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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

PICTIVA DISPLAYS, INTERNATIONAL) CAUSE NO. 2:23-CV-495-JRG
LTD., et al., ()
Plaintiffs, ()
vs. ()
SAMSUNG ELECTRONICS CO., LTD., ()
et al., () MARSHALL, TEXAS
Defendants. () OCTOBER 28, 2025
8:15 A.M.

VOLUME 2

TRIAL ON THE MERITS

BEFORE THE HONORABLE RODNEY GILSTRAP
UNITED STATES CHIEF DISTRICT JUDGE
and a jury

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8:30 A.M.

VOLUME 4

TRIAL ON THE MERITS
BEFORE THE HONORABLE RODNEY GILSTRAP
UNITED STATES CHIEF DISTRICT JUDGE
and a jury

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1 THE COURT: All right. Based on counsel's request
08:31 2 and to protect confidential information, I'll order all
3 persons present who are not subject to the protective order in
4 this case please vacate the courtroom and remain outside until
5 it's reopened and unsealed.

6 And, Ms. Carson, I'll trust you to let me know when
7 you've covered anything confidential so we can unseal the
8 courtroom.

9 (Courtroom sealed.)

10 THE COURT: All right. You may continue.

11 Q. (BY MS. CARSON) Do the confidential materials that
12 document that Samsung produced show the layers in the OLEDs in
13 the accused devices?

08:32 14 A. Yes, ma'am. This is Exhibit JX 6. Again, it's a
15 document that shows the details of the [REDACTED] material set and,
16 as you can see, there's -- the table shows stacks of layers.
17 Those comprise organic materials.

18 Q. Okay. And this is a close-up of those tables?

19 A. That's correct, yes.

20 Q. Okay. Could you point out where those layers are?

21 A. Yes. So the layers would correspond to where I'm
22 pointing now. So these would be -- correspond to an organic
08:32 23 layer sequence. And in this document over here, the organic
24 layer sequence would be the region that I'm pointing to now.

25 Q. Thank you. Did Samsung's engineers confirm that the

1 OLEDs in the accused devices comprise an organic layer
2 sequence?

08:33

3 A. Yes. Ms. Seo, in her testimony, she stated there are
4 multiple layers of -- when she was asked are there multiple
5 layers of organic materials between the cathode and anode of
6 an OLEDs, and she stated, "Correct."

7 Q. And is that true for all of the materials that you
8 analyzed?

9 A. Yes, ma'am. Shown here, all the material sets that I
10 described earlier, and the yellow bracket or orange bracket
11 highlights the organic layer sequence in each of those
12 material sets.

13 Q. All right. Moving on to the next part, it's a radiation
14 exit area. Could you explain what that means for us?

08:34

15 A. Yes, ma'am. So in the context of an OLED, we're going to
16 talk a lot about it today, but radiation is simply light. So
17 light is a form of electromagnetic radiation. So radiation
18 exit area just means the region where light exits the device.

19 And I've shown that schematically on this diagram. The
20 arrows represent the red, green, and blue light in an organic
21 light-emitting diode structure, and the arrows represent the
22 exit from the device [REDACTED].

08:34

23 Q. And in the accused products, where does the light exit
24 the device?

25 A. [REDACTED] [REDACTED]

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Q. And the [REDACTED] is one of the electrodes?

A. That's correct.

Q. Okay. Was that confirmed by Samsung's engineers?

A. Yes, ma'am. Mr. Jo in his testimony, when he was asked where does the light exit the OLED display panel, he confirmed [REDACTED].

Q. Is there a special name for structures where [REDACTED] [REDACTED]?

A. Yes, ma'am. Those are called [REDACTED]

[REDACTED].

Q. And are all of the accused products [REDACTED]

A. Yes, ma'am, they are all [REDACTED].

Q. The last part of the claim talks about an encapsulation. Did the Court construe that term?

A. Yes. And I'll read the Court's construction. It is "a material for surrounding or sealing something else."

Q. Does the patent show an example of an encapsulation?

A. Yes, ma'am. This is Exhibit JX 5, which is the patent figure 19 in the patent, and it shows what I've bracketed here an encapsulation layer sequence. It's [REDACTED] of materials that are shown as an example encapsulation.

Q. Do the OLEDs in Samsung's products include an encapsulation?

1 A. Yes, ma'am, they do. And this is a document taken from
2 Samsung's confidential documents, and it describes that for
3 rigid OLED structures, glass is used as the encapsulation, and
4 that for flexible structures another material called thin film
5 encapsulation is used.

6 Q. And this is JX 20?

7 A. That's correct, JX 20.

08:36 8 Q. Is it important for OLEDs to include encapsulation?

9 A. Yes. The reason that OLEDs need to be encapsulated is
10 that the moisture and oxygen in the air is poisonous to OLED.
11 It causes it to degrade very rapidly. And so the
12 encapsulation protects the OLED from the environment and
13 stabilizes it.

14 Q. Did you confirm the encapsulation of the OLEDs in JX 21
15 as well?

08:36 16 A. Yes. This is another document from Samsung's
17 confidential materials, and it shows two different structures.
18 In the lower left, you can see it says rigid cell seal.
19 That's encapsulation glass. And for another type of
20 encapsulation on the right, it's for the flexible materials,
21 and that's called thin film encapsulation.

22 Q. And what are you showing here from JX 21?

08:37 23 A. This also gives a more detail about the -- this thin film
24 encapsulation structure. It describes it as being [REDACTED]
25 [REDACTED]. So those are [REDACTED]. [REDACTED]

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Q. All right. And if we zoom in on that diagram that was above that, can you point out the individual OLEDs in this design document and how they're encapsulated?

A. Yes. I'm trying my best here to circle. So those are the OLEDs in this diagram, and you can see the red, the green, and the blue to represent the red, green, blue OLED pixel structures.

Q. And so each of those OLEDs has an encapsulation?

A. Yes. You can see right above it, it's says TFE. And that corresponds to this -- this orange layer that I've highlighted.

Q. Thank you.

Do the material set documents also show that each OLED is encapsulated with that TFE structure?

A. Yes, ma'am. As you can see at the top of the material set, there's a region that I've highlighted in yellow at the top that's the encapsulation layer.

Q. Does Samsung dispute this limitation?

A. They do.

Q. And what is their argument?

A. Their argument is, is that the encapsulation is applied to the entire display and not to the individual pixel elements.

1 Q. Is Samsung correct?

2 A. No, they're not.

3 Q. Why not?

4 A. Because as we just saw in the previous diagram, each OLED
5 pixel is encapsulated.

08:39 6 Q. What do Samsung's engineers have to say about this issue?

7 A. They agree with what I just stated, and that is Mr. Jo's
8 testimony when he was asked, are you aware of any OLED that
9 has no encapsulation, and he said no.

10 Q. So what did you conclude for this element?

11 A. I concluded that it's met in the accused products, and so
12 I checked it off.

13 THE COURT: Ms. Carson, could you slow down a little
14 bit, please?

15 MS. CARSON: Sure, Your Honor.

16 THE COURT: Thank you.

08:39 17 Q. (BY MS. CARSON) What's the next element you looked at?

18 A. That would be the element labeled 1c, and that is,
19 "Wherein the organic layer sequence and the encapsulation are
20 disposed on a carrier."

21 Q. What is a carrier?

22 A. The carrier is the material that supports the OLED
23 structure. Previously, we referred to it as the substrate.
24 So the substrate and the carrier are the same thing.

08:40 25 Q. Do the accused products include a carrier?

1 A. Yes. Again, we're looking at Exhibit JX 20. It's a
2 document from Samsung's confidential materials, and it
3 describes the use of glass substrates for the rigid OLED
4 structures, and then it describes a material called flexible
5 poly-image substrate instead of glass for the flexible OLED
6 structures.

7 Q. And is that carrier or substrate also shown in JX 21?

08:40 8 A. Yes. Here I've highlighted at the bottom left for the
9 rigid structures, the substrate is labeled glass. And for the
10 flexible type structures, the substrate is labeled PI and that
11 stands for polyimide. That's a type of plastic.

12 Q. What did Samsung's engineers have to say about this
13 element?

08:41 14 A. They confirmed that Samsung's flexible OLEDs will have
15 flexible substrates. Mr. Park said, "Correct."

16 Q. Does Samsung dispute this element?

17 A. They do, but only for the flexible OLED structures.

18 Q. And what is -- on what grounds?

19 A. They argue that a plastic material or flexible polyimide
20 cannot be used as a substrate.

21 Q. Is Samsung correct?

22 A. No, they're not.

23 Q. And why not?

24 A. Well, the reason is, is that the plastic material is
08:42 25 clearly described in the patent and --

1 Q. Could you show that?

2 A. Yes. So this is from the patent. It's -- I'm not sure
3 exactly what page. It's on column 60 to column 61, line 61
4 through -- sorry. Column 60, line 61, through column 61, line
5 3, and it states, the first carrier is embodied as a
08:42 6 transparent plastic film or as a glass substrate.

7 Q. And what is polyimide?

8 A. Polyimide is a plastic transparent material.

9 Q. What did you conclude for this element?

10 A. I concluded that it's met in the accused products, and so
11 I checked it off.

12 Q. What element are we going to look at next?

13 A. That's the element labeled 1d, and I'll read it slowly
14 because it's complicated. It states, "Wherein the organic
08:42 15 layer sequence comprises at least one radiation-emitting
16 region configured to generate electromagnetic radiation in a
17 spectral range from infrared radiation to UV radiation during
18 operation."

19 Q. Do the patents provide or does the patent provide an
20 example of a radiation-emitting region?

21 A. Yes, ma'am. We saw this earlier. Figure 3, and here
22 I've highlighted examples that are provided by the patent of a
08:43 23 red emission layer, a green emission layer, or a blue emission
24 layer.

25 Q. And do the accused products have radiation-emitting

1 regions?

2 A. Yes, they do. This is a [REDACTED] material set diagram, and in
3 it I've highlighted in the black boxes what would be
4 considered to be the radiation-emitting regions for the green
5 OLED structured, the red OLED structure, and the blue OLED
08:43 6 structure that are used in the devices based on [REDACTED].

7 Q. Did the Court construe a portion of this element?

8 A. Yes, ma'am, they did, and so I'll read their
9 construction. It reads, "The organic layer sequence comprises
10 at least one radiation-emitting region configured to generate
11 electromagnetic radiation with one or more wavelengths in a
08:44 12 spectral range anywhere between the lowest frequency of the UV
13 region [sic] and the highest frequency of the IR region."

14 Q. All right. And can you explain for us what the spectral
15 range from infrared to UV is?

16 A. Yes. So it's not -- it's not a hard concept. So light
17 is electromagnetic radiation, and it travels in waves. And
18 the waves have a wavelength, and the wavelength is listed on
08:44 19 this chart in nanometers. 400 nanometers is the wavelength of
20 light that corresponds to blue violet light. That's the top
21 of the UV. And then visible light extends to the red, and
22 that's a 700-nanometer wavelength. It's longer than the short
23 wavelength of blue. And the visible region is anywhere
24 between the blue at 400 and the red at 700 nanometers. So
25 that's what we define as the visible light spectrum.

08:45 1 THE COURT: Ms. Carson, let me interrupt. Are we
2 still needing to keep the courtroom sealed?

3 MS. CARSON: Yes. We're going right back to the
4 confidential documents.

5 THE COURT: All right. Keep me posted. Thank you.

6 MS. CARSON: Will do. Thank you, Your Honor.

7 Q. (BY MS. CARSON) So what type of electromagnetic
8 radiation falls between UV and infrared?

9 A. That would be visible light corresponding to blue, green,
10 or red light.

11 Q. And what range of wavelengths are emitted by the
12 radiation-emitting regions in the accused products?

08:45 13 A. As demonstrated previously by the red, green, and blue
14 boxes in the screen, the radiation-emitting regions emit red,
15 green, or blue light corresponding to visible light.

16 Q. And so are all of those within the range between UV and
17 infrared?

18 A. That's correct.

19 Q. And do all of the accused products have
20 radiation-emitting regions that correspond to red, green, and
21 blue?

22 A. Yes, they do.

08:46 23 Q. What did you conclude for this element?

24 A. I concluded that that claim element is met, and so I
25 checked it off.

1 Q. What element did you analyze next?

2 A. The next element, and it reads, "Wherein the organic
3 layer sequence comprises an electron transport layer that is
4 N-doped."

5 [REDACTED]

6 [REDACTED]

08:46

7 [REDACTED]

8 [REDACTED]

9 [REDACTED]

10 [REDACTED]

11 [REDACTED]

12 [REDACTED]

13 [REDACTED]

08:47

14 [REDACTED]

15 [REDACTED]

16 [REDACTED]

17 [REDACTED]

18 [REDACTED]

19 [REDACTED]

08:47

20 [REDACTED]

21 [REDACTED]

22 Q. This claim element uses that term N-doped. It says the
23 electron transport layer is N-doped. Can you remind us of
24 what that is?

25 A. So N-doping means adding a material to some other

1 material to increase the concentration or number of electrons
2 in the material.

08:48

3 [REDACTED]
4 [REDACTED]
5 [REDACTED]
6 [REDACTED]
7 [REDACTED]

8 A. No, Ms. Carson. It depends on the material that it's
9 added to.

10 Q. And why does that matter?

11 A. It depends specifically on the interaction between the
12 two materials, and we'll learn more about that as we go along.

08:48

13 [REDACTED]
14 [REDACTED]
15 [REDACTED]

16 Q. And how did you figure that out?

17 A. By using an experimental testing method that's called
18 ToF-SIMS, time-of-flight mass spectrometry, and that method is
19 a method where a thin film is bombarded by energetic
20 particles, and the materials in the film are expelled into the
21 vapor phase and then can be analyzed for exact mass. From the
22 exact mass of the molecules, we can determine their structures
23 and identity.

08:49

24 Q. Okay. And, Professor Schanze, if you could just slow
25 down --

1 A. Okay.

2 Q. -- just a little bit.

3 A. Okay.

4 THE COURT: And if you'd do the same.

5 MS. CARSON: I'll try to set the pace. Thank you,
6 Your Honor.

7 THE COURT: Let's continue.

08:49 8 Q. (BY MS. CARSON) So this testing that you're discussing,
9 you performed this testing on accused products?

10 A. I performed the testing in collaboration with a testing
11 lab called Nova Tech.

12 Q. Okay. And you actually tested the accused products,
13 though.

14 A. Yes.

15 Q. And did you supervise and set up the testing with Nova
16 Tech?

08:50 17 A. That's correct. I -- we met multiple times during the
18 design phase of the experiments and during the time that they
19 were done and then also in the analysis. And I had access to
20 all the analyzed -- all the data and analyzed it myself.

21 Q. And so what were the results of your testing?

22 [REDACTED]
23 [REDACTED]
24 [REDACTED]
25 [REDACTED]

08:50

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[REDACTED]

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[REDACTED]

08:51

10

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

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[REDACTED]

13

[REDACTED]

14

Q. Okay.

15

MS. CARSON: And, Your Honor, since it's a little small, would it be okay if he stood up to show it to the jury?

17

THE COURT: I really think the jury can see it. If they can't, I'll let him stand up.

08:51

19

Q. (BY MS. CARSON) Okay. Thank you, Professor Schanze.

20

THE COURT: Let's move on.

21

[REDACTED]

[REDACTED]

[REDACTED]

22

[REDACTED]

23

A. Yes, they do, Ms. Carson.

24

MS. CARSON: Could you advance the slide? My clicker's --

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08:52 1 [REDACTED]
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4 [REDACTED]
5 [REDACTED]
6 [REDACTED]
7 [REDACTED]
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08:52 10 [REDACTED]
11 [REDACTED]
12 [REDACTED]
13 [REDACTED]
14 [REDACTED]
15 [REDACTED]
16 Q. Has Samsung published any research papers on this issue?
17 A. Yes, they have.
08:53 18 Q. And is this a paper that they published?
19 A. That's correct. This is a paper that was published in
20 the journal called [REDACTED].
21 Q. And what is [REDACTED]?
22 A. So in the technical world, scientists publish articles in
23 what are called technical journals, and the articles that are
24 published are subjected to what's called peer review, which
08:53 25 means other experts in the field review those papers to

1 confirm their validity and accuracy before they get published.

2 Q. Who is [REDACTED]?

3 A. [REDACTED] is the lead author on this, [REDACTED], I believe,
4 and he's a researcher at Samsung Display Company.

5 Q. And other than [REDACTED] being an author, does Samsung
6 have any other connections to this paper?

7 A. Yes. The paper has an acknowledgements section that I've
8 highlighted at the lower right. That indicates that Samsung
9 provided financial support for the research.

10 Q. What compounds were studied in this [REDACTED] paper?

11 A. [REDACTED] [REDACTED]
12 [REDACTED]
13 [REDACTED]
14 [REDACTED]
15 [REDACTED] [REDACTED]
16 [REDACTED]
17 [REDACTED] [REDACTED]
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[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Q. So what was your conclusion regarding this element?

A. I concluded that it's met in the accused products, and so I checked it off.

Q. Let's move on to the next one. What's the next element you analyzed?

A. The next element is, "Wherein the organic layer sequence comprises an emission layer comprising an iridium-containing compound."

Q. What types of materials are used in the emission layer in Samsung's products?

A. This is an example of a document taken from I believe a Samsung website. It shows structures or what they refer to as common molecular doping structures. I've highlighted that region at the bottom.

Q. And are there different kinds of emission layers?

A. Well, this is showing the emission dopants, that is the phosphorus, and you can see the one at the left is colored blue. It contains an iridium atom that's the symbol Ir. The one in the middle is colored green. That's labeled with an Ir

1 meaning it's an iridium compound, and the structure at the
2 right is in red. That's also an iridium compound.

3 I understand that these are blue, green, and red emitting
4 iridium containing iridium phosphorus.

08:57

5 [REDACTED]
6 [REDACTED]
7 [REDACTED]
8 [REDACTED]
9 [REDACTED]
10 [REDACTED]
11 [REDACTED]

08:58

12 [REDACTED]
13 [REDACTED]
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15 [REDACTED]
16 [REDACTED]

08:58

17 [REDACTED]
18 [REDACTED]

19 Q. And so this is an actual report of the ToF-SIMS testing
20 that you did?

21 A. That's correct.

22 [REDACTED]
23 [REDACTED]
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25 [REDACTED]

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14 [REDACTED]
15 [REDACTED]
16 [REDACTED]
17 Q. Did you test all the material set using this methodology?
18 A. Yes, ma'am. This table shows the results of that. [REDACTED]
19 [REDACTED]
20 [REDACTED]
21 [REDACTED]
22 [REDACTED]
23 [REDACTED]
24 [REDACTED]
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09:00

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Q. What did you conclude for element 1f?

6

A. I concluded that it's met, and that all of the elements in claim 1 are met.

8

Q. All right. What element did you look at next?

9

A. The last element is, "wherein the electron transport layer comprises 8-Hydroxyquinolato-lithium."

09:01

10

Q. Okay. And what is that?

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A. We've seen that before, Ms. Carson. That's the substance that we've referred to as Liq.

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Q. Okay. And how do we know that?

15

A. Because of the complexity of names of chemicals, we often use abbreviations or acronyms to describe them. This is a website for the chemical supplier Ossila. They supply

16

17

chemicals to the OLED industry, and we can see down at the bottom the table shows synonyms for

09:01

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19

8-hydroxyquintolato-lithium include Liq.

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[REDACTED]

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[REDACTED]

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[REDACTED]

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[REDACTED]

Q. And so what was your conclusion for claim 2?

A. So I concluded that claim 2 is met, and therefore it's infringed.

MS. CARSON: Your Honor, I think we can unseal the courtroom for a bit now.

THE COURT: All right. Based on that representation, I'll order the courtroom reopened and unsealed. I'll direct the Court Security Officer to invite the public to return.

(Courtroom unsealed.)

09:03

THE COURT: All right. The courtroom is reopened. Please continue.

Q. (BY MS. CARSON) What issue did you analyze next, Professor Schanze?

A. I analyzed the technical benefits that Samsung gains by infringement of the '425 Patent.

09:03

Q. And how did you go about quantifying the technical benefits of the asserted claim?

A. I looked to the non-infringing alternatives that were suggested by Samsung.

Q. What non-infringing alternative did Samsung identify for claim 2 of the '425 Patent?

A. [REDACTED]

1 gamut, and they describe an 18 percent increase in the color
2 gamut. That's basically the range or depth of colors that can
3 be produced by the display; so an 18 percent improvement in
4 gamut compared to WOLED technology.

5 Q. And that's what makes those very vibrant colors on a TV?

6 A. That's correct.

7 Q. And this is PX 14?

11:01 8 A. Yes, ma'am.

