

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
) OCTOBER 27, 2025
Defendants.) 9:00 A.M.

VOLUME 1

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

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05:38 1 THE COURT: Plaintiff, call your next witness.

2 MS. CARSON: Your Honor, Plaintiffs call Professor
3 Kirk Schanze.

4 THE COURT: All right. Professor Schanze, if you'll
05:38 5 come forward and be sworn, please.

6 MR. SHEASBY: Your Honor, may I approach?

7 THE COURT: Go ahead. Let's administer the oath.

8 (Whereupon, the oath was administered by the Clerk.)

9 THE COURT: Please have a seat on the witness stand,
10 sir.

11 Yes, counsel, you may distribute binders.

05:39 12 MR. SHEASBY: Thank you, Your Honor.

13 THE COURT: All right, Ms. Carson, you may proceed
14 with direct examination.

15 MS. CARSON: Thank you, Your Honor.

16 KIRK SCHANZE, Ph.D.,

17 having been first duly sworn, testified under oath as follows:

18 DIRECT EXAMINATION

19 BY MS. CARSON:

05:39 20 Q. Good afternoon, or evening, Professor Schanze. Could you
21 please introduce yourself to the jury?

22 A. Yes Ms. Carson. My name is Kirk Schanze. I am a
23 professor of chemistry at the University of Texas in San
24 Antonio. And I live in San Antonio in the hill country with
25 my wife Barbara and our dog Coco.

1 THE COURT: Professor, pull the microphone a little
2 closer to you, please.

3 THE WITNESS: Okay. Sure thing.

4 THE COURT: Thank you. Go ahead, counsel.

5 Q. (BY MS. CARSON) What will you be discussing today?

05:40 6 A. I will be discussing the '425, the '223, and the '547
7 Patents and Samsung's infringement of those patents, as well
8 as the technical benefits that Samsung gains by use of the
9 '425, the '223, and the '547 Patents, Ms. Carson.

10 Q. Could you please describe your professional background?

05:40 11 A. Yes, ma'am. I have a Ph.D. in the field of organic
12 chemistry from the University of North Carolina at Chapel
13 Hill; I'm a Robert Welch distinguished professor at the
14 University of Texas in San Antonio; and I have about 40 years
15 of experience teaching and doing research in the field of
16 chemistry and material science, much of that related to the
17 topics we'll be discussing today.

18 I'm a fellow of the American Chemical Society, and I also
05:41 19 served as founding editor of a large academic journal
20 published by the American Chemical Society in the field of
21 materials science. And much of that journal focuses on the
22 materials that we'll be talking about today in light emission
23 and OLEDs.

24 Q. What is the primary focus of your laboratory?

25 A. My laboratory works on materials chemistry of light

1 emission. We also work a lot with light, so we work with
2 filtering and Ott light management, so I have a lot of
05:41 3 experience with that area as well.

4 Q. Could you provide us some examples of companies and
5 organizations you have worked with in your research?

6 A. Yes. So this slide shows some of the different
7 organizations, both federal agencies and private companies
8 that I've done research with over 30 years or so.

9 Q. I noticed the Armed Forces on there. Could you tell us a
10 little bit more about your work with them?

05:42 11 A. Yes. With the Air Force Research Lab and AFOSR we
12 developed materials to protect pilots eyes from laser damages.

13 Q. And how about NASA? I see them on there.

14 A. That was a fun project with NASA. For a number of years
15 we worked on developing materials that are luminescent and can
16 be used to make the shuttle and other aerodynamics flight
17 ready.

18 Q. I also see some private companies on here, Ford and BOE.
19 Could you describe for us your work and your research with
20 BOE?

05:42 21 A. So BOE we worked on development of high efficiency
22 organic light emitting diodes, and with Ford and Visteon we
23 developed luminescent materials for engineering testing.

24 Q. Do you have experience designing OLEDs?

25 A. Yes, ma'am, I do; for more than 25 years.

1 Q. And has your work been incorporated into any commercial
2 products or deployed by any of the agencies you've worked
3 with?

05:43 4 A. So the work that I did with NASA and Ford and Visteon was
5 spun out into start-up companies. These are small companies
6 that commercialize new technologies. The work that I did with
7 the Air Force--military--and also with BOE was confidential,
8 so we passed off the technology to them and I'm not sure what
9 was done with it afterwards. It may have been commercialized,
10 but I'm not aware of it.

