UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

- - - - -

SAMSUNG DISPLAY CO., LTD.,	)	
	)	
Petitioner,	)	Case No. IPR
	)	2024-01222
vs.	)	
	)	Patent No. 6,949,389
PICTIVA DISPLAYS INTERNATIONAL LTD.,	)	
	)	
Patent Owner.	)	

REMOTE VIDEOCONFERENCE

DEPOSITION OF VIVEK SUBRAMANIAN PhD

Friday, May 30, 2025, 10:00 a.m.

All Parties Appearing Remotely

Covington Burling LLP

One City Center

850 Tenth Street NW

Washington, DC 20001

Reported By: Marjorie Peters, FAPR, RMR, CRR, RSA

Job Number: CA 7377655

Veritext Legal Solutions
Calendar-CA@veritext.com 866-299-5127

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

REMOTE VIDEOCONFERENCE

VIDEO RECORDED DEPOSITION OF VIVEK SUBRAMANIAN PhD, a witness herein, called by the Patent Owner for examination, taken pursuant to the 37 C.F.R. § 42.53, by and before Marjorie Peters, a Registered Merit Reporter, Certified Realtime Reporter and Notary Public in and for the District of Columbia, All Parties Appearing Remotely, at Covington Burling LLP, One City Center, 850 Tenth Street NW, Washington, DC, on Friday, May 30, 2025, at 10:00 a.m.

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A P P E A R A N C E S

For the Petitioner:

David A. Garr, Esquire
COVINGTON & BURLING LLP
One City Center
850 Tenth Street, NW
Washington, DC 20001
dgarr@cov.com
202 662 5250

For the Patent Owner:

Hong (Annita) Zhong, Esquire
IRELL & MANELLA LLP
1800 Avenue of the Stars
Los Angeles, CA 90067
hzhong@irell.com
310.203.7183

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

I N D E X

EXAMINATION		PAGE
VIVEK SUBRAMANIAN PhD		
By Ms. Zhong		6
Acknowledgment of Deponent		237
Certificate of Court Reporter		238
Errata Sheet		239

I N D E X O F E X H I B I T S

EXHIBIT		PAGE
Exhibit 1003	Subramanian Declaration	6
Exhibit 1005	Yamazaki Patent Application 2003/0206322	24
Exhibit 1008	Weaver Patent Application, 2002/0140347	52
Exhibit 1012	Suzuki Patent 6,198,217	56
Exhibit 2100	Cok, Patent 6,770,502	57
Exhibit 2001	Humphrey Declaration	117
Exhibit 1006	Gosh, Patent Application, 2001/0052752	143

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

INDEX OF EXHIBITS

EXHIBIT		PAGE
Exhibit 1014	Certified Translation of Japan Patent Application, JP H10-41069	173
Exhibit 1021	Cok, Patent 6,770,502	189
Exhibit 1007	Palanisamy, Patent Application, 2003/0011300	192
Exhibit 2103	Burrows, Patent 8,955,217	202

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

P R O C E E D I N G S

VIVEK SUBRAMANIAN PhD,

having been called as a witness, was legally placed under oath, testified as follows: 10:00:38

EXAMINATION 10:00:51

BY MS. ZHONG: 10:00:51

Q. Good morning, Dr. Subramanian. 10:00:55

Can you please state your name for the record. 10:00:56 10:00:57

A. Good morning. My name is Vivek Subramanian. 10:00:58 10:01:02

Q. You have submitted a declaration in IPR 2024-01222; is that correct? 10:01:02 10:01:12

A. That's correct. 10:01:16

Q. That is Exhibit 1003; is that correct? 10:01:16

A. Yes, that's correct. That's correct. 10:01:23

(Exhibit 1003, Subramanian Declaration, was marked for identification.) 11:16:04 11:16:04

Q. What did you do to prepare the declaration? 10:01:38 10:01:41

A. Well, I began by reviewing the relevant subject matter, specifically reviewing the documents 10:01:42 10:01:45

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

that are at issue in this matter that were available to me at that time. 10:01:48 10:01:51

I then used that to formulate my initial opinions regarding the subject matter. Based on those initial opinions, I proceeded to prepare the declaration. 10:01:53 10:01:56 10:02:01 10:02:04

Through the course of preparing that declaration, of course, I finalized my opinions as they were at the time that I submitted the declaration. 10:02:05 10:02:11 10:02:13 10:02:15

Q. So how did you locate the documents that were available to you at the time? 10:02:20 10:02:24

A. The initial set of documents were provided by counsel. 10:02:27 10:02:29

Q. What are those documents? 10:02:31

A. Well, I believe I received the patent at issue. I received some possible items that could constitute useable art. I think that's it. I think those were the initial documents that I started with. 10:02:36 10:02:42 10:02:53 10:02:56 10:02:58

Q. Do you recall which references you received from counsel? 10:02:58 10:03:00

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Certainly the ones that are -- that I have specifically cited in this declaration. There probably were others, but I don't remember. 10:03:06 10:03:08 10:03:11

Q. So if you take a look at the marked exhibit folder, do you have a recollection as to which ones were located by you, and which ones were provided to you? 10:03:13 10:03:18 10:03:20 10:03:24

A. So I'm pretty sure that most of them were -- on this list were provided to me, other than -- I might have provided Sturm. I know I recommended looking at the first by Sturm, but I don't know if I found it and provided that to counsel or counsel found that based on my direction. 10:03:25 10:03:36 10:03:45 10:03:51 10:03:53 10:03:57

Q. Why did you recommend examining the work by Sturm? 10:04:00 10:04:08

A. Because I knew the work. I had used -- I had referred to it previously during my academic work. I happened to know Jim Sturm, and knew what he was working on in that period, and I knew that he had done work at that time that was relevant to the issue at hand. 10:04:09 10:04:12 10:04:16 10:04:19 10:04:21 10:04:23

Q. Okay. 10:04:24

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Now, there were two primary references that you asserted in IPR 2024-01222. One was Yamazaki and the other one is Weaver; is that correct? 10:04:36 10:04:37 10:04:42 10:04:46