9 Q. Did you see data confirming this difference in
10 performance between the QD-OLED televisions and Samsung's
11 competitors who use WOLED?

12 A. Yes. This is a document that -- confidential document
13 that was produced by Samsung that shows the results of some
11:01 14 internal technical testing that was done that compared WOLED
15 technology to QD-OLED technology using that gamut measure that
16 I mentioned, and they reported a 15.5 percent decrease in
17 color gamut if WOLED was adopted rather than QD-OLED.

18 Q. So what was your conclusion regarding the benefit that
19 Samsung derives from using this patent?

20 A. They would suffer a 15.5 percent decrease in color gamut
11:01 21 if they used the non-infringing alternative that was
22 recommended.

23 Q. Thank you.

24 MS. CARSON: I pass the witness.

25 THE COURT: All right. Cross examination by the

1 Defendants.

2 MR. PAK: Thank you, Your Honor.

3 May I hand up the cross binders?

4 THE COURT: You may distribute binders.

5 MR. PAK: Thank you.

11:03 6 THE COURT: Do I have a set of these binders? I'm
7 not feeling slighted, but everybody else got a full box.

8 MR. PAK: Your Honor, I know you don't like to see a
9 lot of boxes and paper, so...

10 THE COURT: As long as I have what I need.

11 All right. Let's proceed with cross examination,
12 Mr. Pak.

13 MR. PAK: Thank you, Your Honor.

14 CROSS EXAMINATION

15 BY MR. PAK:

16 Q. Good morning, Dr. Schanze.

17 A. Good morning, Mr. Pak.

18 Q. It's good to see you.

11:03 19 A. Nice to see you again.

20 Q. It's good to see you again from my deposition of you.

21 Dr. Schanze, I thought it would be helpful to actually
22 cover some background technology before we dive into some of
23 the questions that I have for you on your examination.

24 MR. PAK: But if we could turn to PDX 4 PD 4.56,
25 this is in the slide deck. Yes. Thank you.

11:04 1 Q. (BY MR. PAK) I believe you showed the jury this picture
2 with all the different colors that the human eye can see. Is
3 that correct?

4 A. Yes, sir. I did show this picture of the rainbow, yes,
5 sir.

6 Q. And so it could be a large number of visible colors that
7 we see from this rainbow spectrum that we see on 4.56. Is
8 that correct?

9 A. Yes, sir.

10 Q. And there are different types of OLED technologies
11:04 11 available to generate the entire pattern or spectrum of
12 visible colors. Is that correct?

13 A. I agree with that.

14 Q. So, for example, if we look at PD 4.6, do you recall
15 talking to us about the Samsung way of generating all the
16 visible colors?

17 A. I talked about red and green and blue OLED structures,
18 yes.

11:05 19 Q. Yes. So just to explain to the jury, the red, green, and
20 blue are these distinct color pixels, or sometimes called
21 subpixels in the OLED technology from Samsung?

22 A. I referred to them as pixels.

23 Q. Okay. So why is it that you have a red, a green, and a
24 blue pixel in the Samsung OLED side by side?

11:05 25 A. This document is from Samsung.

1 Q. Right. And I'm asking you as a technology matter, why
2 would Samsung put red, green, and blue pixels next to each
3 other in the organic layer?

4 A. To me this is a cartoon representing a structure.

5 Q. Okay. But isn't it true, sir, that all of the visible
6 colors that you saw in the rainbow spectrum could be generated
11:06 7 by a combination of these three red, green, and blue primary
8 colors?

9 A. I don't completely agree with that.

10 Q. Well, for example, could you generate --

11 MR. PAK: If you go back to PD 56.

12 Q. (BY MR. PAK) If I just pick one of these colors, let's
13 say a cyan color here, is it possible to generate that cyan
11:06 14 color by using the right mixture of intensity for red, green,
15 and blue?

16 A. I think the jury might benefit by knowing what you mean
17 by cyan color. I would as well.

18 Q. Okay. Sure. So you see near 500, that -- so if I pick
19 one of those -- I will call it cyan. If I pick one of those
20 colors in that red dot, could I generate that by combining
11:07 21 red, green, and blue in different intensity values?

22 A. In some cases I would agree with that.

23 Q. Well, you looked at the Samsung technology. Correct?

24 A. Yes.

25 Q. In the Samsung, what they call RGB active matrix OLED,

1 could you generate one of these cyan colors by varying the
2 intensity of red, green, and blue pixels that are side by
3 side?

11:07 4 A. I'm not sure I can agree with that.

5 Q. Okay. So you know that the human eye can see all of
6 these different color patterns, but it's possible to generate
7 any color in the visible spectrum by combining red, green, and
8 blue colors. You agree with that. Correct?

9 A. I don't completely agree with that. It depends on what
10 wavelengths and color purity the red the green and the blue
11 consist of.

11:08 12 Q. So sitting here today, if you look at PD 4.56 again, you
13 can't tell us why Samsung has red, green, and blue--this is PD
14 4.6--why Samsung chose to put red, green, and blue pixels side
15 by side in the same layer? Do you know why that's happening?

16 A. I can't say that I can answer your question.

17 Q. Okay. That's not something you looked into.

18 A. No. That's correct.

11:08 19 Q. But you are aware, as you mentioned, that LG and other
20 companies could generate colors differently for their OLED
21 technologies. Correct?

22 A. Yes, they -- as I understand, WOLED technology is
23 distinct.

24 Q. What does WOLED stand for?

25 A. WOLED, the W stands for white OLED, so it's a white

1 source.

11:09 2 Q. So in LG's OLED technology, all the pixels are generating
3 white color. Is that correct?

4 A. That's my understanding, yes.

5 Q. And then you use filters on top of them such as red,
6 green, and blue. Is that correct?

7 A. That's correct.

8 Q. Okay. And that's different than the Samsung RGB active
9 matrix technology that you see here where each pixel generates
10 a distinct color such as red, green, and blue. Fair?

11 A. Yes, that's fair.

11:09 12 Q. Okay. So just because somebody has an OLED technology
13 that can generate visible colors does not mean that the
14 underlying technology for OLED is the same. You would agree?

15 A. Yes, I'd agree.

16 Q. And you understand that LG took a license to the 1400
17 OSRAM patents that were purchased by the Plaintiffs in this
18 case. Correct?

19 A. That's what I heard in testimony yesterday.

20 Q. Thank you.

11:10 21 Now, I want to turn to another demonstrative from your
22 presentation. That's PD 4.60. Do you recall showing us this
23 document from Samsung?

24 A. Yes, I do, sir.

25 Q. And if I look in the middle there's a purple layer called

1 the emission material layer, or EML. Do you see that?

2 A. Yes, I do, Mr. Pak.

11:10

3 [REDACTED]

4 [REDACTED]

5 [REDACTED]

6 [REDACTED]

7 Q. Right.

8 MR. PAK: But if you zoom back out, Mr. Krueger.

9 Q. (BY MR. PAK) You see in the document here you have a
10 hole that is being transported through the [REDACTED]

11:11

11 [REDACTED] and then it makes it into the purple region called the
12 emission material layer? Do you see that?

13 A. I see the hole that you've circled, yes, sir.

14 Q. What is a hole?

15 A. A hole is a -- if we can call them molecules, it's a
16 molecule that has released an electron, it doesn't have an
17 electron so it becomes positively charged, and holes are
18 carriers like electrons that can move.

11:11

19 Q. Can you generate light in a device like this just with
20 holes and not electrons?

21 A. Not in most cases, no.

22 Q. Okay. Then you have electrons that are traveling into
23 the same [REDACTED] from the opposite direction.

24 Do you see that?

25 A. Yes, sir.

11:12 1 Q. And do you see that the two things, the hole and the
2 electron, come together in the [REDACTED]? Do
3 you see that?

4 A. I see that's what's shown conceptually, yes.

5 Q. And that's sometimes called combination or recombination
6 of electrons and holes. You know that?

7 A. Yes, sir.

8 Q. And that's the mechanism that you need--holes and
9 electrons coming together in the [REDACTED] to
10 create the energy for the generation of light. You would
11 agree?

11:12 12 A. As you stated it, yes.

13 Q. And [REDACTED] is also the layer that
14 contains the -- what's called the emitter dopant or the dopant
15 that produces a particular color. You would agree?

16 A. I don't agree with that completely.

17 Q. You showed us, for example, the red dopant. Correct?

18 A. I showed the profile of the red dopant, yes.

11:13 19 Q. And it's the red dopant that would then be activated or
20 energized by the combination of an electron and a hole in
21 order to produce the red color. You would agree with that?

22 A. Yes.

23 Q. Okay. So now do you see something called HOMO here and
24 LUMO, L-U-M-O?

25 A. I see you've circled them, yes, sir.

1 Q. You are very familiar with these terms. Correct?

2 A. Yes, sir. They are common terms in material science and
3 chemistry.

11:13 4 Q. Can you explain to the jury what L-U-M-O stands for?

5 A. L-U-M-O stands for lowest unoccupied molecular orbital,
6 so it's the lowest vacant level, meaning level that electrons
7 can be put into in a material.

8 Q. So I think we all learned this back in high school where
11:14 9 we have nucleus and then we have electrons that orbit around a
10 nucleus. Is that correct?

11 A. That's correct, yes.

12 Q. So you could have one nucleus and maybe three electrons
13 that would be orbiting? Would that be one example?

14 A. I suppose, yes.

15 Q. And so the H-O-M-O for that particular atom would be the
16 electron that is in the highest orbit, or in terms of the
11:14 17 energy level at the highest -- actually in a -- these values
18 are negative values. Correct? That's what makes it
19 confusing.

20 A. Yes, sir. That's what makes it confusing, yes.

21 Q. So let's see if we can help the jury understand this. So
22 let's say the top of the ceiling is 0. Are you with me?

23 A. Yes, I am.

24 Q. So then I could use a negative scale to determine how
25 below something is compared to the 0 value for the ceiling.

1 Is that one way to think about this?

11:15 2 A. Yes. So if the ceiling is 0, my head could be minus 6
3 relative to it because I'm six feet below the ceiling.

4 Q. Right. And if we are able to take a look at the
5 beautiful seal for the court, that could be a negative 3?

6 A. That's right, because it's closer to the ceiling.

7 Q. So although the absolute value 3 and 6, for your head
8 that would be 6 and 3 for the seal, 6 is greater than 3, but
11:15 9 on a negative scale like the one we're talking about, you
10 would call negative 3 to be higher than negative 6. Is that
11 correct?

12 A. That's correct. It's a higher energy for the electrons
13 because the further up the electrons are the higher the energy
14 they are.

15 Q. So, for example, if we wanted to figure out whether an
16 apple that was sitting on top of a ledge at the height of the
17 seal, a negative 3, would follow gravity and fall down to the
11:16 18 level next to your head, we would want to see a value negative
19 3, or some other value that is higher than negative 6.
20 Correct?

21 A. That's correct. It would be numerically
22 greater--correct, yes--for the electron to fall down into it.

23 Q. So when we talk about HOMO and LUMO, we're talking about
24 negative scale values where a value such as negative 1 is
11:16 25 higher in terms of the energy level than negative 5. Is that

1 fair?

2 A. That's correct, yes, sir.

3 Q. And that's how you typically think about this as a
4 chemist. Is that correct?

5 A. Material scientists mostly or physicists use those terms.
6 Chemists use another whole different terminology.

7 Q. You know that in the asserted patents there's
8 descriptions of HOMO and LUMO values for some of the
9 compounds?

10 A. Yes, sir, I do.

11:17 11 Q. Now, we talked about HOMO, which is the furtherest or the
12 highest electron that's in an atom. Can you describe for us
13 what is a LUMO in that context?

14 A. So in your context we have -- the electrons have orbits
15 and the highest orbit would be the one that's filled. It has
16 an electron in it, but there is still more orbits out there
17 but they're empty. But if we could put an electron into one
11:17 18 of those orbits, the lowest energy of that next orbit is
19 called the LUMO.

20 Q. So LUMO is the available orbit where an atom could accept
21 an electron from another atom, but it has the lowest energy
22 level. Is that correct?

23 A. I think you've stated it correctly, yes, Mr. Pak.

24 Q. Thank you.

25 So when we think about some of the interactions that you

11:18

1 described, such as N-doping or coordinate bonds, one of the
2 things you could look at are HOMO and LUMO values of two
3 molecules or two atoms in the context of seeing whether an
4 electron is being donated from one source to another
5 destination. Fair?

6 A. That's fair, yes.

7 Q. Okay. All right. We'll come back to that, but I want to
8 make sure that we have the terminology correct.

9 MR. PAK: I want to go to PD 4.21.

11:18

10 Q. (BY MR. PAK) You showed us this from your presentation.
11 You said this is an OLED structure that you found in the
12 Samsung accused devices. Is that correct?

13 A. Yes, sir.

14 Q. And so just to orient us, you have the emitting region
15 that's red, green, and blue. Do you see that?

16 A. Yes, sir.

17 Q. And are the emitters here, are those the color dopants
18 that we talked about?

19 A. Yes, sir. They correspond to the dopants that are
20 responsible for the light emission.

11:19

21 Q. Okay. So for the red pixel in Samsung's devices, you
22 would have a red emitter or red color dopant. Is that
23 correct?

24 A. Yes. [REDACTED]

25 Q. And you would have a different type of compound in the

1 green pixel that would be the green emitter for generating
2 green light. Is that correct?

3 A. That's correct.

4 Q. And the same would be true for the blue emitter as well.
5 Correct?

6 A. That's correct.

11:19 7 Q. Okay. And then you also talked to us about the fact that
8 in Samsung's devices these are [REDACTED]. Do you
9 recall that testimony?

10 A. Yes, I do.

11 Q. So let's see what's meant by that.

12 So you have the light being generated -- I'll use the red
13 example. The red light is being generated by this pixel in
14 the emitting region. Are you with me?

15 A. Yes, I think so.

16 Q. And I believe you said this is a [REDACTED]

11:20 17 [REDACTED]
18 [REDACTED]. Is that right?

19 A. I agree with that partially; not completely.

20 Q. Let's see if we can get to agreement on this.

21 So is the [REDACTED] layer meant to be transparent?

22 A. Yes, sir, it is.

23 Q. And is the [REDACTED] layer also transparent?

24 A. To visible light, yes.

25 Q. And the cathode, is that transparent to the visible

1 light?

11:21 2 A. It's partially -- mostly transparent not completely.

3 Q. So each of these [REDACTED] would be transparent enough
4 so that the red light that's generated by the red pixel would
5 [REDACTED] so that the
6 user can see the red pixel light. Correct?

11:21 7 A. I agree, not completely, because [REDACTED]

8 [REDACTED].

9 Q. We'll get to that. I'm just focusing on the light that
10 is actually [REDACTED]. That would go through these
11 partially transparent layers that are transparent enough so
12 that we can see the red pixel light from [REDACTED]. Correct?

13 A. Yes, that's correct.

14 Q. Otherwise, if these were not transparent, the light would
15 be generated inside the device but nobody could see the light.
16 Right?

11:22 17 A. I don't agree completely.

18 Q. Okay. Let's talk about the other scenario where you said
19 the red light pixel could also have light shining [REDACTED].
20 Correct?

21 A. That's correct, sir.

22 Q. And you talked to us about the fact that in the Samsung
23 devices, [REDACTED]. Is
24 that right?

25 A. I don't think I testified to that, sir.

1 Q. But do you know whether it's reflective or not?

11:22 2 A. It is partially reflective, yes, sir.

3 Q. Okay. So if I make this partially reflective, what would
4 happen to the light that is generated in the [REDACTED]
5 direction from the red pixel?

6 A. Well, if it's partially reflective, that means that some
7 of the light would reflect off of that electrode and then be
8 transmitted back out [REDACTED].

9 Q. Like the drawing that I just drew here. Is that fair?

11:22 10 A. That would be correct, yes.

11 Q. Okay. So what the user would see at the [REDACTED]

12 [REDACTED]

13 [REDACTED]

14 [REDACTED] Is
15 that fair?

16 A. I agree mostly with your construction.

11:23 17 Q. Okay. So let's think about the [REDACTED] layer. At the [REDACTED] of
18 that [REDACTED] layer is there a light being emitted?

19 A. I'm sorry. I don't understand your question.

20 Q. Sure. If I --

21 A. Be specific.

22 THE COURT: One at a time, please, gentlemen.

23 MR. PAK: I apologize.

24 Q. (BY MR. PAK) Doctor, if I look at the [REDACTED] of
25 [REDACTED], is the light in this type of system traveling through

1 that [REDACTED] or being emitted from that [REDACTED]?

11:23

2 A. I'm not sure I agree with the way you've worded it,
3 Mr. Pak.

4 Q. You said this is a [REDACTED] device. Correct?

5 A. That's correct.

6 Q. So is the light being emitted at the [REDACTED] of this
7 device?

8 A. The light that's generated in the OLED structure is
9 coming out the [REDACTED], so -- but I don't think I'd agree that
10 it's emitted from the [REDACTED].

11 Q. Well, you understand the patents talk about these kinds
12 of devices as [REDACTED] devices. Is that correct?

13 A. That's correct.

11:24

14 Q. So using that terminology, would you agree that the light
15 is generated in the middle in the emitter region but then the
16 light is shining through or being emitted from the [REDACTED]? Would
17 you agree with that?

18 A. I would agree that it's coming out the top.

19 Q. That's also called a [REDACTED] device in the patents.
20 Correct?

21 A. That's correct. And [REDACTED]

11:25

22

23 Q. So in the context of the patents, the word 'emit'
24 includes the light that is shining through the [REDACTED]
25 [REDACTED]. Correct?

1 A. That language is in the patent, yes. I'll agree with
2 that.

3 Q. And that's being used to describe devices like these.
4 Correct?

5 A. That's correct.

6 Q. And you would at least agree with me that [REDACTED]

11:25 7 [REDACTED].

8 Agreed?

9 A. As you've worded it, I would agree.

10 Q. And also [REDACTED]

11 [REDACTED] [REDACTED]
12 [REDACTED]. Correct?

13 A. That's correct. It's passing through.

14 Q. And [REDACTED]

15 [REDACTED]. Correct?

16 A. I agree with that, yes.

11:25 17 Q. And then if I look at the [REDACTED]

18 [REDACTED]

19 [REDACTED]

20 [REDACTED] Correct?

21 A. Light is passing through those regions. That's correct.
22 There's light present in the whole structure.

23 Q. So if I look at this light traveling in the [REDACTED]

11:26 24 [REDACTED]

25 [REDACTED] Correct?

1 A. Light will pass through those regions, yes. I agree.

2 Q. And all of that is consistent with the terminology that
3 the patent uses as [REDACTED] device, such as the one we see
4 here on the screen. Correct?

5 A. As I understand it, the description -- the general
6 description of the way light is produced and emitted out of
7 the device is a [REDACTED] OLED structure.

11:26 8 Q. So I would see light here at the [REDACTED]. Correct?

9 A. I don't know what you mean by that. I'm sorry.

10 Q. Well, light is passing through, so if I were to look at
11 that [REDACTED]
12 [REDACTED]. Correct?

13 A. The light is present as a standing wave inside of this
14 that acts as a cavity, so there's light present throughout the
15 structure.

11:27 16 Q. Okay. Great. Now, let's move on to your opinions on the
17 '425 and the '223 Patents.

18 MR. PAK: So Mr. Krueger, if I can get PD 4.80.

11:28 19 Q. (BY MR. PAK) Now, you are here on behalf of the
20 Plaintiffs as an expert. Correct?

21 A. Yes, sir.

22 Q. And you walked us through what you believe is evidence
23 for each of the claim limitations. Correct?

24 A. That's correct.

25 Q. And you understand as a technical expert that even if one

1 of these limitations is missing for claim 1 there would be no
2 infringement. Correct?

3 A. That's my understanding.

11:28 4 Q. And claim 2 is a dependent claim, so it incorporates
5 everything in claim 1 and adds one more limitation. Correct?

6 A. As you've stated it, that's correct.

7 Q. And because claim 2 is a dependent claim, if any of the
8 limitations of claim 1 is missing, that means also claim 2 is
9 not infringed. Correct?

10 A. That's correct.

11 Q. Okay. And you checked off all these boxes, but you've
11:28 12 also had a chance to look at the state of the art, the prior
13 art that existed before the '425 Patent was filed. Correct?

14 A. Yes, sir.

15 Q. And you see -- and you've also worked in the OLED
16 industry for a long time. Correct?

17 A. Yes, sir.

18 Q. Going back to times before the '425 Patent was filed?

19 A. Yes, sir, that's correct.

20 Q. So you checked off 1a. That was known in the prior art
21 before the filing of the '425. Correct?

22 A. Yes, sir.

11:29 23 Q. 1b, that was also known in the prior art. Correct?