11 MS. CARSON: Your Honor, we offer Professor Schanze
12 as an expert on chemistry and OLED technology, including on
05:43 13 the subject matters of the 425, '223, and 547 patents.

14 THE COURT: Is there objection?

15 MR. PAK: No, Your Honor.

16 THE COURT: Without objection, the Court will
17 recognize this witness as an expert in those designated
18 fields.

19 Please continue, counsel.

20 Q. (BY MS. CARSON) Professor Schanze, how is OLED
21 technology used in displays like the ones in smartphones?

22 A. So we've already seen a little bit of it in the
23 introduction today. As we know, the -- all the displays that
05:44 24 we use now, many of them use this OLED technology. OLEDs
25 basically are small devices that create light, and they can

1 remain under oath.

2 While he's getting seated, will you bring in the jury,
3 Mr. Estess.

4 THE COURT SECURITY OFFICER: Yes, Your Honor.

5 (Whereupon, the jury entered the courtroom.)

08:26 6 THE COURT: Good morning, members of the jury.
7 Welcome back. It's good to see you. Please have a seat.

8 We'll continue with the direct examination of Dr. Kirk
9 Schanze by Plaintiffs' counsel.

10 Ms. Carson, you may continue.

11 MS. CARSON: Thank you, Your Honor.

12 Could we pull up slide 22? Thank you.

13 KIRK SCHANZE, Ph.D.,

14 having been previously duly sworn, testified further under
15 oath as follows:

16 DIRECT EXAMINATION continued

17 BY MS. CARSON:

18 Q. Good morning, Professor Schanze.

19 A. Good morning, Ms. Carson.

20 Q. When we left off yesterday, we were discussing this
08:26 21 excerpt from the '425 Patent, and I think you had mentioned
22 that these are the examples of emitter materials disclosed in
23 that patent. Correct?

24 A. Yes, ma'am. I described the emission layer that should
25 be in figure 3 and also the use of iridium containing

1 phosphorescent materials in the patent.

2 Q. And just to confirm, Professor Schanze, those are small
3 molecules. Correct?

4 A. That's correct, yes, ma'am.

08:27 5 Q. I was having trouble with my clicker. I got it, though.

6 All right. I think another thing you mentioned was that
7 the '425 Patent discloses a novel way of combining different
8 elements in different layers. What other layer does the
9 patent focus on?

10 A. The patent also discusses what's called the electron
08:27 11 transport layer. That's what I've highlighted here at the
12 bottom. I'll see if I can learn how to use this pointer. So
13 that's the electron transport layer at the bottom.

14 Q. Okay. And I noticed there's a reference to N-dope tier.
15 What does it mean for an electron transport to display N-dope?

16 A. So the N-doping is the act of adding something to a
17 material to increase the concentration of electrons in the
18 material.

08:28 19 Q. And could you give us an example of what N-doping looks
20 in the context of OLED?

21 A. Yes. This diagram gives the example of concept of
22 N-doping. If we imagine that the green slab that I've shown
23 here represents a material, the red circles would -- could
24 represent a dopant. And as I've shown in this diagram, the
25 dopant releases electrons into the electron transport layer

08:28 1 thereby increasing the concentration of electrons in the
2 electron transport layer.

3 Q. All right. Is that how Samsung's documents also define
4 N-doping?

5 A. Yes, ma'am. This is a document taken from Samsung's --
6 Samsung's discovery documentation, and it [REDACTED]
7 [REDACTED]

08:29 8 [REDACTED]
9 [REDACTED]
10 [REDACTED]
11 [REDACTED]

12 Q. What claim of the '425 Patent did you analyze?

13 A. I analyzed claim 2, and claim 2 is a dependent claim that
14 encompasses claim 1 in its entirety.

08:29 15 Q. And which products did you focus on?

16 A. The products that are shown on this slide that contain
17 the [REDACTED], the [REDACTED], the [REDACTED], the [REDACTED], the [REDACTED], and the
18 [REDACTED] material sets.

19 Q. How did you go about structuring your infringement
20 analysis?

21 A. So I broke the claims down into elements, and then looked
22 at each element. And we'll start with the element that's
08:30 23 labeled 1a, and that reads, "A device comprising an organic
24 light-emitting diode."