A. As the primary references, yes. That's true. 10:04:46 10:04:48

Q. For court reporter, I'm just typing in the name of the references so you have them. 10:04:49 10:04:55

REALTIME STENOGRAPHER: Thank you. 10:05:04

Q. Did you review the '389 patent at issue in this IPR? 10:05:09 10:05:15

A. Yes. 10:05:17

Q. So in the '389 patent, there was some terminologies. One is the "planarization layer"; correct? 10:05:20 10:05:24 10:05:30

A. Just so I understand, you mean those words appear in the '389 patent? 10:05:32 10:05:34

Q. Correct. 10:05:39

A. Yes. I believe that's right. 10:05:40

Q. Including in the claims; correct? 10:05:41

A. Yes. That's correct. 10:05:44

Q. There's another word called "barrier 10:05:45

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

layer," also in the claim? 10:05:52

A. I believe that's right, yes. 10:05:55

Q. Do you have an understanding of what a planarization layer is in the context of the '389 patent? 10:06:07 10:06:14 10:06:18

A. In general, yes. 10:06:18

Q. So what is the planarization layer in the context of the '389 patent? 10:06:20 10:06:25

A. Well, specifically in relation to the claims at issue, for example, if we look at Claim 34, where it calls out selectively depositing in at least one planarization layer upon said device, it's referring to that layer in that claim limitation, which would be a layer that is -- that achieves the planarization. 10:06:27 10:06:29 10:06:34 10:06:37 10:06:42 10:06:45 10:06:49

Now, what planarization would generally mean, putting aside any specific requirements of the claim, it's generally referring to a function that results in an increase in planarity. 10:06:52 10:06:54 10:06:57 10:07:01 10:07:06

Q. What -- let me ask. You said a planarization layer is basically a layer that 10:07:07 10:07:14

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

increases -- that results in an increase in planarity. 10:07:17 10:07:22

So what is an increase in planarity? 10:07:23

A. Okay. So generally, if we refer to any surface, we can characterize the surface in terms of its degree of non-planarity. By non-planarity, I would refer to how much it deviates from a perfectly flat surface. 10:07:27 10:07:30 10:07:33 10:07:40 10:07:45

Now, the origins of those deviations could come from intentional topological variations. For example, steps or ramps or pillars, or they could come from non-intended topological variations such as surface roughness or unintentional features that result in non-planarity, asperities, et cetera. 10:07:45 10:07:51 10:07:54 10:07:58 10:08:03 10:08:11

So the goal or sort of the achievement of a planarization layer would be to reduce that. It doesn't have to completely eliminate it because eliminate it completely is never possible in reality. 10:08:15 10:08:21 10:08:26 10:08:28 10:08:31

The goal of a planarization layer is to reduce that degree of non-planarity. 10:08:33 10:08:37

Q. Okay. 10:08:40

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

So let's think about a scenario where you have an OLED device which is terminated with a cathode. Do you have that in mind? 10:08:40 10:08:42 10:08:48

A. I need a little bit of clarification. You're talking about a single OLED, just to be clear? 10:08:52 10:08:53 10:08:56

Q. Let's start out with a single OLED. 10:08:59

A. Okay. When you say it's "terminated with the cathode." You mean at the point we are discussing this, the top-most layer that is exposed prior to the imposition of the planarization layer is the cathode? 10:09:04 10:09:06 10:09:10 10:09:12 10:09:14

Q. Correct. It can be cathode or anode. Let's just say electrode. 10:09:18 10:09:21

A. Okay. I understand. 10:09:23

Q. Okay. 10:09:25

So the top-most layer for the OLED device is an electrode and that electrode, let's say, is about 100 nanometers thick. 10:09:25 10:09:30 10:09:37

A. Okay. 10:09:40

Q. It has, let's say, a 5 percent deviation. 10:09:40 10:09:47

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Off the electrode itself? 10:09:47

Q. Yeah. Right. 10:09:48

A. By deviation, you mean surface roughness. 10:09:49 10:09:52

Q. Some surface roughness. 10:09:52

A. I understand. 10:09:56

Q. Okay. 10:09:57

Then you deposit a planarization layer that's say about one micron thick on top of the electrode. 10:09:57 10:10:00 10:10:03

A. Let me just make sure that I have the numbers in my head. 10:10:04 10:10:06

You said the thickness of the electrode was -- 10:10:07 10:10:09

Q. 0.1 microns -- 10:10:10

A. So 100 nanometers. 10:10:14

Q. Yes. 10:10:17

A. So you've got 100 nanometers with 5 percent of surface roughness. So on the order of 5 nanometers of surface roughness. 10:10:17 10:10:19 10:10:21

Q. Yeah. 10:10:23

A. And then you had a one-micrometer 10:10:23

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

planarization layer. 10:10:27

Q. Yeah, and the -- let's assume that the 10:10:29

deviation for the -- 10:10:31

A. Actually, could I interrupt you. Would 10:10:36

you mind if I noted all of this down with a pen, 10:10:38

because -- 10:10:41

Q. That's fine. That's fine. 10:10:41

A. Can I have a pen and a piece of paper, 10:10:43

please. Sorry. I'm just writing this down, I have 10:10:44

a blank pad. 10:10:47

Q. Yeah, yeah. That's fine. 10:10:48

A. So you said 100 nanometers electrode, 10:10:50

and you said 5 nanometers surface roughness, and you 10:10:54

said one-micrometer planarization layer. 10:10:57

Okay. I'm with you so far. 10:11:03

Q. Let's say that planarization layer 10:11:04

or the polymer layer -- 10:11:06

(Clarification requested by the Realtime 10:11:11

Stenographer.) 10:11:13

Q. The polymer layer also has about 10:11:13

5 percent surface roughness deviation. 10:11:22

A. Okay. 10:11:25

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. So does that result in an increase in planarity in this scenario? 10:11:25 10:11:32

A. It depends. It may or it may not, and the reason is the following: The planarity is not characterized simply by the magnitude of the non-planarity. It's also characterized by the frequently of the non-planarity. 10:11:35 10:11:38 10:11:42 10:11:50 10:11:52