24 A. Yes, sir. I'll agree.

25 Q. 1c was also known in the prior art. Correct?

1 A. Yes, sir.

2 Q. 1d was known in the prior art. Correct?

3 A. Yes, sir.

4 Q. And let's skip 1e and go to 1f. That was known in the
5 prior art. Correct?

6 A. Yes, sir.

7 Q. And so is the limitation of 2. That was known in the
8 prior art. Correct?

9 A. I'm not sure I agree with that.

11:29 10 Q. Well, you see in papers -- prior art papers before '425
11 that used [REDACTED] in the [REDACTED]. Correct?

12 A. Yes, sir.

13 Q. Okay. And that's all claim 2 is requiring. Correct?

14 A. Claim 2 requires all the elements of claim 1 in addition
15 to the proviso that it contain [REDACTED].

16 Q. Correct. So I'm just focusing on the additional thing
11:30 17 that's added by claim 2 where it says [REDACTED]
18 comprises [REDACTED]. That was also on its own known in the prior
19 art. Correct?

20 A. Yes, sir, just -- yes, sir.

21 Q. Okay. So if I write prior art 1a, 1b, 1c, 1d, 1e, 1f,
22 and 2 were all known in the prior art. Correct?

23 MS. CARSON: Objection, Your Honor.

24 THE COURT: What's your objection?

11:30 25 MS. CARSON: This is going outside the scope of his

1 direct, which was on infringement and touching on validity
2 issues which would be the subject of his rebuttal opinions.

3 MR. PAK: May I respond, Your Honor?

4 THE COURT: You may.

5 MR. PAK: Your Honor, I'm just trying to point out
6 the importance of limitation 1e because that's the point of
7 novelty, and that's what I'm trying to get at, Your Honor, for
8 the non-infringement opinions.

9 THE COURT: I'll allow the question.

10 MR. PAK: Thank you.

11:31 11 Q. (BY MR. PAK) So focusing on what's different, what's
12 alleged to be different and new is limitation 1e. You would
13 agree?

14 A. No, sir, I don't agree completely.

15 Q. Okay. But you stand by the testimony you just gave.
16 Correct?

17 A. Yes, everything I've said has been, to the best of my
18 ability, truthful.

19 Q. Okay. So let's turn to the '223 Patent, claim 1.

11:31 20 MR. PAK: And if we turn to PD 4.137.

21 Q. (BY MR. PAK) Again, for this claim you checked off boxes
22 for Samsung. Correct?

23 A. Yes, sir; as shown.

24 Q. But 1pre, which stands for preamble, that was known in
25 the prior art. Correct?

1 A. Yes, sir.

11:32 2 Q. And 1a was known in the prior art?

3 A. Yes, sir.

4 Q. And 1b was known in the prior art. Correct?

5 A. Yes, sir.

6 Q. So again, for the three boxes you checked off, that would
7 be true for the prior art as well. Correct?

8 A. Yes, I can agree with that.

9 Q. And you would agree with me that the thing that you
11:32 10 believe is new about this patent is joint vaporization
11 resulting in this electron conducting layer using these
12 particular compounds. Correct?

13 A. With respect to claim 1, I would say just the element 1c
14 collectively is novel.

15 Q. But you're not saying that central metal atoms were
16 invented by the inventors of the '223 Patent. Correct?

11:33 17 A. No, complexes have been known for a long time.

18 Q. Organic compounds were known prior to the filing of the
19 '223 Patent. Correct?

20 A. Yes, sir, they've been known for a long time.

21 Q. Heteroaromatic compound, which is conjugated with an
22 aromatic compound via a C-C bond, that was also known in the
23 prior art. Correct?

24 A. Yes, sir.

11:33 25 Q. Electron conducting layer was known in the prior art.

1 Correct?

2 A. That's correct.

3 Q. So the reason why you say 1c is not known in the prior
4 art is due to the joint vaporization language. Fair?

5 A. No, I don't agree with that.

6 Q. Okay. But you stand by the testimony you just gave.
7 Correct?

8 A. Yes, I do.

9 Q. Okay.

10 A. And I think I said that it's the entirety of the --
11 what's described in claim element 1c.

11:34 12 MR. PAK: And if we turn to PD 4.147.

13 Q. (BY MR. PAK) Again, organic compound, that was known in
14 the prior art. Correct?

15 A. Yes, sir.

16 Q. Organic compound coordinating to the metal complex, that
17 was also known in the prior art?

11:34 18 A. Yes. There are examples of organic compounds coordinated
19 to metal complexes. Sure.

20 Q. And again, the part you are focusing on is the joint
21 vaporization. Is that right?

22 A. I disagree with that.

23 Q. Okay. All right.

24 MR. PAK: Now let's turn to PD 4.25.

11:35 25 Q. (BY MR. PAK) Doctor, do you recall talking to us about

1 what you call the N-doped electron transport layer?

2 A. Yes, sir.

3 Q. And do you recall that you described N-doping, which is a
4 limitation of this patent, to be the mechanism of donating or
5 transferring an electron from one molecule to another
6 molecule? Do you recall that?

7 A. I don't think I described it using that language. I
8 can't agree with that.

11:36 9 Q. Okay. N-doping requires donation of electrons. You
10 would agree with that. Correct?

11 A. N-doping is increasing the concentration of electrons or
12 number of electrons.

13 Q. Well, let's take a look at what you wrote or you showed
14 us in PD 4.26.

15 Do you recall that you showed us this document from
11:36 16 Samsung to describe N-doping?

17 A. Yes, sir, I do.

18 Q. [REDACTED]

19 [REDACTED] Do you see that?

20 A. Yes, I see that.

21 Q. Okay. And you'd agree with this description of N-doping.
22 Correct?

23 A. It's one mechanism of N-doping. It'd agree.

24 MR. PAK: And let's take a look at a demonstrative
25 that I put together, which is DDX 2.38.

11:37 1 Q. (BY MR. PAK) Do you recall us talking about HOMO, which
2 was the highest occupied molecular orbit of an atom that
3 contains an electron? Do you recall that?

4 A. Yes, I do.

5 Q. And we talked about LUMO, which is another compound, for
11:37 6 example, the organic compound that has a vacant spot or orbit
7 where it can accept an electron?

8 A. Yes, I think I do remember, yes.

9 Q. And this is a negative scale that we talked about where
10 at the top would be 0, such as the ceiling that we discussed.
11 Correct?

12 A. Correct.

13 Q. And so in this particular case you have HOMO. That would
14 be higher than LUMO. Correct?

15 A. That's the way you've drawn it, yes.

11:37 16 Q. Just like the seal would be, for example, three feet
17 below the ceiling, so that would be negative 3 in my example
18 for HOMO. Correct?

19 A. That's the way you've shown it, yes.

20 Q. And then down to your head, that could be negative 6
21 because it's six feet below the ceiling. Correct?

22 A. Yes, sir.

23 Q. And in this case, although it says 3 and 6, actually
24 because it's a negative scale negative 3 is higher than
25 negative 6. Correct?

1 A. That's the way you've drawn it, yes, sir.

11:38 2 Q. And in your expert reports and the testimony you gave to
3 me in the deposition, you described this type of mechanism
4 where electrons are donated when you have a HOMO value that is
5 higher than the LUMO value of the molecule that's receiving
6 the electron. Correct?

7 A. I don't agree completely with that.

8 Q. But you agree that that's generally described as a
11:38 9 transfer mechanism for doping that you look at the HOMO value
10 of the donor and you look at the LUMO value of the electron.
11 Agree?

12 A. Not the way you said it, no. You said electron.
13 Rephrase your question.

14 Q. Sure. How would you say it, sir?

15 A. I can't state your questions for you.

16 Q. Is it true that a negative charged carrier, such as an
11:39 17 electron, will be donated when the HOMO value of the atom
18 containing that electron is higher than the LUMO value of the
19 atom or molecule that's receiving the electron? Yes or no.

20 A. That's one condition, yes.

21 Q. Okay.

22 A. But not a necessary condition.

23 Q. I want to show you what you wrote in your rebuttal
11:39 24 report. And if you'll pull up your rebuttal report,
25 Exhibit B.

1 MR. PAK: We don't have to show it on screen,
2 Mr. Krueger.

3 Q. (BY MR. PAK) Just take look at Exhibit B to your
4 rebuttal report.

5 A. Bear with me just a minute, sir.

6 Q. Sure.

11:40 7 A. I have to find it. Exhibit B?

8 Q. Exhibit B, paragraph 92.

9 A. Oh, sorry. I'm on page--paragraph.

11:40 10 Q. Paragraph 92.

11 A. Yes, sir.

12 Q. In this paragraph you were describing a paper where you
13 said what's described in the paper is consistent with the
14 understanding of N-doping mechanism by low ionization
15 potential molecules in the 2008 to 2009 time frame.

16 Do you see that?

17 A. Yes, sir.

11:41 18 Q. You say, for instance, a person of ordinary skill in the
19 art, an engineer, would understand that N-doping by this
20 particular particle or molecule occurs by removing an electron
21 from the donor, the energy for which ionization energy, and
22 injecting it into the LUMO of the matrix material.

23 Do you see that?

24 A. It's a long paragraph. 92?

11:42 25 Q. Yes.

1 A. And so it says, "would understand N-doping by" --

2 THE COURT: Just a minute.

3 THE WITNESS: Okay.

4 THE COURT: He didn't ask you to explain anything.
5 He asked you did you see the portion of the paragraph that he
6 read. If you didn't see it, tell him you didn't see it; if
7 you saw it, tell him you saw it. But that was the question.

8 THE WITNESS: Okay. I'm sorry, Your Honor.

9 Could you read it again, Mr. Pak, so I can say if I see
10 it?

11 Q. (BY MR. PAK) Sure. You wrote, A person of ordinary
12 skill in the art would understand that N-doping by the
13 molecule that you cited occurs by removing an electron from
14 the donor, the energy for which is ionization energy, and
15 injecting it into the LUMO of the matrix material.

16 You wrote that. Correct?

17 A. Yes, sir. It appears in the report.

18 MR. PAK: And then, Your Honor, may I just have your
19 permission to publish just the figure on the bottom?

11:42 20 THE COURT: Well, there are two figures on this
21 page. Which one are you talking about?

22 MR. PAK: The second figure on the bottom.

23 THE COURT: Is there objection?

24 MS. CARSON: Yeah. Objection, Your Honor. I object
25 to publishing portions of the report. He hasn't asked him a

1 question.

2 MR. PAK: I can ask the question, Your Honor.

3 THE COURT: Let's do that. I don't want to create
4 instantaneous demonstratives.

5 MR. PAK: Sure, Your Honor. I'm happy to do that.

6 Q. (BY MR. PAK) So isn't it true, sir --

11:43

7 MR. PAK: And let's just have that demonstrative
8 back up, Mr. Krueger, which is DDX 2.38.

11:43

9 Q. (BY MR. PAK) In your expert report you cited a figure
10 from a paper in which next to the word 'N-doping' it shows
11 that an electron is being donated from a material with a HOMO
12 that is higher than the LUMO of the molecule that's receiving
13 the electron. Correct?

14 A. Yes, sir. That is one figure that's present.

15 Q. You cited that figure in your expert report as a
16 description of N-doping. Correct?

17 A. It's one mechanism. I'll agree with that.

11:44

18 Q. Now, so let's take a look at your document -- your
19 demonstrative PD 4.67.

20 THE COURT: Counsel, approach the bench, please.

21 MR. PAK: Yes.

22 (The following was had outside the hearing of the
23 jury.)

24 THE COURT: I am beginning to be convinced I need to
25 excuse Juror No. 1. She can't seem to control her coughing.

1 case.

12:47 2 All right. We ended and broke for lunch with Mr. Pak as
3 counsel for the Defendants cross-examining Dr. Schanze, and
4 we'll pick up with that cross examination at this juncture.

5 Please proceed, Mr. Pak.

6 MR. PAK: Thank you, Your Honor.

7 Q. Doctor, welcome back.

8 A. Welcome back and welcome to everybody else. Hopefully
9 you had a lunch.

10 Q. So let's turn back to where we were, which is DX 2.38.

12:48 11 Do you recall before the break we were talking about the
12 HOMO value of a molecule or atom that's donating electrons
13 being higher than the LUMO value of the molecule or atom
14 that's accepting the electrons? Do you recall that testimony?

15 A. Yes, sir, I do, Mr. Pak.

16 Q. Okay. Thank you.

17 MR. PAK: And if I can get the new demonstrative up
18 on the screen.

12:48 19 Q. (BY MR. PAK) And you recognize this figure. Correct,
20 Doctor?

21 A. Yes, sir. I think it's in the -- on page 40 of the same
22 exhibit that we were -- the same appendix from my rebuttal
23 report.

24 Q. This is a figure from a technical paper that you cited in
25 forming your infringement and validity opinions in this case.

1 Correct?

2 A. That's correct. I think it's a chemical reviews article.

12:49 3 Q. And here we see the same mechanism of N-doping where the
4 donor has a higher HOMO value than the LUMO of the recipient
5 of that electron. Correct?

6 A. I -- this is out of context. There's no energy scale
7 here shown, so I would just have to take this as a schematic.
8 I'd have to take your word for that.

9 Q. This is a paper you cited and this is a figure that you
10 cited in your expert reports. Correct?

11 A. Yes, sir, it is, yes.

12:50 12 Q. And you can see that for the donor, the orbital that
13 contains the electron is indicated as being higher than the
14 vacant orbital of the receiving atom or molecule, which is
15 indicated by LUMO. Correct?

16 A. That's how it's drawn in the diagram. I agree.

17 Q. Thank you.

18 And, in fact, sir, you would agree with me that a person
12:50 19 of ordinary skill in the art would expect that electron
20 donation from a donor to an acceptor would occur when HOMO or
21 ionization energy of the donor is higher than the LUMO energy
22 level of the acceptor. Correct?

23 A. I don't think you worded that the way you meant to. Can
24 you rephrase that, please.

25 Q. Sure. A person of ordinary skill in the art would

12:50 1 therefore accept that electron donation from a donor to an
2 acceptor would occur when the HOMO or ionization energy of the
3 donor is higher than the LUMO energy level of the acceptor.
4 Correct?

5 A. I can't agree with it the way it's worded.

6 Q. Okay. Let's take a look at your rebuttal report, Exhibit
12:51 7 B at paragraph 93. And we're not publishing this just yet.

8 A. Okay. Yes, it does read that way. It's just a confusion
9 in wording, but I --

10 THE COURT: Just a minute, Dr. Schanze. He asked
11 you to look at a section of your report, and then you started
12 testifying. Let him ask a question. Okay?

13 THE WITNESS: Yes, sir. I'm sorry, Your Honor.

14 THE COURT: Mr. Pak, do you want to revisit this
15 topic? If so, ask a question.

16 MR. PAK: Thank you.

17 Q. (BY MR. PAK) Doctor, you would agree that a person of
12:51 18 ordinary skill in the art would, therefore, expect that
19 electron donation from a donor to an acceptor would occur when
20 the HOMO or ionization energy of the donor is higher than the
21 LUMO energy level of the acceptor. Correct?

22 A. That is the way it's written. Yes, correct.

23 Q. And you agree with that. Correct?

24 A. Yes, I do.

25 Q. Thank you.

12:52 1 MR. PAK: Now, I want to turn to PD 4.67.

2 Q. (BY MR. PAK) This is one of the demonstratives that you

3 showed us with respect to your infringement allegations in

4 this case. Correct?

5 A. Yes, sir.

6 Q. And this is for the limitation wherein the organic layer

7 sequence comprises an electron transport layer that is

8 N-doped. Correct?

9 A. Yes, sir.

12:52 10 Q. So as an infringement expert, you needed to prove this

11 limitation along with the others in order to offer the opinion

12 that claims of the '425 Patent are infringed. Correct?

13 A. Yes.

14 Q. And just to make it clear, [REDACTED] is what you call the

15 N-dopant in your infringement theory. Correct?

16 A. That's correct.

12:53 17 Q. [REDACTED]

18 [REDACTED] Is that correct?

19 A. It's an example of one, yes, sir.

20 Q. This is the one you were showing us, [REDACTED]

21 [REDACTED]

22 [REDACTED] Do you recall that?

23 A. Yes, I do.

24 Q. And so for this theory to work, [REDACTED]

25 [REDACTED] Correct?

12:54 1 A. I don't agree with that entirely.

2 Q. You have to show N-doping. Correct?

3 A. Yes, that's correct.

4 Q. N stands for negative carrier such as an electron.

5 Correct?

6 A. That's correct.

7 Q. And so you are the one who identified the [REDACTED] as the

8 N-dopant in this case. Correct?

9 A. Yes, sir, I did.

10 Q. And you, in fact, testified that [REDACTED]

12:54 11 [REDACTED], and unless you have N-doping, the claim limitation would

12 not be satisfied even when it's mixed with [REDACTED]. Correct?

13 A. Can you restate the question, please, Mr. Pak?

14 Q. Yes. You can have [REDACTED]

15 [REDACTED]

16 [REDACTED],

12:54 17 you testified that that would not be an infringement.

18 Correct?

19 A. I'm not sure that that's how I worded it. I can't agree

20 with that.

21 Q. Let me put it this way. You can [REDACTED] and not

22 satisfy this limitation of [REDACTED] being an N-dopant. Correct?

23 A. I'm sorry. Again, could you repeat your question so I

24 can --

25 Q. Sure.

1 A. Yeah.

2 Q. You can have [REDACTED] and not satisfy claim 1e
12:55 3 of the '425 because it's not acting as an N-dopant. Correct?
4 That's a possible scenario. Correct?

5 A. Yes.

6 Q. Okay. And we just went over your testimony about what
7 one of ordinary skill in the art would expect in terms of
8 N-doping, which is that the HOMO in this case of [REDACTED] would
12:55 9 need to be higher than the LUMO of the [REDACTED]. Correct? Yes or
10 no, please?

11 A. I agree to that, but it's not the only mechanism.

12 Q. During your testimony in your opening, you didn't
13 describe any specific mechanism for N-doping. Correct?

14 A. Yes, I did.

15 Q. Okay. Are you saying that what you presented to us is
16 inconsistent with what you read from your expert reports?

17 A. I could be. What I'm saying -- please ask a question.

12:56 18 Q. Was the testimony that you provided to this jury in your
19 opening report inconsistent with the way you described
20 N-doping in your expert report? Yes or no.

21 A. I disagree with that. There are different mechanisms.

22 Q. I'm just asking you a simple question. When you talked
23 to us about N-doping theory, was that consistent with what you
24 wrote in your expert report about N-doping in this case? Yes
25 or no.

12:57 1 A. Can you ask the question again? I'm sorry.

2 Q. When you were on the stand being asked on the question of

3 infringement and you opined that [REDACTED] is acting as an N-dopant,

4 was that opinion consistent with your description of N-doping

5 in your expert reports in this case? Yes or no.

6 A. Yes, it is.

7 Q. Thank you.

12:57 8 Now, you also looked at -- and this is from the [REDACTED]

9 paper. Is that correct?

10 A. Yes, I believe so.

11 Q. That's the Samsung paper that you were referencing.

12 Correct?

13 A. That's correct.

14 Q. Okay. So now let's take a look at the Court's

15 construction of the word 'coordinates' which appears in the

16 '223 Patent.

17 MR. PAK: If we can get PD 4.139.

12:57 18 Q. (BY MR. PAK) The Court's construction that the jury will

19 have in the binder for the word 'coordinate' or 'coordinate'

20 is "forms a chemical bond between two atoms in which a shared

21 pair has been supplied by one of the two atoms." Do you see

22 that? Do you see that, sir?

23 A. Yes, I do, yeah.

24 Q. And just for us to be on the same page, when it says

25 shared pair, we are talking about a shared pair of electrons.

1 Correct?

12:58 2 A. That would be the understanding to a POSA.

3 Q. And what is POSA again?

4 A. Person of ordinary skill.

5 Q. And this language as interpreted by His Honor has to be
6 the meaning given to the word 'coordinates' in claim 2.

7 Correct?

8 A. Yes, sir, I think that's where it's defined.

12:58 9 MR. PAK: And if we turn now to PD 4.6 -- actually
10 PD 4.141?

11 Q. (BY MR. PAK) For your infringement analysis that you
12 showed us, you have the language of claim 2 with the language
13 coordinates or coordinates. Do you see that?

14 A. Yes, sir.

15 Q. And this is for the '223 Patent. Correct?

16 A. That's correct.

17 Q. And you're citing the same [REDACTED] paper. Correct?

18 A. In this example, yes.

12:59 19 Q. And, in fact, you're showing us the same [REDACTED] on the right
20 and the [REDACTED] on the left. Is that correct?