25 Q. Are all of the accused products you investigated devices

1 that comprise an organic light-emitting diode?

2 A. Yes, ma'am. And that's confirmed by testimony from Mr.
3 Park, a Samsung representative. When he was shown the list of
4 the accused products, he confirmed that this list is a
5 complete list of Samsung devices that have used OLED displays
08:30 6 since mid 2010, and his response was, "I believe so."

7 Q. And all of the products you investigated were on that
8 list?

9 A. Yes, ma'am.

10 Q. What did you conclude for that element?

11 A. I concluded it's met, and therefore I checked it off.

12 Q. All right. Let's move on to the next one. What did you
13 analyze next?

14 A. The next element is an organic layer sequence, a
15 radiation exit area, and an encapsulation.

16 Q. All right. Let's break this down a little bit. What is
17 an organic layer sequence?

08:31 18 A. So as we learned yesterday, organic refers to
19 carbon-based materials. So it simply refers to a sequence of
20 layers comprised of organic materials. So two or more layers
21 that are stacked atop of one another would be an organic layer
22 sequence.

23 MS. CARSON: And, Your Honor, we're going to get
24 into some confidential information so I need to request to
25 seal the courtroom.

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?

08:49

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.

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]
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08:50

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[REDACTED]

08:51

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[REDACTED]

[REDACTED]

11

[REDACTED]

[REDACTED]

12

[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 --

25

08:52 1 [REDACTED]
2 [REDACTED]
3 [REDACTED]
4 [REDACTED]
5 [REDACTED]
6 [REDACTED]
7 [REDACTED]
8 [REDACTED]
9 [REDACTED]
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]
18 [REDACTED]
19 [REDACTED] [REDACTED]
20 [REDACTED]
21 [REDACTED]
22 [REDACTED]
23 [REDACTED] [REDACTED]
24 [REDACTED]
25 [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]
14 [REDACTED]
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]
24 [REDACTED]
25 [REDACTED]

08:58

08:59

08:59

09:00

1 [REDACTED]

2 [REDACTED]

3 [REDACTED]

4 [REDACTED]

5 [REDACTED]

6 [REDACTED]

7 [REDACTED]

8 [REDACTED]

9 [REDACTED]

10 [REDACTED]

11 [REDACTED]

12 [REDACTED]

13 [REDACTED]

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]

25 [REDACTED]

09:00

1

[REDACTED]

2

[REDACTED]

3

[REDACTED]

4

[REDACTED]

5

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

09:01

10

layer comprises 8-Hydroxyquinolato-lithium."

11

Q. Okay. And what is that?

12

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

14

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

09:01

18

chemicals to the OLED industry, and we can see down at the

19

bottom the table shows synonyms for

20

8-hydroxyquintolato-lithium include Liq.

21

[REDACTED]

22

[REDACTED]

23

[REDACTED]

24

[REDACTED]

25

[REDACTED]

09:02

1

2

3

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

4

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

6

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

8

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.

12

(Courtroom unsealed.)

09:03

13

THE COURT: All right. The courtroom is reopened.

14

Please continue.

15

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

17

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

19

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

21

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

23

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

25

A. [REDACTED]

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.

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 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?

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 [REDACTED] value of the

5 [REDACTED] that's supposed to receive, accept the electron donor, is

6 higher than the HOMO of the material [REDACTED] 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 [REDACTED] 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 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.

RECROSS EXAMINATION

BY MR. PAK:

Q. So, Doctor, let's just go back to the rebuttal report section that counsel asked you about and go to paragraph 91.

A. Yes, sir.

Q. So this is where in your rebuttal report you do talk about the HOMO having to be higher than LUMO for N-doping. Correct?

A. I don't agree with that.

Q. This is -- if you turn to paragraph 92, this is consistent with the understanding of the N-doping mechanism in 2008 to 2009 time frame, and you have a figure that shows no N-doping when the LUMO is higher than the HOMO. Do you see that, sir?

THE WITNESS: May I ask a question, Your Honor?

THE COURT: No. Witnesses are here to answer questions, not to ask them. That's what the lawyers do.

THE WITNESS: Yeah.