So if this -- even though if we just look at the magnitude numbers, the pre-deposition non -- the pre-planarity layer deposition -- 10:11:54 10:11:58 10:12:02

Sorry. Let me rephrase. 10:12:08

The pre-planarization non-planarity in terms of surface roughness was 5 nanometers. If we assume that the planarization layer has a 5 percent roughness, that would now go to 50 nanometers. 10:12:09 10:12:15 10:12:23 10:12:26 10:12:31

Q. Correct. 10:12:31

A. Depending on the frequency, it may still be -- in fact, it could still be achieving a planarization function because when the magnitude of the asperities may increase, they may be smoother. 10:12:32 10:12:35 10:12:41 10:12:43

In other words, a lower frequency in 10:12:48

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

terms of the spatial frequency of the asperities. 10:12:50

Q. So the increase in planarity could be 10:12:57

due to the less frequent occurrence of peak to 10:13:03

valley kind of transitions? 10:13:08

A. No. That's an incorrect way to 10:13:11

describe it. 10:13:12

It's not the frequency of 10:13:13

occurrence, it's the spatial frequency of the 10:13:16

variation. 10:13:19

Q. What do you mean by spatial frequency? 10:13:19

A. So spatial frequency is a term which is 10:13:21

essentially if you were to take a particular 10:13:26

parameter, such as surface topology, and plot it on 10:13:29

a two-dimensional axis. So on one axis, the X axis 10:13:32

would be the position, and then the Y axis is the 10:13:36

height. 10:13:40

Q. Okay. 10:13:40

A. In that situation, you can calculate a 10:13:41

Fourier -- 10:13:53

(Clarification requested by the Realtime 10:14:04

Stenographer.) 10:14:04

A. A Fourier transform off the height 10:14:21

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

versus position graph. 10:14:26

What that Fourier transform will 10:14:28

give you is it will give you the relative 10:14:30

importance, or the relative occurrence of 10:14:34

high-frequency roughness, medium-frequency roughness 10:14:37

and low-frequency roughness. 10:14:41

Where the roughness or the 10:14:44

discussion of frequency is defined in terms as a 10:14:45

function of position. 10:14:49

So in a situation where you have a 10:14:52

high-frequency roughness, you might have a lot of 10:14:54

squiggles occurring over a very small change in X. 10:14:57

In low-frequency roughness, you 10:15:00

would have fewer squiggles over that same change 10:15:03

in X. 10:15:07

Q. Okay. 10:15:10

Is that the understanding of 10:15:10

planarization layer you applied in your analysis? 10:15:15

A. Actually, my answer to you was not 10:15:18

related to the understanding of planarization layer. 10:15:20

It was related to the specific hypothetical that you 10:15:23

gave me. 10:15:25

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

I explained my understanding of planarization layer previously. 10:15:26 10:15:29

Q. Okay. 10:15:30

So your understanding of the planarization layer is a layer that increases the planarity of the surface; is that correct? 10:15:30 10:15:34 10:15:37

A. Relative to what it was pre-imposition of the planarization layer, yes, that's a reasonable description of it. I mean, that's a certainly reasonable characteristic of it. 10:15:44 10:15:48 10:15:52 10:15:54

Q. That is the understanding applied in your analysis of this '389 patent; is that correct? 10:15:55 10:15:57

A. As a general statement, yes. As you will note from my declaration, I didn't -- I didn't explicitly call out a claim construction of "planarization layer," but what I described is how one of skill in the art would understand it, and that's generally how I applied it. 10:16:01 10:16:04 10:16:09 10:16:13 10:16:14 10:16:16

Q. What is a barrier layer? 10:16:18

A. A barrier layer would be a layer that is used to present a barrier between one side of it, and the other. And in this case a barrier -- in 10:16:23 10:16:27 10:16:32

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

this context, in the context of, for example, 10:16:39
Claim 34, the barrier is a physiochemical barrier. 10:16:41
In other words, it is obviously physically there, 10:16:47
but it generally also imposes some sort of chemical 10:16:49
barrier. 10:16:52
Q. In particular, the chemical barrier 10:16:52
against water and oxygen; is that correct? 10:16:56
A. That could be true, but I don't think 10:17:00
that's specifically a requirement of this claim. 10:17:02
This claim calls out a barrier layer. It is true 10:17:04
that in the context of OLEDs, you are generally -- 10:17:08
you, among the species you are concerned about, you 10:17:11
are concerned about oxygen and moisture. 10:17:15
But the term "barrier layer" on its 10:17:18
own doesn't impose that as a requirement. 10:17:20
Q. So in the context of '389 patent, the 10:17:23
claims that you are analyzing, you did not require 10:17:29
the barrier layer to be specifically prohibiting the 10:17:32
permeation of oxygen and/or moisture; is that 10:17:39
correct? 10:17:43
A. Actually, I didn't have to go that far 10:17:44
because it turns out the arc that I found all does 10:17:46

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

provide that functionality. 10:17:50

Q. What does "selectively depositing" mean? 10:17:52

A. I mean, in general here, selectively depositing would refer to putting down material in a spatially specific way. 10:17:59 10:18:02 10:18:06

So that you could deposit the material where you wanted, and it won't be where you don't, so that you don't need to do a subsequent removal step to remove it from unwanted regions. 10:18:08 10:18:11 10:18:13 10:18:16

Q. Okay. 10:18:20

What if you, in the ink jetting, or, like, using any of the -- when you apply -- strike that. 10:18:21 10:18:26 10:18:29

So if you deposit a material in a liquid form, right, because the surface tension, because the wetting, the material is going to spread out from where you deposit it; correct? 10:18:29 10:18:34 10:18:38 10:18:41

A. It may or may not. It turns out that's something that can be controlled, and -- 10:18:44 10:18:46

Q. Okay. 10:18:48

A. -- most importantly, it is -- generally speaking, quite predictable these days on how much 10:18:50 10:18:52

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

it will spread. 10:18:55

Q. Okay. 10:18:56

So if the material spreads out from 10:18:57
where it's deposited, and you have to do a 10:18:58
subsequent ashen layer to remove the material that 10:19:03
may have spread out, is that still selectively 10:19:07
depositing? 10:19:11