21 A. That's correct.

22 Q. And, in fact, sir, in your expert report, isn't it true
12:59 23 that you discussed the following in the context of
24 coordination for the '223, citing a paper, "The study shows
25 that the highest occupied molecular orbital, H-O-M-O, is

1 entirely located in the [REDACTED] molecule, indicating that its role
2 as an electron donor while the lowest occupied molecular orbit
3 is situated exclusively on the [REDACTED] identifying it
4 as the electron acceptor."

01:00

5 Do you recall that?

6 A. Yes, I think I do, yes.

7 Q. So what you described in your expert report is consistent
8 that [REDACTED] transfers an electron or a pair of electrons from the
9 [REDACTED] to the [REDACTED]. Correct?

10 A. I don't agree with that.

01:00

11 Q. Well, you wrote -- take a look at your infringement
12 report, Exhibit J, page -- paragraph 66, please.

13 A. Which exhibit? J?

14 Q. J.

15 A. Is there -- I don't know that there's an Exhibit J.
16 Rebuttal report, sir?

17 Q. I have infringement -- opening report. Do you have the
18 opening report?

01:01

19 A. Sorry. Paragraph, please?

01:01

20 Q. Paragraph 66. I'm looking at opening report, Exhibit J.
21 That's listed declarations from German proceedings. Is that
22 correct?

23 Q. I believe that's what's in that title. And you
24 understand that you accepted the opinions in Exhibit J.
25 Correct? As in your opinions?

1 A. Yes, I do. I'm just trying to find the phrase that you
2 want me to look at.

01:02

3 Q. Paragraph 66.

4 THE COURT: It doesn't appear to be --

5 THE WITNESS: No.

6 THE COURT: -- structured into paragraphs
7 numerically numbered.

8 Q. (BY MR. PAK) PDFF, do you have 18?

9 A. Mr. Pak, I'm afraid we might be looking at different
10 documents. Please excuse me, but --

11 Q. Okay.

12 A. -- I -- I'm seeing only appendix with CV, copy of patents
13 and exhibits, exhibits in Exhibit J.

01:02

14 Q. My apologies. Let me see if I can clear that up --

15 A. Okay.

16 Q. -- and then I'll come back to you on this.

17 A. Okay. I'm sorry.

18 Q. No problem. I want to go to -- can you see the Bates
19 number on the bottom of that, Exhibit J?

20 A. Wait. There -- at the very, very front, there is some
21 numbered paragraphs. I see those now. Okay. I'm sorry. I
22 found what you're referring to.

23 Q. Oh, thank you.

24 A. Yeah. So now which paragraph, please?

01:03

25 Q. It's paragraph 66.

1 MR. PAK: Your Honor, it's -- 41238 is the Bates
2 number.

3 Q. (BY MR. PAK) Exhibit J, paragraph 66.

4 A. Yes, I'm looking at that.

5 Q. Okay. Isn't it true, sir, that as part of your
6 infringement analysis for the '223 Patent, you wrote, "The
7 study shows that the highest occupied molecular orbital, HOMO,
01:03 8 is entirely located on the [REDACTED] molecule indicating its role as
9 an electron donor while the lowest occupied molecular orbital,
10 LUMO, is situated exclusively in the [REDACTED]
11 identifying it as the electron acceptor." You wrote that.
12 Correct?

13 A. Yes. That is what's stated there, sir.

14 Q. And you stand by that opinion as well. Correct?

15 A. As it's stated and depicted, yes.

01:04 16 MR. PAK: Now, let's turn to PD 4.54.

17 Q. (BY MR. PAK) Do you recall showing us this slide for the
18 organic layer sequence?

19 MR. PAK: Or actually it's PD 4.64, Mr. Krueger.
20 Sorry.

21 Q. (BY MR. PAK) Do you recall showing us this slide when
01:04 22 you were doing the analysis for the N-doping limitation of
23 claims in '425 Patent?

24 A. Yes, sir, I do.

25 Q. And you identify these various product types and the

1 different organic compounds that are used. Correct?

2 A. Yes, sir.

3 Q. You didn't show us any HOMO/LUMO values for those
4 compounds. Correct?

5 A. There are some in my report, I believe, but here they're
6 not.

7 Q. Right. You didn't show us any HOMO/LUMO values for the
8 accused organic compounds in the accused products during your
9 trial testimony here today. Correct?

10 A. That's correct.

01:05 11 MR. PAK: And then if you turn to the next
12 demonstrative, which is PD 4.122.

13 Q. (BY MR. PAK) Here you were identifying the organic
14 compounds for the accused products again, but this time for
15 the claims of the '223 Patent. Correct?

01:05 16 A. Yes, sir, I believe that's what this is, yeah.

17 Q. And, again, you didn't show us the HOMO/LUMO values of
18 the organic compound listed in these accused product charts.
19 Correct?

20 A. That's correct, sir.

21 Q. Okay. Just for the jury to understand, when you see
22 words like [REDACTED], those are code names

01:06 23 that Samsung uses for the organic compounds that you have used
24 in this case. Correct?

25 A. Yes, sir.

1 Q. Okay. And when I deposed you after you submitted your
2 expert reports, you didn't know the LUMO values of the organic
3 compounds that you are accusing in the accused products.
4 Correct?

5 A. That's my recollection. That's correct.

01:06

6 Q. And in your expert reports, you didn't identify the
7 specific LUMO values for the accused organic compounds.
8 Correct?

9 A. I disagree with that. There are some LUMO values in the
10 rebuttal report. I think it's a rebuttal report. I'm not
11 sure which page, but...

12 Q. I'm talking about the organic compounds that are accused
13 with these code names in the Samsung products. You did not
14 identify the specific LUMO values for those organic compounds
15 in your infringement report. Correct?

01:07

16 A. I do believe there is one entry in the report. It might
17 take me a while to find it because it's a small table, but I
18 believe there is an entry.

19 Q. And today during your trial testimony you didn't present
20 the LUMO value for any of the accused organic compounds in the
21 accused products. Correct?

22 A. That's correct, yes, sir.

01:07

23 Q. Okay. Now, let's turn to -- I believe this might be what
24 you're referring to, but if you return to PX 24, this is a
25 document that you considered in this case. Correct?

1 A. I don't see anything --

2 MR. PAK: Okay. Let me put that on the screen,
3 Mr. Krueger.

01:08 4 Q. (BY MR. PAK) Do you understand that this is an
5 electronic document that was produced by Samsung and that you
6 cited in this case?

7 A. Yes, sir. I can't see it in its entirety. I'm sorry. I
8 see part of it.

01:08 9 Q. Okay. I'm going to take you to tab 1, column R, row 6.

10 MR. PAK: Scroll up. There you go. So if you see
01:09 11 column R, so let's pull over and let's go up to row 6.

12 Q. (BY MR. PAK) Do you see [REDACTED]?

13 A. Yes, sir, I see where you circled that, yes, sir.

14 Q. That's one of the accused organic compounds in the
15 accused products. Correct?

16 A. Yes, sir.

01:09 17 Q. And if you see the entry of negative [REDACTED]?

18 A. I do see that.

19 MR. PAK: And if you scroll all the way to the left,
20 Mr. Krueger?

21 Q. (BY MR. PAK) We can see that's the LUMO value for that
22 organic compound. Correct? Can you confirm?

23 A. I see what you circled. I don't recognize this document
24 as being the same as what's in my report.

25 Q. So you cited PX 24 in your expert report. This is a

1 Plaintiffs' exhibit. You understand that?

01:10 2 A. Yes, sir.

3 Q. Okay. And this is a Samsung document that was produced
4 in this case. Correct?

5 A. Yes, sir. If you say so.

6 Q. And so we have a negative ■ value for the LUMO of the
7 organic compound that you've accused in this case. Do you
8 understand that?

9 A. That's what you've showed me. I don't exactly agree with
10 that.

11 Q. You didn't show us any LUMO values. You cited this
12 document from Samsung Display, and it identifies negative ■.
13 Correct? Yes or no.

01:10 14 A. The document you showed me does identify that. It just
15 shows a number minus ■, but I don't agree with that.

16 Q. Well, you don't work at Samsung. Correct?

17 A. That's correct.

18 Q. And, in fact, these are proprietary compounds so you
19 don't even know the exact molecular chemistry of these
20 compounds. Correct?

21 A. I don't agree with that.

22 Q. Yes or no, do you know the exact molecular chemistry of
23 the organic compounds you've accused?

24 A. I know the chemistry of the triazene structure, sir.

01:11 25 Q. When I asked you during your deposition, you couldn't

1 recall the LUMO values of the specific organic compounds and
2 you said during your deposition, I don't know the molecular
3 chemistry in its entirety for these organic compounds. Do you
4 recall that?

5 A. Yes, I do agree with that. I'm not changing my
6 deposition testimony.

7 Q. Okay. And you understand that was my opportunity to ask
8 you questions about your infringement opinions?

9 A. Yes, sir.

10 Q. And you were testifying truthfully and under oath during
11 your deposition. Correct?

01:12 12 A. Yes, sir.

13 Q. Okay.

14 A. And I am now, too.

15 Q. Of course. And so, Dr. Schanze, we already saw the HOMO
16 value of [REDACTED] in your presentation and that was negative [REDACTED].
17 Correct?

18 A. I don't recall exactly where it is in my presentation,
19 but I'll take your word for it.

20 Q. Okay. I'll find it for you, but it's in one of your
21 slide decks. You showed us the vendor that provided the [REDACTED]
01:12 22 in that slide. You can see it's negative [REDACTED]. You
23 understand that that's the HOMO value.

24 A. Yes, I agree with that. That sounds reasonable.

25 Q. So if I turn to DDX 1.39, HOMO value of [REDACTED], what you say

1 is the electron donor, is negative [REDACTED]. Correct?

2 A. Yes, sir. I'll agree.

01:13 3 Q. And we just saw the Samsung document that you cited which
4 shows that the LUMO value for the accused product with
5 [REDACTED] is negative [REDACTED]. Correct?

6 A. I don't agree with that value.

7 Q. That's what the document showed from Samsung. Correct?
8 Yes or no.

9 A. That's what I saw, but I don't agree with that value.

10 Q. But, again, you don't -- again, as you established during
11 the deposition, you don't know the LUMO value specifically and
01:13 12 you don't know the molecular chemistry in its entirety for the
13 accused or organic compounds. Correct?

14 A. Can you repeat what you mean by entirety, sir?

15 Q. Let me ask it this way. You don't know the LUMO values
16 of the organic compounds that you have identified other than
17 what we see here, which is the negative [REDACTED] value from the
18 Samsung Display document. Correct?

19 A. I disagree with that.

20 Q. You didn't show us any LUMO values during your trial
01:13 21 testimony for any of the accused organic compounds. Correct?

22 A. That's correct.

23 Q. And when I asked you about those values during the
24 deposition, you said, I don't know them because I don't know
25 the molecular chemistry. Correct?

1 A. If that's what I said at that time, that may have been
2 the case.

3 Q. Okay. And now if I plug in the stated value from the
4 Samsung document of negative ■ compared to negative ■, you
5 would agree with me that the HOMO value is lower for ■ than
01:14 6 the LUMO value of this organic compound that's been accused.
7 Correct?

8 A. I'll agree that it's lower, yes, sir.

9 Q. And as we established before, like an apple falling down,
10 the HOMO of a donor for the mechanism that we've been
11 discussing as N-doping has to be higher on a negative scale
12 than the LUMO value of the acceptor. Correct?

13 A. Could you repeat your question, please?

01:14 14 Q. Sure. Do you recall the testimony you gave about the
15 ceiling being 0 and the ceiling being negative 3 feet, and
16 your head being negative 6 feet. Do you recall that
17 testimony?

18 A. Yes, sir, I do, yes.

19 Q. And do you recall describing to the jury that it's like
20 an apple falling from a higher location to a lower location,
21 that's what you're looking for. Correct?

22 A. That's how I described, but that doesn't describe
23 N-doping. That describes the transfer of an electron from a
24 donor to an acceptor.

01:15 25 Q. Everything that we have discussed from your expert report

1 and deposition testimony, you still stand by that testimony.

2 Correct?

3 A. Yes, sir.

4 Q. All I'm getting at, sir, is the negative ■ value of the

5 ■ that's supposed to receive, accept the electron donor, is

6 higher than the HOMO of the material ■ that's supposed to

7 donate the electron. Correct?

01:15 8 A. I'll agree that's higher, yes, sir.

9 Q. And that's inconsistent with the description of N-doping

10 that we saw in the various expert report statements that you

11 provided in this case. Correct? Yes or no.

12 A. No, I don't agree with that completely. It's consistent

13 with what you showed us today, but not with everything.

14 Q. Right. So it is consistent with what we showed you in

15 your expert report about N-doping in that you would not get an

01:16 16 electron donation from ■ to the organic compound here

17 because the HOMO is lower than the LUMO. You agree?

18 A. No, I don't agree with that, sir.

19 Q. Your expert reports described N-doping as a situation

20 where the HOMO of the electron donor is higher than the LUMO

21 of the acceptor. Correct?

22 A. I disagree with that. The section that you showed us

01:16 23 shows that, but the report in other sections talks about other

24 situations.

25 Q. Take a look again at your rebuttal Exhibit B at paragraph

1 95 -- 93.

2 A. Yes. B?

3 Q. Yes.

4 A. Paragraph 95?

5 Q. 93.

01:17 6 A. 93. It's the one we looked at earlier, sir. Yes, sir.

7 Q. So I'm going to ask you again, isn't it true that a
8 person of ordinary skill in the art would therefore expect
9 that the electron donation from a donor to an acceptor would
10 occur when the HOMO or ionization energy of the donor is
11 higher than the LUMO energy level of the acceptor. You agree
12 with that?

13 A. Yes, I do, sir.

01:17 14 Q. But what we see here, based on the actual value of LUMO
15 stated in the Samsung document, is the opposite--the HOMO of
16 [REDACTED] is lower than the LUMO of the organic compound. Yes or
17 no?

18 A. It's lower, but my document doesn't say it can't occur if
19 the HOMO is lower than LUMO.

20 Q. I just need a yes or no. Is what's shown here, sir, is
01:18 21 the LUMO of the organic compound is higher than the HOMO of
22 Liq?

23 A. As you've drawn it, sir, yes, it is.

24 Q. Thank you.

25 THE COURT: Counsel, if you think the witness or any

1 witness is non-responsive, don't attempt to instruct the
2 witness on yes or no; raise it with the Court and the Court
3 will address it.

4 MR. PAK: Yes, Your Honor.

5 Q. (BY MR. PAK) Now, let's turn to one other organic
6 compound.

01:18 7 MR. PAK: If you'll turn to JX 14.

8 Q. (BY MR. PAK) This is a joint exhibit. It's a Samsung
9 document from Samsung Display. Do you see that?

10 A. Yes, sir, I do.

11 Q. And if you turn -- and this is a document that you cite
12 to in your expert report for showing the specific materials
13 that are used for what you call [REDACTED]. Do you recall
14 that?

15 A. Yes, I recall [REDACTED].

01:19 16 Q. And if you turn to page 23 in this document, and I'll
17 represent to you as you identified in your expert report the
18 [REDACTED] is [REDACTED]. Are you with me?

19 A. Yes, I am.

20 Q. And you can see that the HOMO value of [REDACTED], according to
21 the Samsung document that you cited, is negative [REDACTED]. Do you
22 see that?

01:20 23 A. Yes, sir, I do.

24 Q. That's the same value that we saw in your presentation
25 with the vendor data. Do you recall that?

1 A. Yes, sir.

2 Q. And [REDACTED] is the code name for the organic compound
3 that's accused in the Samsung Display panels. Do you recall
4 that?

5 A. Yes, sir, I do.

6 Q. And you see that the LUMO value is negative [REDACTED].
7 Correct?

8 A. Yes, sir, I see that.

9 Q. And these are negative values again. Correct?

10 A. Yes, sir.

01:20 11 Q. So if we turn to demonstrative 2.40, yes or no, sir, the
12 HOMO value of [REDACTED] is lower on a negative scale than the LUMO
13 of [REDACTED]. Correct?

14 A. Yes, sir. That's -- your diagram is correct, yes, sir.

15 Q. Thank you.

01:20 16 And that diagram accurately reflects the Samsung Display
17 documentation on the HOMO value of [REDACTED] and the LUMO value of
18 the organic compound. Correct?

19 A. That's correct. And this number is -- I agree with the
20 LUMO.

21 Q. For this one, you agree with this LUMO value of negative
22 [REDACTED]. Correct?

23 A. Yes.

24 Q. All right. Doctor, let's move on to a different topic.

01:21 25 You understand that Samsung had a product

1 called -- Samsung had a panel that went into a personal media
2 device called Clix2.

3 A. Yes, sir.

4 Q. And you understand that you have to apply your analysis
5 of the claims the same way consistently whether you're
6 analyzing prior art or you're analyzing the accused devices
7 from Samsung.

8 A. Yes, sir, I do.

01:21 9 Q. And you understand that this Clix2 device that was sold
10 by a company called iRiver, had an OLED panel manufactured by
11 Samsung Display.

12 A. I don't completely agree with that.

13 Q. You didn't -- you don't -- you didn't work at iRiver.
14 Correct?

15 A. No, sir.

16 Q. And you're not here to testify that the Samsung engineers
17 who worked on that product gave false testimony.

18 A. No, sir, I don't believe they told -- they didn't tell
19 the truth.

01:22 20 Q. Right. In fact, you repeatedly rely on the deposition
21 testimony of Samsung engineers for your infringement analysis
22 because that's reliable evidence about how the accused OLED
23 manufacturing works. Correct?

24 A. Yes, sir. That's correct, yes.

25 Q. Samsung people know their own products and technologies.

1 Correct?

2 A. I would assume so.

01:22

3 Q. And, in fact, during your deposition I asked you about
4 Mr. Jo and his statements regarding Clix2 compared to the
5 accused products. Do you recall that?

6 A. Yes, sir.

01:23

7 Q. You don't dispute the following statement: "Indeed,
8 according to Dr. Kymissis, Mr. Jo, which is a Samsung fact
9 witness, talked about the evaporation process for Clix2
10 display panel [REDACTED] which, like the manufacturing process for
11 the current accused product, used [REDACTED] where
12 the [REDACTED]."

13 You don't dispute that statement. Correct?

14 A. No, I don't dispute that.

15 Q. And you don't dispute that because that's a statement
16 made by a Samsung engineer regarding a Samsung manufacturing
17 process. Correct?

01:23

18 A. I can only assume that he was testifying truthfully.

19 Q. Were you here for the opening statement?

20 A. Yes, sir, I was.

21 Q. Were you here when you heard in the opening statement on
22 behalf of Pictiva that '223, '425, and '547 Patents are
23 fundamental to building OLED panels? Do you recall that
24 testimony?

25 A. Yes, sir.

1 Q. But it's your opinion as an expert that you don't believe
01:24 2 those patents were used in the Clix2 OLED panel manufactured
3 by Samsung Display. Correct?

4 A. Can you repeat your question, please?

5 Q. Yep. When you -- even though we heard the statement that
6 '223, '425, and '547 Patents are fundamental to building a
7 commercial OLED panel, it is your expert testimony that the
8 OLED panel from Samsung Display used in the Clix2 prior art
01:24 9 does not use any of the asserted patents that you analyzed.
10 Correct?

11 A. I can't be certain of that. You know, there are
12 uncertainties about the Clix2 process and so forth, so...

13 Q. I'm asking you now, do you have an expert opinion based
14 on everything you've seen on whether the Clix2 prior art
01:25 15 device used the '223, '425, and '547 Patents? Yes or no.

16 MS. CARSON: Objection, Your Honor.

17 THE COURT: State your objection.

18 MS. CARSON: This is getting into validity opinions
19 which is subject to the rebuttal case. They haven't even put
20 on their invalidity case yet. He testified about infringement
21 far outside the scope of that.

22 MR. PAK: May I respond?

23 THE COURT: You may respond.

24 MR. PAK: Your Honor, I'm going to the technical
25 benefits and the claim that these patents are fundamental or

1 paper?

2 A. That's correct. I didn't. Yes.

3 MR. PAK: I pass the witness.

4 THE COURT: All right. Redirect, Ms. Carson?

5 MS. CARSON: Yes, Your Honor.

01:44 6 THE COURT: All right. You may proceed with
7 redirect.

8 MS. CARSON: Thank you, Your Honor.

01:44 9 Could we pull up PD 4.6?

