the
5 references?

6 A Yes.

7 Q And what reference was that?

8 A It was Kijima.

9 Q And Kijima is a reference that you have
10 combined with Fujimori in some of the grounds;
11 correct?

12 A That's correct.

13 Q And does the nature of the Kijima
14 substrate being glass bear on the feasibility of
15 that combination of Kijima's teachings in view of
16 these in Fujimori?

17 A No. I mean, Fujimori -- so I use Fujimori
18 to bring in its masking technique. And
19 specifically, its use of magnetic mask.

20 The fact that the glass -- that it's
21 attached to a glass substrate -- held against a
22 glass substrate is not an issue, because even if the
23 glass -- the glass itself is not magnetic, that's
24 true. But in all of the processing that it's done,
25 it's up against a metal plate.

1 So the net result is you still get the
2 attractive force. When you are printing, when you
3 are evaporating, all of those steps the glass is
4 held on a metallic plate, so therefore a magnetic
5 mask would be held against it.

6 So therefore the combination will work
7 whether it's a glass substrate or not.

8 Q Okay.

9 MR. GARR: I have no more questions.

10
11 FURTHER EXAMINATION

12 BY MR. LINDSAY:

13 Q Dr. Subramanian, did you discuss the
14 substance of your testimony with counsel today after
15 my questions earlier?

16 A We had a brief discussion, yes, but not
17 about what my answers would be. But we just talked
18 generally about what the topics would be.

19 Q So you discussed what topics Mr. Garr was
20 going to ask you about today on your redirect
21 testimony?

22 A Briefly, yes.

23 Q In your original declaration, did you cite
24 to Weaver -- to the Weaver reference to support your
25 opinion that you believe that more than two

1 encapsulation layers were known?

2 A Well, just to --

3 MR. GARR: Objection.

4 THE WITNESS: Well, just to be clear, that
5 question is not -- there's no requirement that we
6 have more than two layers to invalidate the claims.

7 So the whole discussion of more than two
8 layers came from a question you asked during the --
9 this deposition.

10 So, therefore, no, I did not cite to it,
11 but I should point out that I specifically did cite
12 to Weaver in the list of materials considered on
13 paragraph eight of Exhibit No. 1004. It's listed on
14 there.

15 MR. LINDSAY: Okay. It's a pretty simple
16 question.

17 BY MR. LINDSAY:

18 Q Did you cite to Weaver in your original
19 declaration in the 1223 IPR to support your opinion
20 on anything, including that more than two
21 encapsulation layers were known prior to the '389?

22 A No, I didn't depend on Weaver for -- in my
23 original declaration for any explicit referencing
24 that I used with respect to any of the grounds that
25 I put forth for this IPR.

1 Q Yes.

2 And so in your reply declaration for 1223
3 -- for the 1223 IPR, you did cite to Weaver again
4 for anything, including for your opinion that more
5 than two encapsulation layers were known.

6 A So, I don't know how to answer that
7 question --

8 MR. GARR: Objection.

9 THE WITNESS: -- because you are asking me
10 for an opinion that I did not offer until you asked
11 me about it in deposition.

12 But if you are asking for opinions that I
13 cited within my declaration, no, I didn't cite to
14 Weaver in Exhibit No. 1033.

15 BY MR. LINDSAY:

16 Q So in neither of your declarations have
17 you, in the 1223 IPR, relied on Weaver to support
18 any of your opinions?

19 A That's fair.

20 Q Earlier you were also asked about certain
21 disclosure in the '389 patent relating to PML
22 layers?

23 A Yes.

24 Q Did you cite to those portions of the '389
25 patent in the 1223 IPR to support any of your

1 opinions?

2 A That's a good question.

3 Yes, for example, at paragraph 26 of my
4 original declaration, Exhibit No. 1004, I explicitly
5 cite to the very same -- very same section that I
6 read in response to a question from counsel.

7 Q And that's in the summary section for the
8 '389 patent; is that correct?

9 A That is right.

10 Q So the '389 patent does not disclose
11 multiple barrier layers -- strike that.

12 The background section of the '389 patent
13 that describes polymer multiple layers is not
14 describing multiple barrier layers that are in
15 contact with each other?

16 A That's absolutely false. At paragraph --
17 at column one, at line -- I guess it's 43 to 45 it
18 specifically says that entire PML structure may be
19 repeated possibly seven times, so it's going layer
20 after layer after layer. That's exactly what it's
21 calling out.

22 Q Yeah, but my question was: So those are
23 repeating layers alternating between an organic and
24 a barrier layer; right?