MR. GARR: Objection. 10:19:13

A. I understand. 10:19:14

So just to clarify, the material 10:19:18
you're talking about is a material that is oxygen 10:19:21
etchable, so that the ash will remove the material, 10:19:25
if I understand correctly. 10:19:27

Q. Yeah. 10:19:28

You can ash it, or you can use laser 10:19:28
ablation, whatever. Like a very thin layer that's 10:19:33
spread out, then you need to remove it. 10:19:35

A. I understand. 10:19:38

So in that situation, since the 10:19:39
material went to regions where it was unwanted, and 10:19:42
you had to use an etch to remove it, that would not 10:19:44
be a selective deposition, because it's going to 10:19:48

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

regions where you don't want it, and you have to remove it, in that context. 10:19:53 10:19:55

Q. So your position is that if there is any spreading of the material to unwanted regions, then that's not selectively depositing. 10:19:57 10:20:01 10:20:05

A. No. That's not what I said. I answered the specific hypothetical that you gave me. 10:20:11 10:20:13

In that specific hypothetical that you gave me, you told me there's spreading of a material which you subsequently remove using an etch process. Because you had to use an etch process to define the spatial boundaries, it would not be a selective deposition process. 10:20:16 10:20:17 10:20:20 10:20:23 10:20:25 10:20:30

Q. I didn't say etch. I said ashing. 10:20:31

A. I understand that, and ash is specifically an oxygen etch. It's an oxygen plasma etch. 10:20:34 10:20:36 10:20:40

If it is a species that is removable in an oxygen plasma and ash is a standard oxygen etch for that material. 10:20:40 10:20:43 10:20:47

Q. What if it's just laser ablation? 10:20:48

A. My answer would be the same. 10:20:53

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Okay. 10:20:54

What if the deposition is done with 10:20:55

a shadow mask, and the material bleeds under -- into 10:21:05

the shadow. Is that selective deposition? 10:21:11

A. Again, it depends on the context. 10:21:14

If you have accounted for the 10:21:17

bleeding, which by the way is, again, very 10:21:19

well-characterized, it may be that you have designed 10:21:22

the mask to account for the bleeding in which case, 10:21:24

if you don't have to do a subsequent removal, it 10:21:27

could be selective. 10:21:30

On the other hand, if the follow-on 10:21:31

to your hypothetical is that -- it is in unwanted 10:21:35

regions, and therefore, I will follow that up with a 10:21:39

removal process, whether it be an ash laser ablation 10:21:43

or some other removal process, then it would not be 10:21:48

selective. 10:21:51

Q. Okay. 10:21:52

MR. GARR: Just one quick. Can you 10:21:53

turn up the volume on your computer a little bit? 10:21:56

A. Turn up? 10:21:59

MR. GARR: Yeah. Just a tad. 10:22:00

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. It's at 100 percent. 10:22:02

MR. GARR: Maybe the Zoom has a 10:22:04

volume. Let's take a look. 10:22:05

BY MS. ZHONG: 10:22:37

Q. Now, can you please pull up the Yamazaki 10:22:37

reference. I believe that's Exhibit 1005. 10:22:41

(Exhibit 1005, Yamazaki Patent Application 11:16:04

2003/0206322, was marked for identification.) 11:16:04

A. I have it, and I have clean paper 10:22:43

copies, if that's okay. 10:22:46

Q. That's fine. 10:22:54

A. Okay. I have it, and -- 10:22:55

Q. So in the context of the Yamazaki, what 10:22:57

is a device -- I'll put -- let me put it this way. 10:23:03

For Claim 34, which recite 10:23:09

encapsulating a polarity of devices, what are you 10:23:20

mapping to for each device? 10:23:24

A. In the context of Yamazaki, the way I am 10:23:26

mapping device, which by the way is consistent with 10:23:29

the patent at issue, is that I'm mapping it to -- so 10:23:34

a display device. So there's multiple individual 10:23:37

pixels within. 10:23:42

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

(Technical difficulty. Off the record.) 10:26:09
(RECESS, 10:23 a.m. - 10:34 a.m.) 10:26:29
BY MS. ZHONG: 10:34:15
Q. So, Dr. Subramanian, for Claim 34, with 10:34:16
respect to the element of plurality of devices, what 10:34:22
are you mapping to in Yamazaki? 10:34:28
A. So for Claim 34 of the patent at issue, 10:34:32
for the plurality of devices claim term, within 10:34:37
Yamazaki, I am mapping the said devices. So for 10:34:44
example, one instance of said device would be the -- 10:34:50
the device would constitute the display of Yamazaki. 10:35:05
I'm going to open up my report. I 10:35:08
have a paper copy, if that's okay. 10:35:10
Q. That's fine. 10:35:13
A. So if you look at what I'm mapping to 10:35:14
for the plurality of devices element. 10:35:18
Q. It could come up at 73? 10:35:29
A. It does come up there, but I also -- I 10:35:31
map it within element 34[e] which shows up starting 10:35:34
at page 46. 10:35:41
So you can see there, for example, 10:35:42
if you look at, as one exemplar, if you look at the 10:35:44

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

figure -- the annotated Figure 11 of Yamazaki that I show at the bottom of page 46, that would point to, as an example, a singular device. 10:35:47 10:35:52 10:35:56

Then, if you look at for another example, on the Figure 14, which I show on page 47, that would be another singular device. 10:35:58 10:36:01 10:36:06

Then, with respect to the plurality of said devices, I show that in the replicated and annotated versions of Figures 11 and 14, which I show at the top of page 48, where I show the plurality of devices clearly annotated. 10:36:08 10:36:13 10:36:16 10:36:20 10:36:25

Q. Okay. 10:36:27

You don't contend that Yamazaki either expressly or inherently discloses fabricating a plurality of devices on a substrate, do you? 10:36:28 10:36:32 10:36:38