10 REDIRECT EXAMINATION

11 BY MS. CARSON:

12 Q. All right. Do you recall counsel asking you some
13 questions about this slide?

14 A. Yes, Ms. Carson, I do.

15 Q. Okay. And I think he was asking you some questions about
16 the difference between the RGB and WOLED structure using this
17 slide. Do you recall that?

18 A. Yes, I do.

01:45 19 Q. Does infringement of the '223 and '425 Patents relate to
20 the structure of the OLED or to the particular materials used
21 in the organic layers?

22 A. It refers to the particular materials in the OLED layers.

23 Q. Okay. And so those patents can be practiced by many
24 different types of OLED structures. Is that right?

25 A. Yes, ma'am, that is correct.

1 Q. And so this difference in structure, that's only relevant
2 to the '547 Patent?

3 MR. PAK: Objection; leading, Your Honor.

01:45 4 THE COURT: Sustained.

5 Q. (BY MS. CARSON) What is the structure of the OLED --
6 which patent is the structure of the OLED relevant to?

7 A. This structure is relevant to the '547 Patent.

8 Q. Okay.

9 MS. CARSON: Could we pull up the claim language of
10 the '425 Patent, please?

01:46 11 Q. (BY MS. CARSON) All right. This is the claim you
12 analyzed for the '425 Patent. Right?

13 A. Yes, ma'am, it is.

14 Q. Do you recall counsel asking you some questions about
15 whether -- he sort of isolated these elements and asked you
16 whether in isolation those elements existed in the prior art.
17 Do you recall that line of questioning?

01:46 18 A. Yes, ma'am, I do, Ms. Carson.

19 Q. Is that a proper way to consider the novelty of a claim?

20 A. No, it's not.

21 Q. And what is the proper way to analyze it?

22 A. To analyze the claim as a whole encompassing all of the
23 elements of the claim taken together, and in this case it's a
24 dependent claim 2 includes everything in claim 1.

25 Q. Okay. And what is novel about claim 2?

01:47 1 A. Claim 2 is novel in the sense of collecting together all
2 the elements that are shown here into a device.

3 Q. Okay. And is the '425 Patent directed towards something
4 called a phosphorescent OLED?

5 A. Yes, ma'am, it is.

6 Q. And what is a phosphorescent OLED?

7 A. That's an OLED that uses a metal complex like [REDACTED] to
8 generate the light in the emission layer.

01:47 9 Q. Had the combinations of these elements, specifically
10 element 1e, 1f, and 2, had those ever been used in a
11 phosphorescent OLED before the '425 invention?

12 A. No, ma'am.

13 Q. And so what is the novel aspect of the claim?

14 A. Again, the novel aspect is a collection of all the
15 elements that are presented in claims 1 and 2, but in
16 particular 1e, 1f, and 2 combined.

01:48 17 Q. Okay. I also want to ask you some questions -- there was
18 a lot of examination about HOMO and LUMO levels. Do you
19 recall that?

20 A. Yes, I do.

21 Q. Okay. Is there anything in this claim that requires
22 specific HOMO and LUMO levels?

23 A. No, ma'am, there's no -- no discussion of HOMO and LUMO
24 levels in the claims.

25 Q. And I think in connection with that line of questioning,

01:48 1 counsel kept directing you to a paragraph in your rebuttal
2 report. Do you recall that?

3 A. Yes, ma'am. I think it was paragraph 93 of appendix B.

4 Q. Okay. And that paragraph actually related to the '223
5 Patent, not the '425 Patent. Is that right?

6 A. That's correct.

7 Q. Did that paragraph have anything to do with [REDACTED]

8 A. No, it did not.

9 Q. Did it deal with an entirely different compound?

01:49 10 A. Yes, it did.

11 Q. A couple of times I thought you wanted to kind of explain
12 when he was asking you about whether you had accurately
13 described N-doping in your report. Are there various
14 mechanisms for N-doping?

15 A. Yes, it's my understanding there are various mechanisms.

16 Q. Okay. And does the mechanism for N-doping depend on what
01:50 17 materials you're looking at?

18 A. Yes, ma'am, it does. It does depend on the materials
19 that are used as N-dopants and also the host or the material
20 that it's doped into.

21 Q. And that's why being precise about the materials is that
22 important?

23 MR. PAK: Objection; leading, Your Honor.

24 THE COURT: Sustained. This is direct examination.

25 Q. (BY MS. CARSON) Okay. What are some of the other

1 mechanisms you use for N-doping?

01:50 2 A. N-doping, just broadly speaking, is the act of increasing
3 the number of electrons in a material. There are other
4 mechanisms can involve pathways by which the number of
5 electrons can be increased in a material, and that can be done
6 by ways other than just the mechanism of adding electrons from
7 a -- from the dopant itself.

01:50 8 The electrode can be a source of electrons to increase a
9 concentration in the electron transport layer.

10 Q. Okay. And did you consider those other mechanisms or did
11 you discuss those other mechanisms for N-doping in your
12 rebuttal report?

13 A. Yes.

14 Q. Did counsel show you those portions of your report?

15 A. No.

16 Q. Which of those sections is relevant to considering
17 N-doping when it comes to [REDACTED]?

01:51 18 A. It would take me a minute to find them, Ms. Carson.

19 Q. If you could take a look at paragraph 116 of Exhibit B of
20 your rebuttal report.

21 A. Rebuttal report. C? Appendix --

22 Q. Exhibit B.

23 A. Exhibit B. Paragraph, which one?

24 Q. Paragraph 116.

25 A. Yes.

01:51 1 Q. Okay. Does that describe a different mechanism for
2 N-doping?
3 A. Yes, ma'am, it does.
4 Q. Okay. And could you describe that for us?
5 A. Well, what it reads in my --
6 Q. Don't read it. Just describe it.
7 A. Yeah. It basically describes that cation searches with
8 lithium can act as a dopant in a heterocyclic compound like
01:52 9 the ones that are used in the accused products.
10 MR. PAK: Sorry, counsel. Can you restate the
11 paragraph you were referencing?
12 MS. CARSON: 116.
13 MR. PAK: Okay. Thank you.
14 Q. (BY MS. CARSON) When you're considering the types of
15 interactions between these different types of molecules, is it
16 appropriate to mix and match?
17 A. No, it's not. Each -- especially when you're mixing two
01:52 18 materials together, it -- each mixture can be very unique
19 depending on what the nature of the partners is.
20 Q. All right. Towards the end of the cross examination,
21 counsel asked you some questions about Clix2. Do you recall
22 that?
23 A. Yes, ma'am, I do.
24 Q. Okay. And I think he was implying that the
25 patents-in-suit are not foundational because you've opined

1 that Clix2 doesn't practice the patents. Do you recall that?

2 A. Yes.

01:53 3 Q. And was Clix2 a successful product?

4 A. In my understanding, no, it was not.

5 Q. Could you sell it today?

6 A. No.

7 Q. And has the manufacturing process for that product
8 changed from that Clix2, that prior generation product, to the
9 accused products?

10 A. Yes, ma'am. In testimony from Samsung engineers I've
11 seen that that -- the original line that was used to make
01:53 12 Clix2 products has been shut down and an entirely different
13 line is used now to make the new products.

14 Q. And what did the Samsung's engineers say about whether
15 Clix2 was N-doped, the transport layer?

16 A. I believe that the testimony from Mr. Jo stated that the
17 ETL and Clix2 was not N-doped.

01:54 18 Q. Thank you.

19 MS. CARSON: I pass the witness.

20 THE COURT: Additional cross examination?

21 MR. PAK: Yes, Your Honor.

22 THE COURT: Just a minute. Let opposing counsel get
23 seated.

24 All right. Proceed with additional cross.

25 MR. PAK: Thank you.

1 are done at SDC?

2 A. Since I joined the company in 2007 till today, I've been
05:13 3 working -- I've been doing the same work and I've worked on
4 deposition work throughout, so I believe I know very well.

5 Q. Were you contacted regarding how the deposition process
6 work in connection with this litigation?

7 A. No communications.

8 Q. Do you know that before Pictiva filed the lawsuit it was
05:14 9 in discussion with SDC for about a couple of years on
10 technical issues? Are you aware of that?

11 A. I did not know that before.

12 THE COURT: Does that complete this witness by
13 deposition?

14 MS. CARSON: It does, Your Honor.

15 THE COURT: Call your next witness, please.

16 MS. CARSON: Our next witness is Jihyun Seo, and she
17 is a corporate representative on organic materials from
05:14 18 Samsung Display. The allocations of time are 8 minutes and 34
19 seconds to Pictiva and 5 minutes and 57 seconds for Samsung.

20 THE COURT: All right. Proceed with this witness by
21 deposition.

22 JIHYUN SEO

23 BY VIDEO DEPOSITION

24 Q. Can you please state your full name for the record?

25 A. My name is Jihyun Seo.

05:15 1 Q. So you are here to testify on behalf of Samsung regarding
2 the organic materials in Samsung's OLED panels. Correct?
3 A. Correct.
4 Q. And there are multiple layers of organic materials
5 between cathode and anode of an OLED device. Correct?
6 A. Correct.
7 Q. What is this document?
8 A. The title of the document is "[REDACTED]
05:15 9 [REDACTED]"
10 Q. And who is the author of this document?
11 A. It states my name.
12 Q. And also under the title, [REDACTED]
05:16 13 [REDACTED] was written: [REDACTED]
14 [REDACTED]
15 [REDACTED]
16 Is that correct?
17 A. Correct.
18 Q. And your team expects that [REDACTED] would transfer holes
19 and block electrons to the [REDACTED]. Is that correct?
05:16 20 A. Correct.
21 Q. So what is a function of [REDACTED]?
22 A. Although [REDACTED] material has the function of transporting
05:17 23 holes, in reality it was a layer [REDACTED]
05:18 24 [REDACTED], to my understanding.
25 Q. Why does Samsung desire to reduce hole injection to the

1 [REDACTED]?

05:18 2 A. For this layer, hole amount had to be reduced to improve
3 image quality.

4 Q. Do you see there is an entry for [REDACTED]?

5 A. Yes.

6 Q. And according to this document, what does [REDACTED] stand for?

7 A. According to what is written in this document, it is

8 [REDACTED].

05:18 9 Q. Okay. And -- and what is the function of that [REDACTED]

10 [REDACTED]?

11 A. Function-wise, it would [REDACTED]

12 [REDACTED].

05:19 13 Q. My question is, according to this document what is a role
14 or function of the [REDACTED] and the [REDACTED]?

05:19 15 A. [REDACTED]

16 [REDACTED] [REDACTED]

17 [REDACTED]

18 Q. What does it mean by [REDACTED]?

05:20 19 [REDACTED] [REDACTED]

20 [REDACTED]

05:21 21 [REDACTED]

22 Q. And what is a micro-cavity?

05:21 23 A. In micro-cavity, photons that are emitted from the [REDACTED],
24 this is done through the reflection of photons that move
25 between the anode and cathode. As the photons move between

05:23 1 the anode and cathode, ultimately light is emitted out of the
2 cathode. And this photon that goes between the anode and
3 cathode, the distance -- the optical distance has to be
4 adjusted and controlled to extract light out of the cathode.

05:23 5 And this is what is called the resonant structure, [REDACTED]
6 [REDACTED] controls
7 the resonant structure.

8 Q. Okay. And [REDACTED] is [REDACTED]. Correct?

9 A. Correct.

10 Q. Why does Samsung include [REDACTED] in its [REDACTED]?

05:23 11 A. It is used to support electron injection in the cathode.

12 Q. So [REDACTED] helps increase the amount of electrons
13 entering into the [REDACTED]. Correct?

14 A. I believe so.

05:24 15 Q. For page 118, right-hand side, do you see there is
16 "[REDACTED]"?

17 A. Yes.

18 Q. And what does the shape of the curve mean?

05:24 19 A. As the title says, it seems to be simulation results of
20 the [REDACTED] profile.

21 CHECK INTERPRETER: [REDACTED] material profile.

22 Q. As expressed by this graph, from simulation, there are
23 both [REDACTED] at different thicknesses. Is that
24 correct?

05:25 25 A. For some areas, I believe there will be areas where they

1 both exist.

2 Q. Which areas do you believe they don't both exist?

05:26 3 A. During the back and forth of the two cycles, in the
4 initial point, and when it returns back, and then goes, and
5 then returns back, in these points there is a probability that
6 the materials do not both exist. And I recall seeing such
7 simulation results.

05:26 8 Q. Okay.

9 CHECK INTERPRETER: And she said she cannot pinpoint
10 exactly which location, at the start of her answer.

11 Q. So all the OLED panels that you make for Samsung
12 Electronics include an [REDACTED]. Correct?

13 A. Correct. To my recollection.

14 Q. Ms. Seo, can you pull up Exhibit No. 8?

15 A. Yes.

05:27 16 Q. And can you please go to page number 6 ending with 71265?

17 A. Yes.

18 Q. Do you see that there is a Korean word between [REDACTED]

19 [REDACTED]? Do you see that?

20 A. Between [REDACTED]?

21 Q. Correct.

22 A. Yes.

05:27 23 Q. And what does -- what is that supposed to mean?

24 A. It says 'light'.

25 Q. Okay. So is it intended to show that light is generated

1 at the interference of the [REDACTED]?

2 A. No.

3 Q. In this training material, between the [REDACTED]
05:28 4 [REDACTED] there is the word 'light' written there. Is that
5 correct?

6 A. Correct.

7 Q. And do you see that there are three Korean words between
8 [REDACTED]?

9 A. Yes.

10 Q. And what do those Korean words mean?

05:28 11 A. It says 'light-emitting surface'.

12 Q. And the same three words appear at the interface between
13 [REDACTED]. Is that correct?

14 A. Correct.

15 Q. The same three Korean words appear at the interface of
05:29 16 [REDACTED]. Is that correct?

17 A. Correct.

18 Q. And what are the Korean words above [REDACTED]?

19 A. Optical distance support or optical spacer.

05:29 20 Q. And the same words appear above [REDACTED]. Is that
21 correct?

22 A. Correct.

23 THE COURT: Does that complete this witness by
24 deposition?

25 MS. CARSON: It does, Your Honor.

1 these two layers are created, what would be your expectation
04:28 2 about whether dopant or emitter material would make its way
3 into the [REDACTED]?

4 MR. SHEASBY: Same objection, Your Honor.

5 THE COURT: Given the inquiry, given that it's
6 conditioned based upon his experience, I'll allow the
7 question.

8 MR. SCHMIDT: Thank you, Your Honor.

04:29 9 THE WITNESS: That would be impossible because
10 basically [REDACTED]
11 [REDACTED].

12 MR. SCHMIDT: Pass the witness, Your Honor.

13 THE COURT: Is there further cross examination?

14 MR. SHEASBY: No further cross examination, Your
15 Honor.

16 THE COURT: All right. You may step down, Mr. Jo.
17 Thank you, Ms. Park.

04:30 18 Defendants, call your next witness.

19 MR. PAK: Your Honor, Samsung Electronics calls its
20 next witness Jihyun Seo, S-E-O. And my partner Lance Yang
21 will be handling the examination.

22 THE COURT: All right. Let's bring the witness in.
23 This witness will also testify with the aid of an
04:30 24 interpreter in the form of Ms. Park.

25 MR. YANG: Your Honor, just FYI, this witness will

1 soon get into confidential business information again, so may
2 we just stay on the confidential record for now?

3 THE COURT: Well, the courtroom is still sealed.
4 We'll keep it that way.

5 MR. YANG: Thank you, Your Honor.

6 THE COURT: When the witness gets beyond the
7 confidential material, let me know.

8 MR. YANG: I will, Your Honor.

04:31 9 (Whereupon, the oath was administered by the Clerk.)

10 THE COURT: Please come around; have a seat on the
11 witness stand.

12 MR. YANG: Your Honor, may Mr. Kim pass out the
13 witness binders?

14 THE COURT: Yes, he may.

04:31 15 MR. YANG: Thank you, Your Honor.

16 THE COURT: All right. Mr. Yang, you may proceed
17 with direct examination.

18 MR. YANG: Thank you, Your Honor.

19 JIHYUN SEO, Ph.D.,

20 having been first duly sworn, testified under oath as follows:

21 DIRECT EXAMINATION

22 BY MR. YANG:

23 Q. Dr. Seo, can you please introduce yourself to the jury?

04:32 24 A. Good afternoon. My name is Seo Jihyun. I live with my
25 husband, and I have a very cute eight-year-old son, and we

1 live in Korea.

2 Q. What company do you work for?

04:32 3 A. I work at Samsung Display.

4 Q. Prior to joining Samsung Display, had you worked on OLED
5 displays before?

04:32 6 A. Yes. I have my Ph.D. in OLED displays, and so my major
7 for Ph.D. was display engineering.

8 Q. Prior to joining Samsung in 2011, were you aware of a
9 product called the Clix2?

04:33 10 A. Yes, I was. So when I was in Ph.D. program, I bought one
11 of those Clix2 phones, and on my daily commute, actually on my
12 daily commute to my university I used to watch American drama
13 Heroes using Clix2.

14 Q. What is your role at Samsung Display?

04:34 15 A. I'm a principal engineer and I lead Materials Development
16 Group.

17 Q. What does the Materials Development Group at Samsung
18 Display do?

04:34 19 A. What we do is to develop and select organic materials
20 that are used for OLED panels.

21 Q. Can you remind us how the light is generated for each of
22 the pixels in Samsung Display's OLED displays?

04:35

23 [REDACTED]

24 [REDACTED]

25 [REDACTED]

04:35 1 Q. How many years have you worked on Samsung Display's [REDACTED]?

2 A. Since 2011 until now.

3 Q. Other than the [REDACTED], are there any other layers in
4 Samsung's displays that generate light?

04:36 5 A. There aren't.

6 Q. Now, today how many emission materials are in each of
7 Samsung Display's [REDACTED]?

04:36 8 [REDACTED]

9 [REDACTED]

10 Q. Do any of Samsung's [REDACTED] use a three-host [REDACTED]?

11 A. No.

12 Q. Why is that?

04:37 13 A. [REDACTED]

14 [REDACTED], and when it comes to

04:37 15 the three-host materials, there wouldn't be any advantage you

16 can consider in terms of the performance. And even in terms

17 of pricing and processes, it would actually increase the

18 prices and also cut down on--interjection--and it would

04:37 19 actually increase the complexities of processes.

20 Q. Who designed the current [REDACTED] that Samsung Display uses?

21 A. I did.

22 MR. YANG: Mr. Krueger, can we put up PX 20?

23 Q. (BY MR. YANG) This is an English translation of a

24 document dated December 30th, 2013 that was originally

25 produced in Korean in this case.

04:38 1 Are you able to read English, Dr. Seo?

2 A. Yes, I am. I'm not good at speaking, but I am able to
3 read.

4 Q. What is this document?

04:39 5 A. This is a document that describes the [REDACTED]

6 [REDACTED].

7 Q. Why did you give this presentation back in 2013?

8 A. Because I wanted the company Samsung Display to use the

04:39 9 [REDACTED] that I developed.

10 MR. YANG: Mr. Krueger, can you turn to page 13,
11 please.

12 Q. (BY MR. YANG) Now, in developing your [REDACTED], what
13 was the problem you were trying to address?

04:39 14 A. It was to overcome the quenching issues that occurred
15 when we were using [REDACTED].

16 Q. How does your [REDACTED] solve the quenching issue?

04:40 17 A. So when we talk about the area where the light is
18 generated, we call that [REDACTED]

19 [REDACTED], and the [REDACTED]

20 [REDACTED]

04:40 21 [REDACTED]

22 [REDACTED]

23 [REDACTED] would be more efficient in
24 terms of generating more light and in terms of the efficiency
25 as compared with the [REDACTED].

04:41 1 Q. Now, did you perform any testing on actual displays to
2 figure out whether your [REDACTED] performed as you
3 expected?

4 A. I did.

5 MR. YANG: Mr. Krueger, can we put on PX 20, 5
04:41 6 through 8, onto the screen together? Thank you.

7 Q. (BY MR. YANG) Now, are these four slides in your
8 presentation where you presented your test results?

9 A. That's right.

10 Q. Does your presentation say anything about using a
11 three-host [REDACTED]?

04:42 12 A. It doesn't.

13 Q. If someone were to say that your presentation showed that
14 three materials would give you a 30 percent improved
15 performance over two materials, would that be a correct
16 interpretation of your document?

04:43 17 A. No, that would not be the case because this document
18 explains [REDACTED].

19 Q. Now, do the color dopants in Samsung Display's [REDACTED] exist
04:43 20 in any other layer?

21 A. No.

22 Q. Is it possible for the color dopants to exist in any
23 other layer?

24 A. It is impossible.

04:43 25 Q. Okay. Let's explore that. Are you familiar with a

1 display code named [REDACTED]?