THE COURT: If you don't understand --

THE WITNESS: Can you ask the question again then, Mr. Pak?

Q. (BY MR. PAK) Sure. The section that you testified earlier during my examination is a section where you talk about N-doping where the HOMO has to be higher, HOMO, the donor, has to be higher than the LUMO of the acceptor.

1 Correct?

2 A. That's correct.

01:56

3 Q. And if you turn to paragraph 116 that she was talking
4 about, that counsel for Pictiva was talking about, it says
5 that "but alkaline metals were thought to do a B Phen through
6 a different mechanism."

7 Do you see that?

8 A. Yes, sir, I see that sentence.

9 Q. You were pointing this out because you wanted to
10 distinguish prior art that used B phen along with [REDACTED] compared
11 to what you are accusing in this case for the Samsung
12 products. Correct?

01:56

13 A. The paragraph does include B Phen as the material that is
14 believed to be -- thought to be doped by the alkaline metals.

15 Q. You were saying that was a different type of mechanism
16 because you were trying to distinguish, you were trying to say
17 that what was happening in the prior art is not the claimed
18 invention. Correct? Yes or no.

19 A. Yes.

20 Q. Thank you.

21 MR. PAK: Pass the witness.

22 THE COURT: Any further direct?

23 MS. CARSON: No, Your Honor.

24 THE COURT: All right. You may step down,
25 Dr. Schanze.

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 receive [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 We'll keep it that way.

2 MR. YANG: Thank you, Your Honor.

3 THE COURT: When the witness gets beyond the
4 confidential material, let me know.

5 MR. YANG: I will, Your Honor.

04:31 6 (Whereupon, the oath was administered by the Clerk.)

7 THE COURT: Please come around; have a seat on the
8 witness stand.

9 MR. YANG: Your Honor, may Mr. Kim pass out the
10 witness binders?

11 THE COURT: Yes, he may.

04:31 12 MR. YANG: Thank you, Your Honor.

13 THE COURT: All right. Mr. Yang, you may proceed
14 with direct examination.

15 MR. YANG: Thank you, Your Honor.

16 JIHYUN SEO, Ph.D.,

17 having been first duly sworn, testified under oath as follows:

18 DIRECT EXAMINATION

19 BY MR. YANG:

20 Q. Dr. Seo, can you please introduce yourself to the jury?

04:32 21 A. Good afternoon. My name is Seo Jihyun. I live with my
22 husband, and I have a very cute eight-year-old son, and we
23 live in Korea.

24 Q. What company do you work for?

04:32 25 A. I work at Samsung Display.

1 Q. Prior to joining Samsung Display, had you worked on OLED
2 displays before?

04:32 3 A. Yes. I have my Ph.D. in OLED displays, and so my major
4 for Ph.D. was display engineering.

5 Q. Prior to joining Samsung in 2011, were you aware of a
6 product called the Clix2?

04:33 7 A. Yes, I was. So when I was in Ph.D. program, I bought one
8 of those Clix2 phones, and on my daily commute, actually on my
9 daily commute to my university I used to watch American drama
10 Heroes using Clix2.

11 Q. What is your role at Samsung Display?

04:34 12 A. I'm a principal engineer and I lead Materials Development
13 Group.

14 Q. What does the Materials Development Group at Samsung
15 Display do?

04:34 16 A. What we do is to develop and select organic materials
17 that are used for OLED panels.

18 Q. Can you remind us how the light is generated for each of
19 the pixels in Samsung Display's OLED displays?

04:35 20 A. So within an EML, which has an emitting dopant in it,
21 when a hole and an electron, when they come in contact
22 together, the light would be generated.

04:35 23 Q. How many years have you worked on Samsung Display's EMLs?

24 A. Since 2011 until now.

25 Q. Other than the EML, are there any other layers in

1 A. I have.

2 Q. What kind of testing would that be?

04:57

3 A. So if -- not the [REDACTED]. [REDACTED]

4 [REDACTED]

04:57

5 [REDACTED]

6 [REDACTED]

7 [REDACTED]

8 [REDACTED] In that instance, you would not be able to maximize

04:57

9 the amount of light in the upper part of the pixel and you

10 would not get the color that you wanted, which would lead to

11 panel defects.

12 Q. Do you also work on the [REDACTED], the

13 [REDACTED]?