A. No, I do not. 10:36:40

For the purposes of that combination, I am doing it in various ways; either based on the knowledge of one of skill in the art, or with respect to specific secondary references. 10:36:41 10:36:43 10:36:47 10:36:50

Q. Okay. 10:36:52

Your specific ground is Yamazaki in 10:36:55

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

view of AAPA/Ghosh, G-H-O-S-C-H; correct? 10:37:00

A. I believe you put an extra C in there. 10:37:06

Ghosh is G-H-O-S-H. 10:37:09

Q. Okay. Ghosh. 10:37:14

So are you using both AAPA and Ghosh 10:37:14

with Yamazaki, or are they alternate grounds, or are 10:37:22

they used in combination? 10:37:27

A. I think I understand your question. 10:37:29

So it's -- I actually address that 10:37:31

in the section that I just pointed to, which is the 10:37:34

section on page 46 of my declaration. 10:37:37

Specifically, it is my view that 10:37:40

just based on the knowledge of one of skill in the 10:37:42

art, so AAPA, it would be obvious. 10:37:45

I additionally provide a basis based 10:37:49

on Ghosh. So I cover it from both. 10:37:52

Q. So when you say a person of ordinary 10:37:54

skill -- strike that. 10:37:57

When you say the knowledge of a 10:37:58

person of ordinary skill in the art, you are 10:38:01

referring to the AAPA, or applicant admitted prior 10:38:03

art; is that correct? 10:38:08

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Correct. Correct. Or I'm pointing to that to help make clear what one of skill in the art would know. 10:38:09 10:38:12 10:38:19

Q. Okay. 10:38:20

So one of the bases for your invalidity or unpatentability theory is Yamazaki in view of AAPA; is that correct? 10:38:21 10:38:24 10:38:28

MR. GARR: Objection. 10:38:31

A. So it's -- well, it's specifically -- with respect to this limitation, it's Yamazaki in view of AAPA, and it's further taught by Ghosh. 10:38:33 10:38:36 10:38:41

So it is in the AAPA, and if that's not sufficient, we can additionally look at Ghosh. 10:38:45 10:38:48

Q. Okay. 10:38:51

So Ghosh is on top of AAPA. Ghosh is not an independent combination with Yamazaki; is that correct? 10:38:51 10:38:57 10:39:04

MR. GARR: Objection. 10:39:04

A. I'm not sure I understand. 10:39:04

AAPA would represent what one of skill would know. 10:39:06 10:39:09

So any obviousness combination is in 10:39:09

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

view of what one of skill would know. 10:39:12

So to that extent, if I'm pointing 10:39:14
to Ghosh, it clearly also depends of how one of 10:39:16
skill would interpret that. 10:39:20

Q. Okay. 10:39:22

So my understanding -- I'm just 10:39:27
trying to understand. What exactly is your ground? 10:39:29
Do you have a ground that is only based on Yamazaki 10:39:33
and Ghosh, or it would necessarily include AAPA? 10:39:39

MR. GARR: Objection. 10:39:43

A. I think I just answered that. 10:39:44

So any time we are doing this 10:39:45
analysis, and in particular, when we are talking 10:39:48
about obviousness, which is the analysis that I'm 10:39:49
doing, it is obviously through the eyes of one of 10:39:52
skill in the art. 10:39:56

One of skill in the art has AAPA 10:39:57
because the applicant themselves has said that that 10:40:01
is known. 10:40:03

So to that extent, if I have a 10:40:03
ground which has Ghosh, it's not excluding what one 10:40:06
of skill would know. The nature of obviousness is 10:40:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

it includes what one of skill would know, and the applicants for the patent at issue clearly acknowledge the material that constitutes the AAPA as within the realm of what one of skill would know. 10:40:12 10:40:21 10:40:25 10:40:28

Q. So AAPA is part of the basis for your unpatentability theory? 10:40:30 10:40:43

MR. GARR: Objection. 10:40:47

(Clarification requested by the Realtime Stenographer.) 10:40:47 10:40:52

A. I'm not sure I understand what you mean by that. 10:40:52 10:40:54

I mean, this is all obviousness. I have offered an analysis with respect to this ground, which is ground 1 in my analysis. It's an obviousness analysis. 10:40:54 10:40:56 10:41:00 10:41:05

So to that extent, given that it's an obviousness analysis, any analysis that I'm doing is in light of what one of skill would know. 10:41:06 10:41:08 10:41:11

The patent applicants themselves, the inventors themselves are acknowledging that the material that I have referred to as AAPA was prior art, and therefore, would have been known to one of 10:41:14 10:41:17 10:41:21 10:41:25

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

skill. 10:41:27

Q. So for ground 1, you don't have an independent basis, that's only based on Yamazaki and Ghosh; is that correct? 10:43:26 10:43:30 10:43:33

MR. GARR: Objection. 10:43:34

A. Again, I'm not sure I understand the question. 10:43:35 10:43:38

Because if I point to Yamazaki in combination with Ghosh, necessarily that's an obviousness combination, and in an obviousness combination, it's done through the eyes of one of skill in the art, and those eyes would include a knowledge of what I refer to as AAPA. 10:43:39 10:43:42 10:43:45 10:43:49 10:43:52 10:43:55

Q. Okay. 10:43:57

So AAPA is part of the basis for your unpatentability theory; is that correct? 10:43:58 10:44:01

MR. GARR: Objection. 10:44:05

A. Again, my answer is the same as I just said. 10:44:06 10:44:07

This is an obviousness analysis; therefore, the obviousness is done through the eyes of one of skill in the art. Based on that, one of 10:44:08 10:44:12 10:44:14

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

skill in the art is assumed to have an understanding of the subject matter at the time at issue, which would, as the inventors themselves admit, include AAPA. 10:44:17 10:44:19 10:44:21 10:44:25

Q. So the answer to my question is yes; correct? 10:44:29 10:44:31

MR. GARR: Objection. Mischaracterizes. 10:44:33 10:44:34

A. No, the answer to my question is what I gave you, which is I don't understand what you mean by your question. 10:44:34 10:44:36 10:44:39