2 A. I am.

3 Q. Now, if you can turn in your binder to the tab SDC44397,
4 could you let me know what this document is, please?

04:44 5 THE INTERPRETER: Tab number was what again, please?

6 MR. YANG: SDC44397. That's the label on the tab.

04:44 7 I'm sorry. I just gave you two different numbers. SDC72475.

8 THE WITNESS: Yes.

9 Q. (BY MR. YANG) What is this document?

10 A. This is the final sign-off document for the purposes of
11 mass production transfer for the OLED devices to be used for

04:45 12 [REDACTED].

13 MR. YANG: Can we pull up the figure on page 59,
14 please?

15 Q. (BY MR. YANG) Now, what is this showing?

16 A. This shows some part of the assembly line of the mass
17 production facility used for producing [REDACTED] OLED devices.

04:45 18 MR. YANG: Mr. Krueger, can you zoom in on the top
19 assembly line here, the AB line?

20 Q. (BY MR. YANG) Okay. Dr. Seo, what are the orange boxes
21 here?

04:46 22 A. So these boxes, each of these boxes would be used to
23 create one layer or more, and this is a completely vacuum
24 airtight, sealed -- sealed so that you can do the organic
25 material deposition in these chambers.

04:46 1 Q. Okay. So where is the start of this assembly line and
2 where does it end?

3 A. So it starts from all the way to the left where it says
4 1AB, the glass would move from 1AB all the way to the right,
5 and it would end at A AB.

04:47 6 MR. YANG: Mr. Krueger, can we put a red line there
7 to indicate how the glass moves?

8 Q. (BY MR. YANG) Now, in this assembly process, where is
9 the red EML layer made?

04:47 10 A. That would be made in the chamber referred to as [REDACTED]
11 [REDACTED].

12 MR. YANG: Can we point that out, please?

13 Q. (BY MR. YANG) Now, are the [REDACTED] right
14 above that used in any other chamber in this process?

04:48 15 A. No. As you can see, other chambers are using other
16 materials indicated.

17 Q. Now, what does that tell us about whether red light is
18 generated in the OLED?

04:49 19 A. So what this means and shows us -- what this means is
20 that the red light is only generated in red [REDACTED].

21 Q. Now, does Samsung Display also use airtight chambers to
22 make the green and blue [REDACTED]?

23 A. That's right.

24 Q. What would happen if these [REDACTED] materials made their way
04:49 25 into other layers?

1 A. That would become -- that would be defective. The panel
2 would be defective.

3 MR. YANG: Can we pull up PX 21, please?

4 Q. (BY MR. YANG) Dr. Seo, what is this document?

04:50 5 A. It's an internal training material.

6 MR. YANG: Can we turn to page 30, please?

7 Q. (BY MR. YANG) Okay. Now, what is the concept being
8 taught on this slide?

04:50 9 A. This concept is teaching how to use micro-cavity and
10 resonance.

11 Q. Now, if someone were -- well, let me ask you this
12 question. What does the light-emitting surface label there
13 mean?

14 A. This is referring to the bottom surface of the [REDACTED] where
04:51 15 light is generated.

16 Q. Okay. Now let's explore that a little bit. If you focus
17 on the green pixel stack there in the middle, where is the
18 green light generated?

04:51 19 A. It is generated inside the green [REDACTED].

20 MR. YANG: Can we indicate with arrows where that
21 light is coming out of the [REDACTED], please?

22 [REDACTED] [REDACTED] [REDACTED]

23 [REDACTED]

04:52 24 [REDACTED] [REDACTED]

25 [REDACTED]

04:52 1 [REDACTED]
2 [REDACTED]
3 [REDACTED]
4 [REDACTED]
04:53 5 [REDACTED]
6 Q. So if someone were to say that that light-emitting
7 surface label indicated that the light was actually generated
8 outside of the [REDACTED], would they be correct?
04:53 9 A. No, they wouldn't be.
10 Q. Why is this slide calling out that bottom light-emitting
11 surface?
04:54 12 [REDACTED]
13 [REDACTED]
14 [REDACTED]
04:55 15 [REDACTED]
16 [REDACTED]
17 [REDACTED]
18 [REDACTED]
04:55 19 [REDACTED]
20 [REDACTED]
21 Q. Now, turning to the previous slide, does this slide also
22 discuss the same resonance micro-cavity phenomenon?
04:55 23 A. That's right.
24 Q. Okay. And what does that light symbol here mean?
25 A. As I told you earlier, this is also referring to the

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[REDACTED]

Q. Now, have you seen any testing that confirms that there are no emission materials outside of the [REDACTED]?

A. I have.

Q. What kind of testing would that be?

A. So if -- not the [REDACTED]. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] In that instance, you would not be able to maximize the amount of light in the upper part of the pixel and you would not get the color that you wanted, which would lead to panel defects.

Q. Do you also work on the [REDACTED], the [REDACTED]?

A. I do.

Q. How many materials does the [REDACTED] include?

A. It uses [REDACTED]. [REDACTED]

[REDACTED].

Q. Does Samsung's [REDACTED] use any N-dopants?

A. No.

Q. What is the function of the [REDACTED] material inside the [REDACTED]?

A. [REDACTED].

Q. Why doesn't Samsung Display use the [REDACTED] as an N-dopant?

04:59 1 [REDACTED]
04:59 2 [REDACTED]
3 [REDACTED]
4 [REDACTED] [REDACTED]
5 [REDACTED]
05:00 6 [REDACTED] [REDACTED]
7 Q. Now, if someone were to say that the [REDACTED] in the [REDACTED] were
8 an N-dopant, would that be correct?
9 A. No, that wouldn't be.
10 Q. Okay. Let's look into that with JX 14, please.
11 MR. YANG: And if you could go to page 23, that
05:00 12 would be great. Thank you.
13 Q. (BY MR. YANG) Now, which row indicates the [REDACTED]?
14 A. So the second from the last, [REDACTED], that's the one.
15 Q. Okay. Now, where is the organic material and the [REDACTED]
05:01 16 located in this [REDACTED]?
17 A. So you see the reference of [REDACTED]. That's the organic
05:01 18 material. That's the [REDACTED] organic material.
19 Q. Okay. Now, what does this document tell us about whether
20 or not the [REDACTED] is an N-dopant?
05:02 21 A. This document shows us that [REDACTED] cannot be an N-dopant
22 because when you look at the HOMO values for [REDACTED], that is
05:02 23 indicated to be minus [REDACTED], and when you compare that to the
24 LUMO values of the organic material, which is minus [REDACTED], it's
25 lower than that. That's why.

1 Q. If the [REDACTED] were being used as an N-dopant here, what
2 would happen in the display?

05:03 3 A. So [REDACTED] would comprise [REDACTED], so if that is
4 the case, then in the case that you're referring to, that
05:03 5 would make [REDACTED] more conductive. And so if you're talking
6 about a case where [REDACTED] is being used as an N-dopant, and that
7 would actually increase the conductivity of the [REDACTED] layer
05:04 8 significantly which would lead to current leakage or leakage
9 current in between RGB pixels. If that happens, if the
10 leakage current happens, then that means that we would not be
11 able to individually control the RGB pixels, which would lead
05:04 12 to panel defects.

13 MR. YANG: Can we put up SDC44379 [sic].

14 Q. (BY MR. YANG) And if you could turn to that document in
15 your binder, please.

16 A. Did you say 44397?

05:05 17 Q. 44397, yes.

18 A. Yes.

19 Q. What is this document?

20 A. Its's a sales document of a company called [REDACTED], which
05:05 21 is a -- which is one of the OLED materials suppliers.

22 Q. What is the material that [REDACTED] was trying to sell to
23 Samsung Display?

24 A. It is an [REDACTED] material.

25 Q. Okay.

1 MR. YANG: Can we pull up page 4, please?

2 Q. (BY MR. YANG) Now, is this a Samsung Display OLED being
3 shown here?

05:06 4 A. It is not. It is [REDACTED] OLED.

5 Q. Did Samsung Display buy or use any of the materials shown
6 here?

7 A. No, we never did.

05:06 8 Q. Now, for the entire time you've been at Samsung Display,
9 to your knowledge has anyone ever used OSRAM technology?

10 A. No, I haven't seen anyone.

11 Q. How would you describe your time and the work that your
12 team has been doing since you've been there?

05:08 13 A. So we are rather proud of our technology. It is because
14 we have spent a very long time to innovate new technologies
15 and to come up with new technologies, so we have spent a lot
05:08 16 of time in R&D. And these new technologies that we came up
17 with, I am very proud that -- to say that these have been
18 thoroughly tested so that it can be rendered appropriate for
19 our mass production.

20 Q. Thank you, Dr. Seo.

21 MR. YANG: I pass the witness, Your Honor.

22 THE COURT: All right. Cross examination by the
23 Plaintiff.

24 And I'm assuming we need to keep the courtroom sealed for
25 cross examination.

08:31 1 THE COURT: All right. We had finished Ms. Seo
2 yesterday. Is that correct?

3 MR. PAK: Yes, Your Honor.

4 THE COURT: And Defendants' next witness is
5 Dr. Katona?

6 MR. PAK: Yes, Your Honor.

7 THE COURT: All right. Let's bring the jury in,
8 please.

9 (Whereupon, the jury entered the courtroom.)

08:34 10 THE COURT: Will come back, ladies and gentleman.
11 Please have a seat. It's good to see you again. We'll
12 continue with the Defendants' case in chief.

13 Mr. Pak, call your next witness.

14 MR. PAK: Good morning, ladies and gentleman.

15 Samsung calls Dr. Thomas Katona to the stand, and the

08:34 16 examination will be handled by my partner, Lance Yang.

17 Thank you.

18 THE COURT: All right. Dr. Katona, if you'll come
19 forward and be sworn, please.

20 (Whereupon, the oath was administered by the Clerk.)

21 THE COURT: Please come around, sir, have a seat on
22 the witness stand.

23 MR. YANG: Your Honor, may we approach with the
24 witness binders?

25 THE COURT: Yes, you may.

08:35 1 MR. YANG: Thank you. Your Honor, may I proceed?

2 Oh, sorry, Your Honor.

3 THE COURT: Yes, counsel, you may proceed.

4 MR. YANG: Thank you.

5 THOMAS KATONA, Ph.D.,

6 having been first duly sworn, testified under oath as follows:

7 DIRECT EXAMINATION

8 BY MR. YANG:

9 Q. Good morning, Dr. Katona.

10 A. Good morning.

08:36 11 Q. Could you please introduce yourself to the jury?

12 A. Yes. My name is Dr. Thomas Katona. I've been -- I grew
13 up in the midwest. I've been married for over 25 years. I'm
14 a proud girl dad. I've got seventh and ninth grade daughters,
15 and I'm really proud of the fact that I was the first
16 generation in my family to have the opportunity to go to
17 college.

18 Q. Dr. Katona, can you tell us about your work at the
08:36 19 university today?

20 A. Yes. I'm a full professor at California Polytechnic
21 State University. We're one of the largest undergraduate
22 engineering colleges in the country, very similar to Texas A&M
23 actually, and I have a role there as a professor in the
24 college of engineering.

25 I also work on teaching students about product design and

1 commercialization of new technologies. I work in our Center
08:36 2 for Innovation and Entrepreneurship as the academic director.

3 I also have a Ph.D. in electrical and computer
4 engineering from the University of California at Santa
5 Barbara, which is one of the premier research universities in
6 optoelectronic semiconductors. I studied under Steve Dunbars
7 and Shuji Nakamura, who won a Nobel prize for inventing the
8 blue LED.

9 THE COURT: Could you slow down a little bit,
10 please, Dr. Katona?

11 THE WITNESS: Yes.

12 THE COURT: Thank you.

13 Go ahead, counsel.

14 MR. YANG: Thank you, Your Honor.

08:37 15 Q. (BY MR. YANG) Do you also have industry experience?

16 A. I do. So right after my undergraduate degree, I worked
17 for several years for Hughes Aircraft, which later became part
18 of Raytheon. I worked on weapon systems. I had a top secret
19 clearance developing infrared sensors for missile systems and
20 then also for tactical night vision systems.

21 Later went back to school. And then after that, my first
08:37 22 industry experience after my Ph.D., I moved to South Carolina
23 for a start-up company that was commercializing deep
24 ultraviolet light-emitting diodes. Those were used for bio
25 agent detection, some other military systems, and then later

1 for germicidal water disinfection.

2 My role there was the R and D program manager. So I
3 interfaced with all of our government contracts -- government
4 contacts as our start-up was largely funded from government
5 research dollars.

08:38 6 I brought up our first clean room. So we'll hear a lot
7 about semiconductor processing today. And I have a background
8 in CVD deposition cleaning and processing. I was also the
9 point of contact for our company that helped transition our
10 semiconductor fabrication processes into a larger manufacturer
11 in Korea that was an investor in our company.

12 After that, I joined a company Sorra, which was another
08:38 13 start-up company that was started by my Ph.D. advisors. So
14 that was a vertically integrated LED and lighting
15 manufacturer. We did everything from growing the bulk
16 crystals all the way up through delivering end lighting
17 products like the type that you would see in the ceiling here.

18 We started that company. I was one of the first
19 employees. We actually moved the company up to the Bay Area,
20 and I was in charge of helping bring up our clean room
08:39 21 facility for the processing and then later became the director
22 of business development where I benchmarked all of our
23 products, defined the products, and benchmarked them against
24 all of our competition.

25 And, last, I was the VP of products at NEXT Lighting

1 where I was in charge of designing and developing the products
2 and taking that into developing our processes for bringing
3 into manufacturing.

08:39 4 MR. YANG: Your Honor, at this time Samsung offers
5 Dr. Katona as an expert in OLED technology, manufacturing,
6 thin film encapsulation, and the subject matter of the '389,
7 '425, and '547 Patents.

8 THE COURT: Is there objection?

9 MR. SHEASBY: No objection.

10 THE COURT: Without objection, the Court will
11 recognize this witness as an expert in those designated
12 fields.

13 Please continue, counsel.

14 MR. YANG: Thank you, Your Honor.

15 Q. (BY MR. YANG) Dr. Katona, what were you asked to do in
16 this case?

17 A. So I had three assignments in this case. The first was
08:40 18 to look at whether Pictiva had proven infringement for the
19 three patents I was assigned. That's the '389 Patent, the
20 '425, and the '547. And my determination is that they did not
21 prove that.

22 Next was to look at invalidity for these patents, and I
23 did determine that I believe the patents were invalid based on
24 my research.

25 And the last had to do with technical apportionment, and

08:40 1 I did not believe that the benefits that were indicated that
2 these patents were alleged to provide, that they did provide
3 those. And, moreover, it was my determination that Samsung's
4 own innovations were what provided those benefits.

5 Q. What materials did you consider in forming your opinions
6 in this case?

7 A. So I reviewed a lot of documents for this case, including
08:41 8 the asserted patents themselves; their file histories; prior
9 art, including patents and publications; the claim
10 construction that was issued by this Court; manufacturing
11 recipes and different process documentation; technical
12 documents that were disclosed by Samsung as part of the
13 process; obviously the expert reports that were delivered; and
14 then discovery and depositions.

08:41 15 Q. Now, let's start with the '389 Patent. That was the
16 encapsulation patent. Can you walk us through what the patent
17 itself describes as already pre-existing encapsulation
18 techniques?

19 A. Yeah. So this patent is about encapsulation, thin film
20 encapsulation, and the patent itself right at the beginning
21 calls out figure 1 as prior art, which is showing that thin
22 film encapsulation and methods to do it existed.

08:42 23 So what's shown here as prior art is down it labeled 104.
24 That's our organic light-emitting diode. The planarization
25 layer is the brown layer over it, and then the barrier layer

1 is what seals off the device. They call it in this patent the
2 PML, or polymer multilayer, but it's also been referred to in
3 this case as thin film encapsulation.

4 So this shows that the thin film encapsulation was not a
5 novel concept; it was in the prior art. So the invention of
08:42 6 it is not claimed in the patent.

7 Q. Now, according to at least the patent, using the prior
8 art method, how would you be able to place the encapsulation
9 in certain select areas?

10 A. So this is also a prior art figure from the patent, and
11 so I've annotated it with the gray on top of it. So on the
12 left what you see is you would initially blanket deposit all
08:43 13 of the layers on top of the devices. So the OLED device we're
14 now looking from the top here is the rectangle. The little
15 boxes on the OLED device are what represents the electrical
16 contacts. And you have to get electricity into the device, so
17 that's where you would actually connect to the device and get
18 the electricity in.

19 So what's shown here is a blanket deposition over the
20 entire kind of mother glass or substrate, and then you would
21 go in and remove the gray areas where you don't want them,
08:43 22 including the electrical contacts and the scribe and break
23 lines.

24 Q. Now, what does the '389 Patent claim to be its invention?

25 A. So the '389 Patent is fundamentally a method claim which

1 is sort of the process to get somewhere. So, again, it's not
2 claiming the thin film encapsulation.

3 So this morning when I came to the courthouse, I had to
4 type in the address because I don't live here. And I got a
5 couple of different directions to get here, and I chose one.
08:44 6 But I could have chosen a different one. I still would have
7 gotten to the courthouse.

8 So that's kind of what we're looking at here is what's
9 claimed is just depositing directly on the area that you want
10 so you don't have to go in and do that removal step that was
11 shown on the previous slide.

12 Q. So just to be clear, the '389 Patent, is that a method
13 claim or an apparatus claim?

14 A. It's a method claim.

15 Q. So whether you use the '389 selective deposition process
08:44 16 or the prior art non-selected deposition process, could you
17 get to the same TFE structure?

18 A. Yes, you could.

19 Q. Now, have you applied the Court's claim construction in
20 analyzing the '389 Patent?

21 A. Yes, I have. And there's two claims -- there are claim
22 constructions I'll highlight here. The first one is
23 selectively depositing. That's basically depositing in the
24 desired areas only.

08:45 25 And then the second one is a planarization layer, and

1 there's sort of two parts to the planarization layer. The
2 first is that it's a layer that planarizes such that the
3 propagation of defects don't go from one layer to the next.
4 So you've got to seal off the defects. And then the second
5 part to that is that the topography of the underlying layer is
6 not reproduced.

7 Q. Now, in analyzing the validity of the '389 Patent,
8 generally what were you trying to do?

08:45 9 A. Generally I was trying to look at and understand the
10 claims of the existing -- or of the asserted patents and look
11 at prior art to understand whether the prior art either
12 anticipated or rendered obvious those claims.

13 Q. Let's look at some of the prior art that you analyzed for
14 the '389 Patent. What are you showing on the screen here?

15 A. So we're first looking at two patents--the first one,
08:46 16 JX-35, and then JX-39. These are referred to as the Jones and
17 the Burrows patents. These are two pieces of prior art that
18 are actually owned by Samsung Display.

19 Q. Okay. Are these -- if you look at the Jones and Burrows
20 patents, do these predate all of OSRAM's asserted patents in
21 this case?

22 A. They do predate all of them. And specifically for the
23 '389, it predates it by several years.

08:47 24 Q. Let's look at Jones' TFE. Does Jones disclose a
25 selectively deposited TFE?

1 A. Yes, it does. So if we -- we're looking at a cross
2 section again here of the device, and the blue highlighted
3 area is the organic light-emitting diode itself. We'll try to
4 keep the same colors here.

08:47 5 The brown area is the planarization layer, and you can
6 see on the right edge of the organic light-emitting diode
7 there's a sharp drop-off step. That step is not replicated up
8 to the top layer. So the topography of the underlying layer
9 is not replicated. And the planarization here sort of has a
10 smooth, sloping edge.

11 And then the barrier layer is the silver layer that's
12 labeled on top of it. That's the layer that's actually
13 provides the end sealing from the moisture and the oxygen.

08:47 14 Q. Where does the Jones patent disclose that this is a
15 selective deposition process?

16 A. So up in the top part of Jones in 5:47 through 41 [sic],
17 it talks about using shadow masks, and Pictiva's experts
18 talked about those the other day. It's basically like a
19 stencil that you spray through. And it specifically calls out
20 similar to the '389 Patent that they're using it to keep the
21 electrical contacts clean. So same motivation.

08:48 22 Q. So does Jones disclose every limitation of claim 34 of
23 the '389 Patent?

24 A. Yes, I believe it does.

25 Q. Do you understand that Pictiva has claimed that Jones

1 does not include a planarization layer?

2 A. Yes, I understand that.

3 Q. And what is your response to that?

4 A. I disagree with it. So Pictiva has claimed that because
5 the very top surface of 150 isn't entirely flat, that it has a
08:48 6 sloping edge, that it's not a planarization layer.

7 Q. Now, were you here when Pictiva's expert accused
8 Samsung's thin film encapsulation of being -- of having a
9 planarization layer?