14 A. I do.

15 Q. How many materials does the [REDACTED] include?

04:58

16 A. It uses [REDACTED]. [REDACTED]

17 [REDACTED].

18 Q. Does Samsung's [REDACTED] use any N-dopants?

19 A. No.

04:58

20 Q. What is the function of the [REDACTED] material inside the [REDACTED]?

21 A. [REDACTED].

22 Q. Why doesn't Samsung Display use the [REDACTED] as an N-dopant?

04:59

23 [REDACTED] [REDACTED]

04:59

24 [REDACTED]

25 [REDACTED]

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Q. Now, if someone were to say that the [REDACTED] in the [REDACTED] were an N-dopant, would that be correct?

A. No, that wouldn't be.

Q. Okay. Let's look into that with JX 14, please.

MR. YANG: And if you could go to page 23, that would be great. Thank you.

Q. (BY MR. YANG) Now, which row indicates the [REDACTED]?

A. So the second from the last, [REDACTED], that's the one.

Q. Okay. Now, where is the organic material and the [REDACTED] located in this [REDACTED]?

A. So you see the reference of [REDACTED]. That's the organic material. That's the [REDACTED] organic material.

Q. Okay. Now, what does this document tell us about whether or not the [REDACTED] is an N-dopant?

A. This document shows us that [REDACTED] cannot be an N-dopant because when you look at the HOMO values for [REDACTED], that is indicated to be minus [REDACTED], and when you compare that to the LUMO values of the organic material, which is minus [REDACTED], it's lower than that. That's why.

Q. If the [REDACTED] were being used as an N-dopant here, what would happen in the display?

A. So [REDACTED] would comprise [REDACTED], so if that is

1 the case, then in the case that you're referring to, that
05:03 2 would make [REDACTED] more conductive. And so if you're talking
3 about a case where [REDACTED] is being used as an N-dopant, and that
4 would actually increase the conductivity of the [REDACTED] layer
05:04 5 significantly which would lead to current leakage or leakage
6 current in between RGB pixels. If that happens, if the
7 leakage current happens, then that means that we would not be
8 able to individually control the RGB pixels, which would lead
05:04 9 to panel defects.

10 MR. YANG: Can we put up SDC44379 [sic].

11 Q. (BY MR. YANG) And if you could turn to that document in
12 your binder, please.

13 A. Did you say 44397?

05:05 14 Q. 44397, yes.

15 A. Yes.

16 Q. What is this document?

17 A. Its's a sales document of a company called [REDACTED], which
05:05 18 is a -- which is one of the OLED materials suppliers.

19 Q. What is the material that [REDACTED] was trying to sell to
20 Samsung Display?

21 A. It is an [REDACTED] material.

22 Q. Okay.

23 MR. YANG: Can we pull up page 4, please?

24 Q. (BY MR. YANG) Now, is this a Samsung Display OLED being
25 shown here?

1 THE COURT: All right. Let's proceed.

2 MR. SHEASBY: Thank you.

3 CROSS EXAMINATION

4 BY MR. SHEASBY:

5 Q. Good afternoon, Dr. Seo.

6 A. Good afternoon.

05:09 7 Q. These are the patents that Samsung has been accused of
8 infringing. Have you reviewed any of these five patents and
9 analyzed them?

10 A. No, I have not reviewed them.

11 Q. Did you understand that patent infringement is a strict
05:09 12 liability standard?

13 THE COURT: Just a minute.

14 Yes, Mr. Yang?

15 MR. YANG: Your Honor, objection. I think this
16 violates the MIL against asking witnesses about issues that
17 they have no knowledge of.

18 THE COURT: It calls for a legal conclusion.

19 MR. YANG: Yes, Your Honor.

20 THE COURT: Strict liability is a legal concept that
21 unless you're a trained attorney I wouldn't expect you to know
22 anything about.

23 MR. SHEASBY: Your Honor, may I be heard just
24 briefly on this?

25 THE COURT: You may.

05:33 1 material that we saw earlier is different from what we are
2 looking at here in terms of the structure.

3 Q. Okay. I'll go back to that so it's easier.

4 The [REDACTED] right there is involved in the resonant
5 structure that determines how much light will be released.
6 Correct?

05:34 7 A. Yes.