If by your question you're referring to the fact that this is an obviousness analysis that involves Yamazaki and Ghosh, because it's an obviousness analysis, the one of skill would be assumed to have knowledge of the material that I referred to as AAPA. 10:44:40 10:44:42 10:44:45 10:44:49 10:44:51 10:44:53

Q. Well, I want to understand, what is a ground of challenge for ground 1? 10:44:59 10:45:01

A. Okay. 10:45:05

So firstly, I -- as I lay out in my analysis, within my declaration, I believe one of 10:45:06 10:45:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

skill in the art, viewing Yamazaki, in view of AAPA, putting aside Ghosh, would find the claims that I address specifically with respect to Ground 1, Claims 34 through -- 34, 35, 37 and 40 to be obvious. That's the first bullet point. 10:45:15 10:45:21 10:45:25 10:45:31 10:45:36

The second point is further to that, one of skill could look at alternative art, and specifically as further taught by Ghosh would come to the same opinion of obviousness. 10:45:37 10:45:41 10:45:46 10:45:49

Q. The combination of Yamazaki and Ghosh is independent of Yamazaki in view of AAPA; is that right? 10:45:51 10:45:56 10:46:04

A. I think I understand. 10:46:04

So if by independent, you mean one of skill would not have to go to Ghosh to find it obvious, they could find it purely in light of Yamazaki plus AAPA, I agree, that is a position within my ground. 10:46:05 10:46:08 10:46:12 10:46:14 10:46:17

However, should that be insufficient or just to get further confirmation, they could additionally look to Ghosh and then that would be another part of this ground, another way to get to 10:46:18 10:46:21 10:46:23 10:46:26

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

this ground. 10:46:29

Q. Okay. 10:46:29

But assume if AAPA is not a proper 10:46:30
basis for the ground, you don't contend that you 10:46:38
have done an analysis basing only on Yamazaki and 10:46:42
Ghosh; correct? 10:46:50

MR. GARR: Objection. 10:46:50

A. No. That's not true. 10:46:51

In fact, I specifically point to 10:46:54
that. For example, if you look to Paragraph 75 10:46:56
where I provide some description of this basis, in 10:46:59
Paragraph 75, I say, this idea of doing this 10:47:03
plurality of devices during batch fabrication, as 10:47:08
was known based on the admitted prior art, and as 10:47:11
further taught by Ghosh. 10:47:15

So if I take your hypothetical, 10:47:17
which I think is incorrect; in other words, I assume 10:47:19
the admitted prior art doesn't teach it, I'm saying 10:47:22
it is further taught by Ghosh, so it would still be 10:47:25
invalid on the basis of the additional teachings of 10:47:30
Ghosh. 10:47:33

Q. Okay. 10:47:34

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Now, in Ghosh, the -- the second encapsulation layer and the third encapsulation layer are not deposited selectively; is that correct? 10:47:34 10:47:49 10:47:54 10:47:59

MR. GARR: Objection. Form. 10:48:00

A. Sorry. 10:48:01

Q. In particular -- 10:48:17

A. Can you repeat your question, please. 10:48:18

Q. Sure. 10:48:20

Go to Paragraph 83 of your declaration. 10:48:20 10:48:26

A. Okay. 10:48:36

Q. In Paragraph 83, are you discussing the teachings of Ghosh; correct? 10:48:36 10:48:39

A. With respect to the specific subject matter I address in Paragraph 83, that's true. 10:48:41 10:48:46

Q. Okay. 10:48:48

You cited Figures 3 and 5 of Ghosh; correct? 10:48:48 10:48:53

A. Yes. 10:48:53

Q. Okay. 10:48:54

Element 21 is the first 10:49:00

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

encapsulation layer for the OLED display devices 3 for Ghosh; correct? 10:49:02 10:49:07

A. In Ghosh, in the discussion related to element 21 on Paragraph 32, it refers to it as a first encapsulation layer. 10:49:11 10:49:33 10:49:38

Q. Okay. 10:49:39

And elements 22 and 23 are respectively second and third encapsulation layers; is that correct? 10:49:44 10:49:47 10:49:51

A. In the same Paragraph 32 of Ghosh, it refers to element 22 as a second encapsulation layer, and further down, it refers to element 23 as a third encapsulation layer. 10:49:51 10:49:54 10:50:00 10:50:05

Q. You don't contend that Ghosh's second encapsulation layer or third encapsulation layer is deposited selectively; correct? 10:50:10 10:50:13 10:50:19

A. Actually, for the purposes of my analysis, I am not -- I'm only using the teachings of Ghosh in relation to the batch fabrication idea to achieve a plurality of devices for my mapping. 10:50:25 10:50:27 10:50:32 10:50:38

The specifics of whether the encapsulation layers 22 and 23 are not -- are 10:50:45 10:50:50

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

selective or not is not relevant for the teachings that I'm using. 10:50:56 10:50:59

In other words, I don't need them for the teachings that I'm taking from Ghosh, and using to inform my analysis. It doesn't happen. 10:51:00 10:51:02 10:51:05

Q. I understand that you don't think it matters, but can you just answer my question. 10:51:08 10:51:11

In Ghosh, is the second encapsulation layer deposited selectively? 10:51:14 10:51:17

MR. GARR: Objection. 10:51:25

Q. Why don't you take a look at Paragraph 58 of your declaration? 10:51:47 10:51:50

A. Okay. I've read that, but just to be clear, there I'm not offering my opinion. I'm telling you what the -- what happened during prosecution, and so your question is different. 10:51:51 10:52:13 10:52:16 10:52:19

Q. Understood. 10:52:22

You did not voice any disagreement with the applicant's characterization of Ghosh's teaching regarding the second encapsulation layer; is that correct? 10:52:27 10:52:30 10:52:33 10:52:36

A. With respect to my declaration, I agree. 10:52:38

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

I did not voice any disagreement because I didn't need to go to that for my analysis. 10:52:45 10:52:47