25 A Yes, I agree.

1 Q Okay.

2 So the question was: The background
3 section of the '389 patent that are you citing to
4 here regarding polymer multiple layers, PMLs, those
5 aren't describing multiple barrier layers that are
6 in contact with each, where you would deposit a
7 barrier layer on top of another barrier layer?

8 A I see. I think I understand.

9 So you are asking me, does it disclose
10 going to inorganic layers on top of each other, no.
11 It says here you are alternating in this -- this
12 disclosure is you have an organic layer and then an
13 inorganic layer in this particular example.

14 So it says the organic layer -- it talks
15 about it at column one, roughly line 33. And then
16 the barrier layer says, "Typically comprises a
17 sputtered metal oxide or dielectric layer." So in
18 these examples it's inorganic and that's at line 37
19 and those are the ones that alternated.

20 Q Okay.

21 MR. LINDSAY: No further questions.

22 THE COURT REPORTER: Mr. Garr, do you need
23 a copy of the transcript?

24 MR. GARR: How about a rough draft, would
25 be good.

1 THE COURT REPORTER: I'm preparing one for
2 you as well, Mr. Lindsay.

3 MR. LINDSAY: What's the turnaround, for
4 the final?

5 THE COURT REPORTER: Two weeks or ten
6 business days.

7 MR. LINDSAY: So the rough, you'll provide
8 by tomorrow. But for the final, could we get it
9 Wednesday, is that possible? We have a filing due
10 Friday and we'll need to get the cites in on time.

11 THE COURT REPORTER: I understand, that
12 would be fine.

13 (Deposition ended at 3:02 p.m.)

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PENALTY OF PERJURY CERTIFICATE

I, VIVEK SUBRAMANIAN, Ph.D., do solemnly declare under penalty of perjury, under the laws of the State of California, that the foregoing is my deposition under oath; that these are the questions asked of me and my answers thereto; that I have read same and have made the necessary corrections, additions, or changes to my answers that I deem necessary.

EXECUTED this ____ day of _____, 2025, at _____, California.

VIVEK SUBRAMANIAN, Ph.D.

JOB NO. 7682399

C E R T I F I C A T E

I, the undersigned, a Certified Shorthand Reporter for the State of California, do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that any witnesses in the foregoing proceedings, prior to testifying, were placed under oath; that a verbatim record of the proceedings was made by me using machine shorthand, which was thereafter transcribed under my direction; further, that the foregoing is an accurate transcription thereof.

I further certify that I am neither financially interested in the action nor a relative or employee of any attorney of any of the parties.

IN WITNESS THEREOF, I have this date subscribed my name this November 5, 2025.



Lynda L. Fenn

CSR No. 12566

1 DAVID A. GARR

2 dgarr@cov.com

3 November 5, 2025

4 RE: Samsung Display Co., LTD. v. Pictiva Displays International
5 10/30/2025, Vivek Subramanian, Ph.D., (#7682399).

6 The above-referenced transcript has been
7 completed by Veritext Legal Solutions and
8 review of the transcript is being handled as follows:

9 ___ Per CA State Code (CCP 2025.520 (a)-(e)) - Contact Veritext
10 to schedule a time to review the original transcript at
11 a Veritext office.

12 _XX_ Per CA State Code (CCP 2025.520 (a)-(e)) - Locked .PDF
13 Transcript - The witness should review the transcript and
14 make any necessary corrections on the errata pages included
15 below, notating the page and line number of the corrections.
16 The witness should then sign and date the errata and penalty
17 of perjury pages and return the completed pages to all
18 appearing counsel within the period of time determined at
19 the deposition or provided by the Code of Civil Procedure.
20 Contact Veritext when the sealed original is required.

21 ___ Waiving the CA Code of Civil Procedure per Stipulation of
22 Counsel - Original transcript to be released for signature
23 as determined at the deposition.

24 ___ Signature Waived - Reading & Signature was waived at the
25 time of the deposition.

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1 ___ Federal R&S Requested (FRCP 30(e)(1)(B)) - Locked .PDF
2 Transcript - The witness should review the transcript and
3 make any necessary corrections on the errata pages included
4 below, notating the page and line number of the corrections.
5 The witness should then sign and date the errata and penalty
6 of perjury pages and return the completed pages to all
7 appearing counsel within the period of time determined at
8 the deposition or provided by the Federal Rules.
9 ___ Federal R&S Not Requested - Reading & Signature was not
10 requested before the completion of the deposition.