8 Q. And the function of an OLED is to release light.
9 Correct?

10 A. Yes.

11 Q. Okay. We have one other point and we can go very
12 quickly.

05:34 13 You use [REDACTED] to increase the amount of electrons that are
14 entering the [REDACTED] layer. Correct?

15 A. Yes.

16 Q. Whether and you're aware that your researchers have
05:35 17 testified that -- well, let me actually do it in a slightly
18 different way to make it easier.

19 The injection of electrons into -- the injection of
20 electron carriers is a form of N-doping. Correct?

05:35 21 A. It is not.

22 Q. The injection of electrons -- cathodes increases the
23 amount of electrons entering in the [REDACTED] layer. Correct?

05:36 24 A. Yes. That's what [REDACTED] does; it pulls electrons from the
25 cathode so it can increase the number of electrons.

1 Q. And an N-type semiconductor donates negatively charged
2 electrons. Correct?

05:36 3 A. Yes.

4 Q. And before your testimony, did you speak and interview
5 with your colleague Mr. Kang from Samsung?

6 A. Mr. Kang you said?

05:36 7 Q. Kang; Sunwoo Kang.

8 A. I don't know who that is.

9 Q. Okay. Final questions. Did you present the ladies and
10 gentleman of the jury with any TOF-SIMS data showing that
11 there were no emitters in the [REDACTED]?

05:37 12 A. When are you talking about?

13 Q. In your presentation to the ladies and gentleman of the
14 jury.

15 A. I did not discuss any TOF-SIMS data or results.

05:37 16 Q. Are there any TOF-SIMS data at Samsung regarding the
17 distribution of emitters between [REDACTED]
18 [REDACTED]? Has those studies been done?

05:38 19 A. When you ask this question, are you talking about the [REDACTED]
20 [REDACTED]?

21 Q. Yes; TOF-SIMS data on those.

05:39 22 A. I have seen TOF-SIMS data myself, because sometimes

05:39 23 TOF-SIMS data can be analyzed, but when we talk about TOF-SIMS
24 data, we're talking about using very strong energy, so you are
25 actually injecting the sample really deep into the surface of

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?

08:40 17 A. So I had three assignments in this case. The first was
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

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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 ETL?

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 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 another molecule that has a [REDACTED]. Correct?

2 A. I'm sorry. Which -- what is this from?

3 Q. Sure.

4 A. Just for my -- I'm not recognizing it off the top of my
5 head.

6 Q. Sure. Do you understand what layer -- what material the
7 [REDACTED] is doped into?

8 A. Yes, I do.

9 Q. What's the name of the material?

10 A. Well, I know by the code names.

11 Q. Yes.

10:07 12 A. [REDACTED]. There was a [REDACTED], I think.

13 Q. It's the [REDACTED].

14 A. [REDACTED], sure.

15 Q. And you're not a chemist. Correct?

16 A. I'm not a chemist.

17 Q. And you understand that the [REDACTED] compound has a [REDACTED]
18 [REDACTED] associated with it. Correct?

19 A. Yes, that's correct.

20 Q. And you understand that there is literature showing that
21 when [REDACTED] is interacted with a compound that is a [REDACTED]
10:08 22 [REDACTED], it can inject electrons -- it can help inject electron
23 carriers from the cathode. Correct?

24 A. Yeah, carriers from the cathode.

25 Q. Yes. And N-doped means N is negative. Correct?

1 A. Yes.

2 Q. Electrons.

3 A. Electrons.

4 Q. N-doped is -- means electron doped. Correct?

5 A. Yes, from the dopant.

10:08 6 Q. Yes. Now, you then talked about some prior art designs,
7 and you talked about the Clix2. Correct?

8 A. Yes.

9 Q. And you conceded that the Clix2 does not have an N-doped
10 electron transport layer. Correct?

11 A. I conceded that Pictiva hasn't shown that they do.

12 Q. Sir, you understand it's your burden by clear and
13 convincing evidence to establish that the Clix2 prior art has
14 an N-doped electron transport layer. Correct?

15 A. Yes.

10:09 16 Q. And you testified to the ladies and gentleman of the jury
17 that it's your opinion it does not have an N-doped electron
18 transport layer. Correct?