The teaching that I was applying from Ghosh was related to the plurality of devices. In other words, the selective deposition learning is already provided within Yamazaki. 10:52:50 10:52:51 10:52:56 10:53:00

Q. I understand where you're coming from, but do you have an opinion as to whether Ghosh's second encapsulation layer 22 was deposited selectively or non-selectively? 10:53:01 10:53:08 10:53:11 10:53:16

A. Okay. 10:53:20

So if we look at Ghosh itself. 10:53:23

Q. Okay. 10:53:38

A. Specifically, if we look at Paragraph 32 of Ghosh, and we can also then look at that in conjunction with the figure we have been discussing, specifically Figure 3. 10:53:39 10:53:46 10:53:50 10:53:54

Ghosh says, the second encapsulation layer 22 in Figure 3, is formed of one or more oxide layers, and is deposited by ALE or ALD. ALE/ALD are respectively atomic layer epitaxy/atomic layer deposition. 10:54:00 10:54:04 10:54:08 10:54:17 10:54:21

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Okay. Those are well-known techniques. Turns out that those techniques can be both selective or non-selective depending on the specifics of the technique. 10:54:22 10:54:25 10:54:27 10:54:29

So Ghosh is actually silent with respect to this disclosure as to whether it is selective or not. I'll come back to the figure in a minute. 10:54:31 10:54:33 10:54:35 10:54:38

Similarly, if we look at the discussion of the third encapsulation layer 23, it says, in the same paragraph, roughly two-thirds of the way down, "Optionally on top of encapsulation layer 22, is laid down a third encapsulation layer 23, preferably formed of one or more polymer layers to provide chemical and mechanical protection to the device." 10:54:38 10:54:43 10:54:48 10:54:56 10:54:59 10:55:02 10:55:07 10:55:10

So again with respect to this disclosure, it doesn't say whether it is selective or not. 10:55:10 10:55:12 10:55:15

If we look at Figure 23, it depends on the specifics. We notice that at the edges of Figure 23, there are regions where there is no 10:55:16 10:55:20 10:55:25

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

layer 22 or layer 23. 10:55:32

So we would need more information to 10:55:35
answer. It could be done selectively, or it might 10:55:37
not. 10:55:41

The applicant has said that it's not 10:55:42
selective. Since I didn't need to go to that for my 10:55:44
obviousness combination, I haven't specifically 10:55:49
addressed that. 10:55:52

Q. At least the Examiner accepted that 10:55:56
representation; correct? 10:55:58

Strike that. 10:55:59

At least the Examiner agreed with 10:56:00
the applicant's characterization to -- when it -- 10:56:03
when he allowed the claims; correct? 10:56:08

A. Well, to the extent that the applicants 10:56:11
overcame the rejection based on this argument, that 10:56:18
appears to be the case. Certainly there doesn't 10:56:22
appear to be a pending dispute that would have 10:56:26
prevented validity at that point during the initial 10:56:28
prosecution. 10:56:32

Q. Okay. 10:56:33

In Ghosh, the encapsulation layer 22 10:56:33

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

fills the exposed area between the OLED devices and the encapsulation layer 1; is that correct? 10:56:40 10:56:47

A. I think I understand your question. 10:56:52

You're asking if I were to look at the individual OLED devices pointed to by the number 3, and I noticed a small gap between them, I agree, that 22 appears to fill that gap. 10:56:55 10:57:00 10:57:03 10:57:07

Q. Are those individual devices subsequently diced? 10:57:10 10:57:21

(Clarification requested by the Realtime Stenographer.) 10:57:30 10:57:36

A. So that's addressed in the same paragraph I referred to. So if we look at Figure 3, it points to sort of a side view of this system. If we look at Figure 5, it provides a top-view. In other words, we're looking from the top down. 10:57:36 10:57:37 10:57:42 10:57:46 10:57:50

It says in Paragraph 32, Figure 5 is a top view of the substrate 2, with the first encapsulation layer 21 of this embodiment shown without a second encapsulation layer laid down over it. 10:57:52 10:57:59 10:58:04 10:58:08 10:58:11

The dashed lines 25 in Figure 5 10:58:11

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

indicate where the substrate would be cut as part of the dicing operation, following completion of the encapsulation assembly. 10:58:14 10:58:17 10:58:23

So if we sort of put those two pieces of information together; in other words, the side view of Figure 3, and the top-down view of Figure 5, the dicing would occur between the -- or within the gaps between the individual item numbers 3. 10:58:25 10:58:27 10:58:30 10:58:34 10:58:40 10:58:44

Q. Okay. 10:58:45

So encapsulation layer 22 would fill the areas between the OLED devices, including covering up the dicing lines, the dashed lines; correct? 10:58:47 10:58:54 10:59:02 10:59:07

A. If by covering up, you mean they're spatially within the regions within which dicing would subsequently occur, I agree with that, yes. 10:59:08 10:59:16 10:59:19

Q. Okay. 10:59:22

So they cover up the scribe line? 10:59:22

A. If we use scribe line -- I mean, that is a term that is commonly used, if we use scribe line to refer to the regions where subsequent dicing 10:59:26 10:59:29 10:59:35

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

would occur, I agree. There is encapsulation material 22 in the scribe lines. 10:59:36 10:59:39

Q. Now, can you go to Yamazaki Figure 12. 10:59:52

A. Okay. 11:00:01

Q. So in Yamazaki Figure 12, 1200 is a substrate; correct? 11:00:01 11:00:06

A. Specifically, if we look at Paragraph 179 of Yamazaki, it refers to 1200 as an active matrix substrate. 11:00:08 11:00:52 11:01:00

Q. This is a complete substrate; correct? 11:01:02

MR. GARR: Objection. 11:01:17

A. I'm not sure I understand what you mean by that question. 11:01:17 11:01:19

Q. This is the entirety of the substrate. It's not one that's without dicing. 11:01:21 11:01:25

A. Oh. I understand the question. Okay. 11:01:30

Well, actually, no. I'm not sure I understand the question. Could you clarify, please. 11:01:39 11:01:41