10 A. Yes, I was.

11 Q. And what are you showing here on this slide?

12 A. This is a cross section of the accused device or one of
13 the accused devices, and you can see highlighted is the
14 accused planarization layer. They call that the [REDACTED]

08:49 15 [REDACTED]. And you can see on the [REDACTED]

16 [REDACTED]

17 [REDACTED]

18 Q. Let's move on to the Burrows patent. Can you tell us
19 about the Burrows patent?

20 A. Yeah. So the Burrows patent is another example of prior
21 art that shows a thin film encapsulation process. We have on
22 the bottom 205, which is the substrate that actually contains
23 the device. It's just shown as a block here. But you can see
08:50 24 in paragraph 8:1 through 7, it says the mother glass is diced
25 and has environmentally sensitive devices on it. So those

1 devices aren't shown on 205, but they're part of -- sorry,
2 yeah, they're part of 205.

3 And then the planarization layer, again we've kept as the
4 brown coloring that's been highlighted here for -- to ease
5 your finding it. Those are the layers 210, and then the
08:50 6 barrier layers are the sealing layers or layers 215.

7 Q. And does Burrows also disclose selective deposition?

8 A. It does. So similar to the last patent, it -- Burrows
9 discloses using shadow masks and for the deposition of the
10 decoupling layer, the planarization layer, and the barrier
11 layer.

08:50 12 Q. Claim 35 of the '389 Patent also has a requirement
13 regarding inkjet printing the materials. Does Burrows
14 disclose inkjet printing?

15 A. I believe it does. So Burrows in 7:28 through 35
16 specifically highlighted here, it talks about one of the
17 deposition methods that could be used is spraying. And inkjet
18 printing is a type of spraying.

19 Q. Now, does Pictiva dispute that either of these two
08:51 20 Samsung patents disclose selectively deposited encapsulation?

21 A. They do not.

22 Q. Let's look at another non-Samsung patent on selective
23 deposition called Ni. Can you describe Ni for the members of
24 the jury?

25 A. Yes. So Ni is another patent that discloses a thin film

1 encapsulation process. And what you see here, again we're
2 looking at cross section, the blue is the organic
3 light-emitting diode or sometimes may call environmentally
4 sensitive device.

08:52 5 The planarization layer is the brown again, and you can
6 see how it's filling in the entire layer with these ribbed
7 structures, 103. It covers them over and plane rises. And
8 then the barrier layer or layers are deposited on top of that
9 structure.

10 Q. And what are you showing here on this slide regarding
11 Ni's thin film encapsulation?

12 A. So this is a figure from Ni. And, again, I've added the
08:52 13 gray boxes on top of it. But a figure from -- or the gray
14 coloring figure from Ni, again top down view of the device
15 comparing it side-by-side with the top down view that we saw
16 in the '389 Patent. And what you see is Ni is disclosing
17 selectively depositing in just the area where the devices are,
18 similar to what's shown in the '389 Patent.

19 Q. Now, Pictiva has claimed that it wouldn't have been
08:52 20 obvious for someone who is in the field to use inkjet printing
21 to deposit encapsulation layers. Do you agree with that?

22 A. I disagree with that.

23 Q. Why is that?

24 A. So, as an example of another prior art, this is DX 31
25 from Yamazaki, which is prior art showing inkjet printing of

1 organic materials. And specifically in Yamazaki, he equates
2 inkjet method with spraying, which is exactly what I've just
08:53 3 called out, and this demonstrates that I think they also say
4 it's a conventional inkjet method.

5 So this was known technology. It's not like it was a new
6 technology, and it was known for depositing organic materials.
7 Yamazaki is actually more challenging for the deposition than
8 what's in the '389 Patent because Yamazaki is talking about
9 inkjet printing the actual pixels, so the little small dots,
08:53 10 where the planarization layer is kind of blobbing material
11 over a much larger area, which is an easier process.

12 Q. So, Dr. Katona, would the combination of Burrows, Jones,
13 and Yamazaki render the '389 Patent, claims 34 and 35,
14 invalid?

15 A. Yes, that's correct.

16 Q. And would the combination of Ni and Jones also render
17 claims 34 and 35 invalid?

08:54 18 A. Yes, that's correct.

19 Q. I'd like to move on to Pictiva allegations of
20 infringement. Now, Pictiva has alleged that Samsung's
21 deposition process is selective. Do you agree with that?

22 A. No, I do not.

23 Q. And can you remind us what the construction of selective
24 deposition means?

25 A. It's depositing in the desired areas.

1 Q. Okay. And does Samsung deposit their TFE in the desired
2 areas?

08:54

3 [REDACTED]
4 [REDACTED]
5 [REDACTED]
6 [REDACTED]
7 [REDACTED]
8 [REDACTED]
9 [REDACTED]

08:55

10 [REDACTED]
11 Q. And what do they call the [REDACTED]?

12 A. So it's done by [REDACTED]
13 [REDACTED]
14 [REDACTED]
15 [REDACTED]

08:56

16 Q. Now, is it your understanding that Pictiva's claimed that
17 the inventors of the '389 Patent actually came up with their
18 idea a few -- almost a year before it was actually filed with
19 the Patent Office?

20 A. Yeah. So their claim conception date is in February of
21 2001. And I've reviewed the email exchange from the inventors
22 from that time, and what I see in their exchange is not
23 something that's conceived such that they know what they're
24 supposed to be doing.

25 But as you can see their quotes, they don't know if it

1 will work, it's never been tried, they see all sorts of issues
2 with it. Just an undeveloped idea. This to me does not seem
08:56 3 like something that has truly been conceived.

4 Q. Now, with all of the prior art and pre-existing thin film
5 encapsulation techniques that already existed, in your
6 opinion, what was the technology that really, really made the
7 lifetime benefit possible for Samsung's products?

8 A. Now, what's interesting to note is, you know, we're
9 looking at patents from the late '90s and early 2000s. The
08:57 10 thin film encapsulation didn't get into their mass production
11 until much later, and part of that is just putting the
12 process -- or putting these materials down wasn't enough to
13 ramp up high volume manufacturing.

14 So you have particles in these lines even. You heard
15 Dr. Seo talking about these high vacuum chambers that they do
16 the deposition. There's still particle problems. [REDACTED]

17 [REDACTED]

08:57 18 [REDACTED]

19 [REDACTED]

20 [REDACTED]

21 [REDACTED]

22 [REDACTED]

23 [REDACTED]

24 [REDACTED]

25 [REDACTED]

08:57

1 [REDACTED]
2 [REDACTED]
3 [REDACTED]
4 [REDACTED]
5 [REDACTED]
6 [REDACTED]
7 [REDACTED]
8 [REDACTED]
9 [REDACTED]

08:58

10 [REDACTED]
11 [REDACTED]
12 [REDACTED]
13 [REDACTED]
14 [REDACTED]
15 [REDACTED]
16 [REDACTED]
17 [REDACTED]
18 [REDACTED]

08:58

19 [REDACTED]
20 [REDACTED]
21 [REDACTED]

22 And that took multiple years of development effort for
23 them to do, and that technology was required for them to get
24 the yields up to actually take what was, you know, a fairly
25 simple process of developing these planarization layers but

1 putting it into the practice where you could do it in a
2 factory at high volume and get the types of yields that you
08:59 3 would need to deliver products.

4 Q. Let's move on to the '425 Patent, which was the N-doping
5 ETL patent. Now, can you describe the concept of improper
6 inventorship to the jurors?

7 A. Yeah. So improper inventorship, any patent -- the names
8 on the patent, the inventors that are on there have to
9 contribute to the claim language of the patent, and people
08:59 10 that did not contribute cannot be on the patent. So if you
11 either have too many inventors or not enough inventors on your
12 patent, that's improper inventorship.

13 Q. And did you find that problem with the '425 Patent?

14 A. It's my opinion that, yes, the '425 Patent does have
15 improper inventorship.

16 Q. And if it does have improper inventorship, is the patent
17 invalid?

18 A. Yes, that's correct.

19 Q. Let's look at that analysis that you did. Can you
20 describe what you're showing on the screen here?

09:00 21 A. Yeah. So the '425 Patent actually dates back to an
22 original filing from OSRAM back in 2009 and that was issued as
23 the '567 Patent. Pictiva then purchased that patent 11 years
24 later in 2020, and then there was a follow-on patent, the '425
25 one that we're discussing today, from January of 2023. So

1 almost 14 years later.

09:00

2 Q. Now, let's look at the inventors of the original '425
3 Patent. What do we see here on the screen?

4 A. So the inventors of this patent are actually not all from
5 OSRAM. The first two are listed are from OSRAM. The rest are
6 from a product design company called Kiska that OSRAM had a
7 joint development partnership with.

8 Q. By product design, what do you mean?

09:01

9 A. It's the type of firm that you would go to if you sort of
10 have a technology and you're looking at people that add form
11 and function to it. So, yeah, they help with all the
12 industrial design, making things look pretty.

13 Q. Now, what did your investigation into the documents that
14 Pictiva had to produce in this case reveal to you about
15 inventorship of the '425 Patent?

09:01

16 A. So, first, if you look at the top of this slide, this is
17 from internal Kiska presentation that Pictiva disclosed
18 showing images of concepts that the Kiska folks had come up as
19 part of that joint development with OSRAM. So they came up
20 with sort of novel lighting concepts with these OLEDs. The
21 one on the far right would be integrated into your shower.
22 The one on the far left was some sort of concept for like an
23 alarm clock light that would come on to help wake you up or
24 things that would be integrated with your heating element in
09:02 25 your home.

1 Q. And did these same figures make their way into the '425
2 Patent application?

3 A. Yeah. So these figures on the bottom now are directly
4 out of the patent, and you can see where the origin was which
5 was directly from these concepts from the partnership with
6 Kiska.

7 Q. Now, let's compare the original patent claims in the
8 older OSRAM patent to the '425 Patent claims. On the
09:02 9 left-hand side here, what are you showing?

10 A. So the left-hand side are the original -- the original
11 claim 1 from the patent that was issued, and you can see it
12 starts out talking about a luminaire. So a luminaire is like
13 the light that's in the ceiling here. It is an end lighting
14 fixture, and it's similar to what we saw on the last page,
15 these novel luminaires. So that was the original patent
16 issued.

17 Q. Did claim 1 of the original OSRAM patent include examples
18 of the type of luminaires it was directed toward?

09:03 19 A. Yes. So some of the examples were emergency lighting,
20 changing cubicle vision protection. So different sort of
21 novel lighting concepts.

22 Q. Now, does the '425 Patent claim being asserted here have
23 any of those luminaire limitations?

24 A. The luminaire has been dropped completely. So where all
25 the limitations in that patent now are specifically about an

1 organic light-emitting diode.

09:03

2 Q. What does that mean about the fact that the Kiska
3 inventors are still listed on the '425 Patent?

4 A. So Kiska is a product design firm. They don't develop
5 fundamental OLED technology. So I don't understand how they
6 would still be inventors on this patent.

7 Q. Is that one of the reasons you find this patent to be
8 invalid?

9 A. Yes, that's correct.

09:04

10 Q. Let's move on to Pictiva's allegation that the '425
11 Patent is infringed by Samsung. Do you agree with that
12 allegation?

13 A. I do not.

14 Q. And why is that?

15 A. So the claim that's asserted here on the '425 is claim 2
16 which depends from claim 1. So for -- to find infringement,
17 all the parts of claim 1 plus claim 2 have to -- to be met.
18 And I've specifically highlighted two areas that I don't think
19 Pictiva has demonstrated have been met. The electron
20 transport layer has to be N-doped, and therefore if it's not,
21 claim 2 cannot be satisfied.

09:04

22 Q. What are you showing on this slide here?

23 A. [REDACTED]

24 [REDACTED]

25 [REDACTED]

09:05

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Q. Were you here for Dr. Seo's testimony yesterday where she said Samsung does not use an N-doped ETL?

A. Yes, I was.

Q. Were you here in the courtroom when Pictiva said that the novel aspect of the '425 Patent was disclosed using an N-dopant, specifically [REDACTED], in the ETL?

A. Yes, I was here for that.

Q. Does the '425 Patent itself even suggest that?

A. It doesn't. Highlighted here from 26:32 to 64, you can see that what they specifically call out is [REDACTED] not as a dopant. This is from the patent itself, but as the matrix material in the electron transport layer.

Q. Is there any example of using [REDACTED] as an N-dopant in the '425 Patent?

A. There is not.

Q. So does Samsung infringe the '425 Patent?

A. No.

Q. Let's look at invalidity. What are your opinions regarding the validity of the '425 Patent?

A. It's my belief that the '425 Patent is also invalid.

Q. And what is one of the prior art references you rely on?

A. The first one is this Clix2 device which we've heard and

09:06 1 seen I guess in the courtroom, which was an MP3 player that
2 predated the '425 Patent.

3 Q. Now, what evidence regarding the Clix2 did you review in
4 coming to your opinions?

5 A. So I looked at specifically DX 7, DX 8, DX 10, and DX 12,
6 in addition to other documents. So these included things like
09:07 7 process -- Samsung's process forms, product design reviews. I
8 looked at sales data from the company that sold the eventual
9 Clix2.

10 I also looked at and helped supervise analysis --
11 tear-down analysis and testing from a group called Evans
12 Analytical Group, which is an independent testing lab that did
13 some testing on a Clix2 product.

14 Q. Let's look at the U.S. sales record for that Clix2
09:07 15 manufacturer that you mentioned. What are you showing here in
16 the left-hand side of the screen?

17 A. So the first thing I'm showing is that this is from the
18 head of legal affairs from Dreamus which was the subsequent
19 company from ReignCom who is attesting that the data that was
20 provided was the actual sales data of the Clix2.

21 Q. And what does this sales data tell us?

22 A. So looking at the sales data, it shows that this device
23 was sold into the U.S. by at least April of 2007, and that in
09:08 24 the first three-quarters of the year, they sold 13,489 devices
25 into the U.S.

1 Q. And in your experience both in the industry and also in
2 your role as one of the leaders of the entrepreneurship group
3 at the university, what would you make of these sales numbers?

4 A. Well, I have a rough idea of what an MP3 player cost at
5 that time, and I would consider that a successful first
09:08 6 year -- first partial year of sales.

7 Q. All right. Let's walk through the Clix2 and what it
8 shows. Can you sit -- can you walk us through what it
9 discloses with respect to the organic layer sequence, the
10 radiation exit area, and the encapsulation limitations?

11 A. Yeah. I don't think these are disputed by anyone, but
12 they do have, you know, they contain OLED, so there's an
13 organic layer sequence. We saw the display, light comes out
14 of it, so it must have a radiation exit -- exit area.

09:09 15 The devices were encapsulated, and specifically here I
16 call out it says it's encapsulated with glass. So it's got a
17 glass encapsulation.

18 Q. And then are all of these features disposed on a carrier?

19 A. Yes. So this is a cross section now of the device. And
20 we have DX 10.0013, and there is a carrier substrate or a
21 mother glass on the bottom.

09:09 22 Q. The claims also require using iridium in the emission
23 layer. Did Clix2 do that?

24 A. Yes. So the DX 008.0009 shows [REDACTED], which is the [REDACTED]
25 [REDACTED].

1 Q. Did Clix2 include an [REDACTED]?

2 A. Yes, it did. You can see on the figure on the right, the
09:10 3 cross section, it has an [REDACTED]. So
4 that's the [REDACTED].

5 Q. And does this [REDACTED] include [REDACTED]?

6 A. It does.

7 Q. Okay. Is this an N-doped [REDACTED]?

8 A. I don't believe it's been shown that it is.

9 Q. What is the LUMO of the [REDACTED] organic material in this
10 [REDACTED]?

09:10 11 A. The LUMO value for [REDACTED] is [REDACTED] EV, which is similar to
12 what Dr. Seo testified yesterday for all of the allegedly
13 infringing products.

14 Q. Now, you understand that it's Pictiva's contention that
15 Samsung Display's [REDACTED] are N-doped. Correct?

16 A. Yes, that's correct.

17 Q. Now, under that interpretation, would the Clix2 also be
18 N-doped?

19 MR. SHEASBY: Your Honor, objection. May we
20 approach?

09:11 21 THE COURT: Approach the bench.

22 (The following was had outside the hearing of the
23 jury.)

24 THE COURT: I have a wheel barrow full of binders
25 back here for cross examination apparently. What's the issue,

1 Mr. Sheasby?

09:11

2 MR. SHEASBY: Yes. He just admitted that the Clix2
3 was not N-doped, so it's now not anticipating. Under X's
4 interpretation, then it is anticipating. He hasn't shown any
5 evidence of what X's interpretation is. He hasn't laid any
6 foundation as to what our interpretation is. He hasn't shown
7 how our interpretation is the same. So for him just to say
8 that is completely inappropriate.

9 He said it's not N-doped. He should now move on. But to
10 sort of characterize our interpretation just out of the blue
11 is not rigorous or appropriate.

09:12

12 THE COURT: What's your objection? I don't need a
13 commentary. What's your objection? What's your evidentiary
14 or procedural objection?

15 MR. SHEASBY: Yes, Your Honor. That practicing the
16 prior art is not a defense.

17 THE COURT: What's your response, Mr. Yang?

18 MR. YANG: Your Honor, that's not our position.
19 We're simply saying under their interpretation of the claims
20 Clix2 also satisfies. I'll note, Your Honor, that this was
21 something they tried to strike from Dr. Katona's report.

09:12

22 Judge Payne already denied saying that it was a proper
23 analysis to also analyze the product under their view of the
24 patent.

25 THE COURT: Anything else, Mr. Sheasby?

1 MR. SHEASBY: Yes, Your Honor. He hasn't laid the
2 foundation of what our analysis is. So for him to say it just
3 out of the blue like this, Judge Payne said it has allowed him
4 to go through his detailed analysis about how our
5 interpretation is the same as that interpretation. He's --
6 just throwing it out in the air to save time like this is --
09:13 7 it's improper. Let him go through our interpretation and show
8 the jury how it's different or the same.

9 THE COURT: Mr. Yang?

10 MR. YANG: Your Honor, I'm not sure what he means by
11 that. We're simply saying what their interpretation is. I
12 don't know what else beyond that he wants us to say. He's a
13 responsive expert responding to what their expert has said.
14 So he's simply laying out the position which they've already
15 set forth in their first two days of trial, and he's simply
16 saying, if you look at the claims like that, then this is the
17 result.

09:13 18 THE COURT: All right. I'm not going to sustain any
19 objection at this juncture. I want to hear the rest of the
20 witness' testimony. If you think the completion of the
21 witness' direct testimony opens the door to something, let me
22 know.

23 MR. SHEASBY: I understand the instruction.

24 THE COURT: But I'm not going to interrupt the
25 continuation of the testimony at this juncture.

1 MR. SHEASBY: Thank you, Your Honor.

2 THE COURT: Let's proceed.

3 MR. YANG: Thank you, Your Honor.

09:14 4 (The following was had in the presence and hearing
5 of the jury.)

6 THE COURT: All right. Let's proceed, please.

7 MR. YANG: Thank you, Your Honor.

09:15 8 Q. (BY MR. YANG) Now, Clix2 doesn't use an N-doped [REDACTED], but
9 would it have been obvious to someone who was in this field to
10 use an N-doped [REDACTED] if they wanted to?

11 A. Yes. So there's a prior art reference from Wei which
12 shows an N-doped [REDACTED] using [REDACTED] in the [REDACTED]. And if one were
09:15 13 motivated to N-dope the [REDACTED], this prior art would have been
14 evidence that you could indeed go ahead and do that.

15 Q. So does the of Clix2 in Wei render the '425 invalid?

16 A. Yes, that's correct.

09:15 17 Q. Now, what is the DX number for Wei?

18 A. I'm sorry. I'm not seeing it.

19 Q. We'll come back to that.

20 A. Okay.

21 Q. Now, did you find any prior art that did use an N-doped
22 [REDACTED]?

09:16 23 A. Yes, I did. So looking at Kondakova, which is DX 32 and
24 dated from 2004, Kondakova I think discloses the inventions of
25 the '425 Patent.

1 Q. Can you walk us through the undisputed limitations as far
2 as Kondakova?

3 A. So most of Kondakova is undisputed by Pictiva. So we'll
4 quickly go through those. It shows an organic layer sequence
5 that's highlighted. There's a radiation exit area. It's
09:16 6 deposited on a carrier. I tried to call each of those out
7 with different colors. It does emit light so there's suitable
8 phosphorescent materials. And you can see highlighted in
9 paragraph 193 on the right, the emitter materials contain
10 iridium.