19 THE COURT: What is it, Mr. Yang?

20 MR. YANG: Your Honor, may I approach?

21 THE COURT: Approach the bench.

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

24 MR. YANG: Your Honor, the slide that was just
25 shown, we had a dispute about whether or not to put the

10:09 1 initial disclosures that we identified in this case for our
2 witnesses on this slide. They had agreed to remove it, but I
3 still see it on the slide there.

4 MR. SHEASBY: I have no idea. I must confess -- I'm
5 not being dense. I'll go get the slide. I didn't --

6 THE COURT: Go get the slide.

7 Is this the slide, Mr. Yang?

8 MR. YANG: Yes, Your Honor.

9 THE COURT: What is the issue?

10 MR. YANG: This is our initial disclosures
10:10 11 identifying the people relevant to this case, and it's a
12 filing, and we thought it was inappropriate to put it as a
13 demonstrative. So we raised an objection. They agreed to
14 withdraw it, but now it's back on the slide and being shown to
15 the jury.

16 MR. SHEASBY: Well, I didn't show them -- I don't
17 know anything about that because I didn't show them my cross
18 examination slides, Your Honor. But I'm happy to do it that
19 way. Problem solved.

20 THE COURT: You will use it that way?

21 MR. SHEASBY: Yes, Your Honor.

22 THE COURT: Let's do it that way.

23 MR. YANG: Thank you, Your Honor.

24 (The following was had in the presence and hearing
25 of the jury.)

1 Q. (BY MR. SHEASBY) A Samsung engineer who testified
10:11 2 yesterday testified that the Clix2, this prior art design from
3 2007, doesn't have an N-doped electron transport layer.

4 Correct?

5 A. Yes, that's correct.

6 Q. And, in fact, the claims require an N-doped transport
7 layer. Correct?

8 A. Yes, that's correct.

9 Q. And so if Clix2 lacks an N-doped transport layer, it
10 cannot invalidate the claims of the patent. Correct, sir?

11 A. It cannot anticipate the claims of the patent.

10:11 12 Q. Okay. Now, what you do, and to be clear, although you're
13 not a chemist, you understand that Clix2, that old design,
14 doesn't use an organic material with a [REDACTED] in it.
15 Correct?

16 A. I don't know that that's correct.

17 Q. Did you investigate the differences between the old
18 design that was being used by Samsung and the Clix2 design?

10:11 19 A. I don't recall providing any chemical analysis.

20 Q. You showed this to the ladies and gentleman of the jury
21 as the material in the [REDACTED] layer as being [REDACTED]. You showed
22 that to the jury. Correct?

23 A. That's correct.

24 Q. You didn't even take the step of investigating what is an
25 [REDACTED]. Correct?

10:12 1 A. No. I think that just the only thing that's in my report
2 that I recall are the HOMO/LUMO values of that material.

3 Q. And, in fact, you didn't even analyze the chemistry of
4 that design. Correct?

5 A. Not that I recall.

6 Q. And the -- you then proposed to combine the Wei -- the
7 Clix2 design with a number of other references. Correct?
10:12 8 Wei, for example?

9 A. I believe today I just spoke about Wei, yes.

10 Q. And, in fact, no one in history as far as you can tell
11 has ever taken this old Clix2 design and combined it with Wei.
12 Correct?

13 A. No.

14 Q. Now, you also said that there was an improper
15 inventorship issue associated with the patent. Is that
16 correct?

17 A. I believe that's correct.

10:13 18 Q. And you said there were some inventors that were omitted.
19 Correct?

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

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

23 THE COURT: The Court granted summary judgment on
24 the inventorship defense. I don't know why we're talking
25 about inventorship, I don't know why it came up, I don't know

1 why it would be talked about now, and I thought we had made
2 that clear when it came up in the direct.

10:13 3 MR. SHEASBY: Your Honor, there are two improper
4 inventorship defenses. Summary judgment was granted only as
5 to one of them, not as to the other.

6 THE COURT: This is the live one?

7 MR. SHEASBY: Yes, Your Honor.

8 THE COURT: All right then. Thank you.

9 MR. SHEASBY: I should have made that clear.

10 (The following was had in the presence and hearing
11 of the jury.)