11 Q. What is the exhibit you're referring to here and the
12 paragraph number?

13 A. DX 32, paragraph 193.

09:17 14 Q. Okay. Now, let's turn to the N-doped ETL comprising [REDACTED]
15 limitation that was supposed to be the novel aspect of the
16 '425 Patent. Does Kondakova disclose this?

17 A. Yes. Kondakova discloses both an electron transporting
18 layer that's N-doped. So specifically it talks about in
19 paragraph 355 of DX 32 doping the ETL with an alkaline metal,
20 and it gives one example of [REDACTED]. That's not [REDACTED],
09:17 21 but just [REDACTED], the alkaline metal. It also talks of Cesium
22 as another alkaline metal.

23 And then in the bottom in paragraph 226, it references
24 the ETL could be, for example, [REDACTED] in the
25 section where they specifically talk about electron transport

1 layers. And they say that any metal chelated oxynoid can be
2 used, of which [REDACTED] is an example.

09:18 3 Q. So does Kondakova invalidate claim 2?

4 A. Yes, it does.

5 Q. Both either anticipation or obviousness?

6 A. Yes.

7 MR. YANG: And for the record, the Wei article was
8 JX 48.

9 Q. (BY MR. YANG) Now, did you also look into the technical
10 benefits of the '425 Patent?

11 A. I did.

12 Q. And what was your conclusion regarding the technical
13 benefits of the '425 Patent to Samsung's products?

09:18 14 A. So I didn't find the Samsung's products practice the '425
15 Patent, so I ascribed zero benefits because they seem to be
16 doing just fine without it. But if I had to ascribe some
17 value, it would be very minimal and I ascribed a minimal value
18 of .2 percent.

19 Q. Now let's move on to the '547 Patent, and this is the
20 patent that Pictiva's been calling the QD display patent.

09:19 21 Now, can you walk us through what the '547 Patent is
22 actually about?

23 A. Yes. So this is figure 1B from the '547 Patent, and what
24 it calls out on the bottom is a non-yellowish color when the
25 organic layer sequence does not emit light. So if we want to

1 think about what this patent was fundamentally about is the
2 inventors wanted a device that, when it was off and when it
3 was on, would look the same.

09:19 4 So you can imagine coating a blue organic light-emitting
5 diode with like a yellow phosphor, part -- some of the blue
6 light comes through and some of yellow light comes out and it
7 looks white. And what they were concerned with was when you
8 turn that device off, then it would look yellow because light
9 from the room or the outside would hit it.

10 You probably remember back in the day when your camera
11 flashed, when you would look at it, it looked yellow, there
12 was a yellow block in the back. And that was sort of what the
13 inventors were trying to get rid of.

09:20 14 And so their idea here -- and we'll -- there's a lot of
15 language in this patent; we'll try to keep it really simple --
16 is the first region and second region when you look at this
17 picture. So the first region is the wavelength conversion
18 region so that's where blue light turns to yellow light. And
19 then the second region is the -- the filter region, and that's
20 where the blue light, only blue light, passes through.

21 Q. And how does the patent describe this arrangement of the
22 first and second region?

09:20 23 A. It describes them as being lateral to one another. So if
24 we look here, those two regions are side by side. They're not
25 stacked one on top of another.

1 Q. Let's look at the prototype that OSRAM produced that
2 supposedly used the invention of the '547 Patent. Can you
3 walk us through what's being shown here?

09:21 4 A. So this is a prototype of what was a practiced '547
5 invention. And you can see that what we have here is a sign
6 basically in its off state and on state. So when you turn it
7 on, all that yellow stuff we talked about, like the blue light
8 goes through it, some blue comes through, some yellow comes
9 through, and it looks white. And then next to it, it looks
10 blue.

11 What we can see here is the invention actually doesn't
12 work because when you turn it off, it doesn't look the same,
13 it looks very different. And actually this isn't a display at
09:22 14 all. It's a sign. The '547 Patent never once uses the word
15 'display'. If you wanted to make this thing say 48, you'd
16 have to make a new sign. So there's nothing dynamic about
17 this.

18 Q. And just to go back to this slide here previously, the
19 problem that we're trying to solve was the yellowish color
09:22 20 when the organic layer sequence does not emit light. Correct?

21 A. That's correct.

22 Q. They wanted -- and this is a quote here from the patent
23 at the bottom -- a non-yellowish color. Correct?

24 A. That's correct.

25 Q. And from their prototype, when it's off, do you see the

1 yellowish color there?

2 A. It looks pretty yellow to me.

3 MR. SHEASBY: Your Honor, I object.

4 THE COURT: State your objection.

5 MR. SHEASBY: Yes. It is undisputed that the '547
6 Patent is fully enabled and described for the scope of these
7 claims. I believe this is a surreptitious not enabled
09:22 8 argument that's being made, and it's highly improper.

9 THE COURT: There's not a lack of enablement
10 invalidity defense that's been raised in this case, is there,
11 as to this patent?

12 MR. YANG: No, Your Honor. This goes to the benefit
13 of the invention to show that even in OSRAM's products there
14 was no benefit to using the invention.

15 THE COURT: Enablement is not an issue as to this
16 patent. So whether there's a surreptitious or whatever you
17 said enablement argument really doesn't amount to anything, to
09:23 18 be honest with you, because it's not an issue. It's not an
19 issue the jury will be questioned on.

20 MR. SHEASBY: Yes, sir.

21 THE COURT: So to that extent, the objection's
22 overruled.

23 MR. SHEASBY: Thank you, Your Honor.

24 THE COURT: You're welcome. Let's proceed.

25 MR. YANG: Thank you, Your Honor.

1 Q. (BY MR. YANG) Okay. Now, let's move on to whether or
2 not Samsung's TVs infringe the '425 Patent. We talked about
3 the laterally arranged first and second regions. Has the
4 Court provided a construction to help us understand what that
5 means?

09:24 6 A. They have. So it's such that the first and the second
7 regions are not again stacked.

8 Q. Okay. Now, let's look at the accused products and how
9 they stack the first and second regions. So let me just play
10 the animation here. Can you explain to the members of the
11 jury what we're seeing here in Samsung's TVs?

12 A. Yeah. So, once again, I'll try to simplify things. The
09:24 13 first region again is the color conversion region. So if we
14 look at the box that's labeled green QD, that would be the
15 color conversion region that's in the beam path.

16 So what's not shown here is the LED is below this. So
17 all the light's shining up into this whole screen. So the
18 green GD box is the first region.

19 Q. Can you circle the regions that you're talking about?

09:25 20 A. Yeah. [REDACTED]

21 [REDACTED] [REDACTED]

09:25 22 [REDACTED] [REDACTED]

23 [REDACTED]

24 Q. What is the benefit that Samsung's TVs get from using
25 this [REDACTED]?

1 A. So they actually get better pixel definition by doing
2 this. So you can imagine that if you're not filtering light
3 out in between the pixels, adjacent pixels, the light starts
09:25 4 mixing and it blurs together. Having clear pixel delineation
5 and definition helps you both when adjacent pixels are on or
6 when you have one off and one on.

7 Q. And how does [REDACTED]
8 prevent that?

9 A. So, as an example, if I -- if I pointed to this area, any
10 of the green light that's emitted here, when it comes over
11 here, the blue filter is going to absorb it so you don't get
09:26 12 what some of us refer to as lightly (unintelligible) or light
13 cross-talk.

14 Q. Okay. And can you just walk us through quickly what this
15 is showing?

16 A. This is just taking what you saw in cross section before
17 and showing it in a 3D animation. So to get an idea of -- for

18 [REDACTED]
19 [REDACTED] [REDACTED]
09:26 20 [REDACTED].

21 Q. Let's look at another reason Samsung's TVs do not
22 infringe. Can you show us -- tell us what you're showing on
23 this slide, please?

24 A. So another part of the '547 requires that the organic
25 layer sequence emit light that is transparent to that filter.

1 So the blue filter, the filter layer.

2 Q. And have you applied the Court's construction in forming
3 your opinions in this case?

09:27 4 A. I have. So the organic layer sequence has to emit a
5 first wavelength, and that first wavelength has to -- the
6 entire wavelength spectrum emitted from the organic layer
7 sequence has to basically pass through that filter except for
8 they sort of give a caveat for the stuff at the very tail
9 ends, the noise.

10 Q. Now, does Samsung's TVs have any filters -- now, we saw
11 the [REDACTED]. Do they have any filters
12 that are transparent to the entire wavelength spectrum of the
09:28 13 light coming out of the organic layer sequence?

14 A. They do not. So what we're looking at here, now we
15 talked a lot about red, green, and blue pixels and OLEDs. In
16 these QD TV devices, the way that it works is you actually
17 have [REDACTED]

18 [REDACTED] [REDACTED]

09:28 19 [REDACTED]

20 [REDACTED] [REDACTED]

21 [REDACTED].

22 Q. Let's take a look at that. Can you walk us through this
23 demonstrative?

24 A. Yeah. So we're showing, again, organic layer sequence
25 that emits that [REDACTED]. The arrows on the bottom are

09:28

1 showing the beam path up. And then out of the top of the far
2 right image, you'll see that what's going to come out is not
3 that [REDACTED].

4 Q. So is this another reason why Samsung's TVs don't
5 infringe?

6 A. That's correct. That filter is not transparent to the
7 light emitted from the organic layer sequence.

8 Q. Now, how do Samsung's TVs generate that [REDACTED] light
9 coming from the bottom?

09:29

10 A. They have a [REDACTED], they call it.

11 So this is the cross section of all those layers together.

12 And what happens, you can see all of those layers. [REDACTED]

13 [REDACTED] [REDACTED]

14 [REDACTED] [REDACTED]

15 [REDACTED] [REDACTED] [REDACTED]

16 [REDACTED]

09:29

17 Q. Now, what is Pictiva's position as to whether or not the
18 Samsung TV products are transparent to this [REDACTED] light?

19 A. Well, what Pictiva has tried to do is draw a box around
20 just part of this device and say that that's the organic layer
21 sequence. But the patent says the organic layer sequence is
22 an OLED.

23 And, in fact, Dr. Schanze in his own testimony said the
24 organic layer sequence is encompassed as an OLED.

25 Q. And did you look at deposition from Samsung Display's

1 corporate representative in forming your opinions?

09:30

2 A. I did. Mr. Kwon from Samsung confirmed that there's [REDACTED]

3

4

5

6 Q. What is the benefit that Samsung gets for its TVs by

7

using this [REDACTED] light instead of a [REDACTED] light?

8

9

A. Yeah. This one's a little bit non-obvious because the first order you'd say, well, why do you make something where

09:31

10

you're going to [REDACTED]? But what the

11

benefit of it is is you actually [REDACTED]

12

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09:31

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Q. Now, let's talk about the validity of the '547 Patent.

20

Did you find any prior art that invalidates the '547 Patent?

21

A. I believe I did. We're looking here at JX 59, which is a patent from Igarashi.

22

23

Q. Let's look at Igarashi. Does Igarashi disclose all of the limitations of the '547 claims?

24

09:31

25

A. It does. I misspoke. Igarashi. So if we look at the

1 image figure 5 from Igarashi now, and it's been annotated to
2 help highlight the colors for you-all, you can see that it
3 actually looks a lot more like the Samsung products than what
4 the '547 Patent does, quite honestly.

5 So you've got the blue arrows are coming out of where
6 would be the OLED devices in the structure. So you can see
09:32 7 the four blue arrows coming up. And then you've got the color
8 conversion layers. That's the 29G, 29R, and 29C. That's
9 where the light would be converted. So those are the first
10 regions.

11 And then you have the second region which is the filter
12 layer. That's 30B, which is shown next to it. And you can
13 see that clearly these ones are lateral from one another.
14 They're not stacking the filters over the conversion layers.

09:33 15 Q. And does Igarashi use a [REDACTED] light like Samsung
16 does?

17 A. Igarashi doesn't. Igarashi discloses a blue light and
18 specifically in the patent specification talks about the
19 wavelength being 450 to 470 nanometers.

20 Q. So is the blue filter there above the blue light fully
21 transparent to the blue light?

22 A. It would be. And I guess one other thing to note in this
09:33 23 image is that there's another claim, claim 8, that's asserted,
24 and that adds for second color filters downstream from the
25 first wavelength conversion areas. And those are shown

1 between the green, red, and cyan areas as filters 30R, 30G,
2 and 30C.

3 Q. So does Igarashi anticipate or render obvious the
4 asserted claims of the '547 Patent?

09:33 5 A. Yes, I believe it does.

6 Q. What is Pictiva's only dispute with respect to Igarashi?

7 A. My understanding is Pictiva's only disagreement is that
8 they claim that Igarashi doesn't have only blue that's coming
9 out. To the extent that that's true, which I disagree with
10 because the patent clearly says blue going through blue, but
11 to the extent that they're correct, there are other prior art
09:34 12 disclosures of only blue light -- only blue emitters that you
13 could have put into Igarashi and it would have worked.

14 Q. So do the -- does the combination of Igarashi and Kido
15 render obvious the '547 asserted claims?

16 A. Yes, it does.

17 Q. And that other reference, Kido, that's JX 49. Correct?

09:34 18 A. Yes, sorry about that.

19 Q. No, it's fine.

20 Okay. Now, do you understand that Pictiva has claimed
21 with this '547 Patent that there is some technical benefit to
22 Samsung's QD TVs?

23 A. Yes, I understand that.

24 Q. Do you agree with that opinion?

25 A. I don't agree with it at all.

1 Q. Why is that?

09:35 2 A. So I think that there's several key innovations that
3 Samsung's implemented. The [REDACTED],
4 specifically; plus the combination with Quantum Dots which are
5 not mentioned in the '547 Patent; plus the combination of
6 actually being able to implement those Quantum Dots so Samsung
7 developed the process to do [REDACTED]
8 [REDACTED]. And I think that those combinations
9 provide far more benefit than anything that's in the '547
10 Patent.

09:36 11 Q. Now, to compare the benefit of the '547 Patent, Pictiva
12 was supposed to compare the '547 Patent to the next best
13 alternative. Correct?

14 A. That's correct.

15 Q. Now, you were here when they showed us that the next best
16 alternative supposedly was WOLED. Were you here?

17 A. Yes, I was here.

18 Q. Do you agree that WOLED was the next best alternative?

09:36 19 A. I do not. I think if the criticism is that the Samsung's
20 displays have a [REDACTED], the next best alternative would be to
21 just take the blue from Igarashi and stick it in Samsung's
22 existing designs.

23 Q. And could Samsung have also used the laterally-positioned
24 filters from Igarashi as well?

25 A. They could have.

1 Q. Okay. So let's just talk about that for a little bit.

09:36 2 Now, the benefit that Samsung Display's [REDACTED] light has
3 over Igarashi, is that a benefit associated with the '547
4 Patent?

5 A. No, it's not.

6 Q. That benefit is associated with Samsung's innovation.
7 Correct?

8 A. That's correct.

9 Q. And any benefit that Samsung gets from the
10 [REDACTED], is that Samsung's innovation?

11 A. I believe it would be.

09:37 12 Q. So based on your analysis, what is the technical benefit
13 of the '547 Patent?

14 A. I don't see any benefit of the '547 Patent. And if I was
15 forced to ascribe some benefit, I'd put a minimal value of .1
16 percent.

17 Q. Now, you were also asked to consider the technical
18 benefits to the accused products that come from Samsung's own
19 innovations. Correct?

20 A. I'm sorry. Can you repeat the question?

09:37 21 Q. Sure. You were also asked to consider the technical
22 benefits to Samsung's accused products that come from
23 Samsung's own innovations. Correct?

24 A. Yes, I was.

25 THE COURT: Dr. Katona, speak up a little bit,

1 please.

2 THE WITNESS: Okay. Sorry, Your Honor.

3 THE COURT: Go ahead, counsel.

4 Q. (BY MR. YANG) Now, we've already gone through the
5 eMagin, Vitex, and Clix2 innovations in your testimony today?

6 A. Yes, we have.

09:38 7 Q. Were you here for Dr. Antoniadis' testimony when talked
8 about Samsung's choice to use active matrix, OLEDs, LTPS
9 technology, fine metal masks, and small molecule vapor
10 deposition?

11 A. Yes, I was here for that testimony.

12 Q. And based on your analysis of the evidence, does Samsung
13 use those technologies for the accused products in this case?

14 A. Yes. My analysis would indicate they do use that
15 technology and it provides -- all those together provide a
09:38 16 host of benefits. The back plane, or LTPS, an active matrix
17 design, there's many, many innovations that go into the
18 driving of these devices that actually lead to longer
19 lifetime, more efficient, reliable displays. They have
20 nothing to do with sort of the deposition processes we've been
21 talking about here.

22 But, in addition to that, the fine metal mask technology
23 is extremely difficult and required for these types of
09:39 24 displays with the many, many millions of pixels. All of these
25 innovations are huge and in my opinion are what leads to the

1 benefit that Samsung has achieved.

2 Q. Now, we've seen that when Samsung is interested in
3 technology other companies has developed like Vitex and
4 eMagin, it goes out and works with those companies. Correct?

5 A. Yes, we have.

09:39

6 Q. Now, have you seen a license between Samsung and another
7 entity for OLED patents in this case?

8 A. I did. I was asked to review some licenses to try to
9 understand comparability technically, and I did look at one
10 license in particular that Samsung took with a group or a
11 company called Orthogonal where they got a patent family. And
12 I looked at a handful of the patents that I thought were
09:40 13 technically comparable in that they were related to OLED
14 technology, materials for OLED technology, and processing
15 techniques for OLED technology, which is sort of the general
16 field by which the patents that I was asked to look at are
17 incorporated within.

18 Q. And what is the exhibit number of the license shown here?

19 A. That's Exhibit DX 21.

20 Q. And what are the patent numbers that you have on the
21 screen?

09:40

22 A. Patent No. 9,500,948 B2; 10,158,075 B2; 8,871,545 B2; and
23 8,846,301 B2. And just to be clear, this wasn't all the
24 patents, but it was ones I identified as at least being
25 similar in the field.

1 Q. And what type of patents are these again?

2 A. They're for OLEDs and OLED processing.

09:41 3 Q. So, in conclusion, based on your analysis, has Samsung
4 infringed any of the asserted patents with respect to the
5 '389, '425, and '547 Patents?

6 A. I don't believe so.

7 Q. And on your analysis, did you find existing prior art
8 that invalidates these three patents?

9 A. Yes, I did.

10 Q. Thank you, Dr. Katona.

11 MR. YANG: I pass the witness, Your Honor.

12 THE COURT: All right. Cross examination by the
09:41 13 Plaintiff. Proceed when you're ready, counsel.

14 MR. SHEASBY: Good morning, ladies and gentleman of
15 the jury.

16 Good morning, Dr. Katona.

17 With your permission, Your Honor.

18 CROSS EXAMINATION

19 BY MR. SHEASBY:

20 Q. Doctor, I'd like to start by speaking about what you
21 omitted from your discussion of your qualifications. Can I do
09:42 22 that?

23 A. I think the floor is yours.

24 Q. So, for example, you didn't disclose this to the ladies
25 and gentleman of the jury, but you've never designed a

1 shut down.

2 CHECK INTERPRETER: A1.

3 THE WITNESS: A1. Number 1.

4 THE COURT: Does that complete that witness by
5 deposition?

6 MR. TEZYAN: Yes, Your Honor.

7 THE COURT: Call your next rebuttal witness, please,
8 Plaintiff.

05:49

9 MR. TEZYAN: Plaintiffs call YongHun Jo, principal
10 engineer at Samsung Display. The time allocation is 28
11 seconds all to Plaintiffs.

12 THE COURT: Proceed with this witness by deposition.

13 YONGHUN JO

14 BY VIDEO DEPOSITION

15 Q. Mr. Jo, can you please state your name for the record?

16 A. Right. My name is Joe YongHun.

17 Q. Does iRiver include an N-doped electron transport layer?

18 A. When you say 'iRiver', are you referring to Clix2.

05:49

19 Q. Yes.

20 A. No.

21 THE COURT: Does that complete this witness by
22 deposition?

23 MR. TEZYAN: Yes, Your Honor.

24 THE COURT: Plaintiff, call your next rebuttal
25 witness.

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2 CORRECT TRANSCRIPT FROM THE RECORD OF
3 PROCEEDINGS IN THE ABOVE-ENTITLED MATTER.
4 I FURTHER CERTIFY THAT THE TRANSCRIPT FEES
5 FORMAT COMPLY WITH THOSE PRESCRIBED BY THE
6 COURT AND THE JUDICIAL CONFERENCE OF THE
7 UNITED STATES.

8
9 S/Shawn McRoberts

10/28/2025

10 _____ DATE _____
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12 FEDERAL OFFICIAL COURT REPORTER
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