12 THE COURT: Let's continue, please.

13 Q. (BY MR. SHEASBY) You said that there was improper
14 inventorship. Did you speak to a single one of the inventors
15 that you said should have been included to ask if they were
16 inventors?

17 A. I don't believe I said there were people not included
18 today.

10:14 19 Q. Did you speak to a single one of the inventors that
20 you -- is the basis for your claim of improper inventorship?

21 A. I didn't speak to the inventors.

22 Q. And, in fact, the '425 Patent, you seem to suggest that
23 it related to something called luminaires. Correct? Did I
24 have that testimony right?

25 A. The claim 1 of the original patent was about a luminaire.

10:14 1 Q. But you weren't telling the jury that this patent relates
2 to only what you describe as luminaires. Correct?

3 A. What I testified to is what was in the claims of the
4 original patent.

5 Q. Sir, the patent expressly discloses using its designs for
6 large area displays, correct, in column 87, lines 40 through
7 45?

8 A. Yes. My testimony was only about the claims.

9 Q. It expressly discloses using the design for large area
10:15 10 device displays. Correct?

11 A. The specification includes that, not the claims.

12 Q. And you didn't speak to any Samsung engineer about the
13 value of the '425 Patent or N-doping of an ETL layer.
14 Correct?

15 A. I didn't speak to any Samsung engineers about that.

16 Q. Okay. Let's go to the last patent, the '389 Patent.

10:16 17 You showed this to the ladies and gentleman of the jury
18 and used as a basis to claim non-infringement as not being
19 selectively deposited?

20 A. Yes, that's correct.

21 Q. Who drew these figures?

10:16 22 A. Let's see. So I think they're a modified version of what
23 was in the Samsung documents that I reviewed.

24 Q. Yeah. Modified. That's my whole point. Did you
25 disclose to the jury --

1 Q. And what is does the Court say about whether the lateral
2 structure in the '457 Patent can be stacked [sic]?

10:28

3 A. It says they cannot be stacked.

4 MR. YANG: Can we take this down?

5 Q. (BY MR. YANG) Now, let's go back to the '425 Patent and
6 the N-doping. Now, do you recall being here when Dr. Schanze
7 testified that you can look at the HOMO and LUMO values of two
8 materials to figure out whether or not it's N-doped?

9 A. Yes, I was here for that.

10 Q. Do you recall hearing from Dr. Seo the same thing?

11 A. Yes, I do.

10:29

12 Q. Okay. And when you look at the Clix2 HOMO and LUMO
13 values for [REDACTED] and the organic material, how do they compare
14 to those values for the accused products?

15 MR. SHEASBY: Your Honor, objection. Outside the
16 scope.

17 THE COURT: This is redirect. It's not cross.

18 MR. SHEASBY: Outside the scope of the report, I
19 believe.

20 MR. YANG: Your Honor, he was just asked during
21 cross examination why he compared the Clix2 to the accused
10:29 22 products -- the [REDACTED] material. I'm just following up and
23 asking him why he did that.

24 THE COURT: I'll allow the question.

25 MR. YANG: Thank you, Your Honor.

1 Q. (BY MR. YANG) So let me state it again. How does the
2 HOMO/LUMO values of the [REDACTED] and organic material in Clix2
3 compare to those same values in the accused products?

4 A. So my report included the HOMO and LUMO values of [REDACTED]
5 which was in the Clix2 product and, to the best of my
10:30 6 recollection, they were the LUMO of [REDACTED] and the HOMO was [REDACTED],
7 which are almost identical to what Dr. Seo said yesterday was
8 the HOMO and LUMO in the accused products.

9 Q. Thank you. Now you were also asked whether you knew the
10 chemical structures of some of these materials. Do you recall
11 that in cross examination?

12 A. Yes, I was asked about that.

13 Q. Okay. And do you know where Samsung gets these materials
14 that have these code names?

15 A. From [REDACTED].

10:30 16 Q. Okay. So Samsung gets it from another supplier.
17 Correct?

18 A. That's correct.

19 Q. Okay. And that's why the actual chemical structures
20 aren't disclosed. Correct?

21 A. To my knowledge, that's correct.

22 Q. Okay. Thank you.

23 MR. YANG: I pass the witness, Your Honor.

24 THE COURT: All right. Is there additional cross?

25 MR. SHEASBY: Just briefly, Your Honor.

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.