Q. So this is a substrate before any dicing. 11:01:44 11:01:48

MR. GARR: Objection. 11:01:52

A. I honestly don't know if there's any 11:01:55

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

discussion of diced -- well, I can look in the discussion on Figure 12. 11:01:57 11:02:00

With respect to Figure 12, there doesn't appear to be any discussion of dicing, so I don't know how to answer your question. 11:02:04 11:02:07 11:02:10

Q. So the 1200 shown in Figure 12, it's not just a section of a larger substrate, it's the entirety of the substrate; correct? 11:02:11 11:02:22 11:02:28

MR. GARR: Objection. 11:02:32

A. Okay. I think I understand it. 11:02:32

If you're asking me if the bounds shown in Figure 12 of 1200 are the ends of the physical material that constitutes 1200, and it doesn't extend past that, I generally -- that appears to be the case with respect to 1200 in Figure 12. 11:02:56 11:03:03 11:03:11 11:03:14 11:03:17 11:03:20

Q. Okay. 11:03:20

Do you see the two dashed boxes -- 11:03:21

A. Yes. 11:03:24

Q. -- on 1200? 11:03:24

A. Yes. 11:03:26

Q. What are they? 11:03:26

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. So with respect to the discussion of Figure 12, which is provided in Yamazaki in the section starting on Paragraph 179, and continuing until the end of that section -- so ending on Paragraph 184, it's actually silent as to what those are. 11:05:28 11:05:33 11:05:43 11:05:53 11:06:01 11:06:04

Based on their position, they appear to be the location for row and column drivers. 11:06:05 11:06:07

Q. Okay. 11:06:11

Row and column drivers, are they part of the OLED device? 11:06:14 11:06:16

MR. GARR: Objection. 11:06:22

A. It depends on the context. In some contexts, yes, and in other contexts, no. They certainly could be in particular context. 11:06:23 11:06:27 11:06:31

Q. In the context of the '389 patent and your mapping of Yamazaki against the '389 patent? 11:06:33 11:06:36

A. So again, they don't -- so with respect to the analysis, they don't need to be. So they could be, but they don't have to be. Because you can make a plurality of devices which accessed without row and column drivers, and there are 11:06:46 11:06:48 11:06:51 11:06:53 11:07:00

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

examples of that in the passive matrix versions, for example, of Yamazaki. 11:07:03 11:07:06

Or you can put row and column drivers in there, in which case you would have a row and column driver for -- or a row and column driver set for each of the individual OLED displays that will collectively constitute the plurality of devices. 11:07:07 11:07:09 11:07:12 11:07:16 11:07:21 11:07:24

Q. Okay. 11:07:28

Do you usually need to cover up the row and column drivers? 11:07:28 11:07:34

A. Sorry. Say that again, please. 11:07:34

Q. Do you usually need to encapsulate the row and column drivers for environmental protection? 11:07:37 11:07:41

A. No. Typically, no, actually. 11:07:43

The row and column drivers are typically silicon chips that are subsequently tape bonded. They do not need to be covered. 11:07:46 11:07:49 11:07:51

In fact, in most commercial devices, you may put adhesive to prevent them from coming off, but they don't need encapsulation. The drivers themselves are silicon devices that are encapsulated 11:07:53 11:07:58 11:08:01 11:08:04

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

during the building of the drivers themselves. 11:08:09

Q. We have been talking about encapsulation 11:08:10

layer. Have you also heard of the word -- the term 11:08:13

"passivation layer"? 11:08:17

A. Yes. 11:08:20

Q. Is there a difference between a 11:08:20

passivation layer and an encapsulation layer? 11:08:22

A. It depends on the context. 11:08:25

So in some cases, it's certainly 11:08:26

true, in some contexts, it's certainly true that the 11:08:29

terms are almost used interchangeably, but there are 11:08:32

also probably contexts where they're not used to 11:08:36

refer to the same thing. So it's conceptually 11:08:38

specific. 11:08:41

Q. When are they used differently? 11:08:41

A. So I mean -- this is unrelated to this 11:08:45

matter, and unrelated to the patent at issue, but 11:08:51

there are instances where passivation layers are 11:08:54

used within the construction of a larger device, so 11:08:57

it could be an intermediate layer that's buried 11:09:02

within the device. It's used to passivate a 11:09:06

specific interface, for example, within the device. 11:09:08

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

So that would be a passivation layer, but it's not an encapsulation layer. 11:09:11 11:09:14

Q. Is a passivation layer necessarily a planarization layer? 11:09:14 11:09:19

MR. GARR: Objection. 11:09:21

A. Again, it's contextually specific. 11:09:21

In the example that I gave you, which is again unrelated to this subject matter, if it is used to passivate a particular interface, and it could be or it could not be, depending on the specifics of it. 11:09:24 11:09:26 11:09:29 11:09:35 11:09:37

Q. So if you place a passivation layer over a cathode of an OLED, and assume that it's organic material, is that necessarily a planarization layer? 11:09:38 11:09:52 11:09:58

MR. GARR: Objection. 11:10:03

A. I guess it depends on the specifics. 11:10:04

If it's not providing the planarization, as we discussed previously, it wouldn't be a planarization layer, but if it is providing it, it could be. It depends on the specifics. 11:10:06 11:10:11 11:10:13 11:10:16 11:10:17

Q. Okay. 11:10:17

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

If you use inkjet printing, does that necessarily make the organic layer a planarization layer? 11:10:18 11:10:24 11:10:27

MR. GARR: Objection. 11:10:30

A. I'm going to need more information to answer that. 11:10:43 11:10:45

So you said use inkjet printing for an organic layer, but we haven't talked about an organic layer before in your previous questions, so I'm not sure I understand your question. 11:10:46 11:10:50 11:10:52 11:10:55

MS. ZHONG: Court reporter, it's inkjet, not think jet. I-N-K-J-E-T. One word. 11:10:58 11:11:00

(Off the record.) 11:11:18

Q. So if you use inkjet to deposit organic material over the top most electrode of an OLED, does that necessarily make the organic layer a planarization layer? 11:11:31 11:11:35 11:11:40 11:11:43

A. Necessarily -- no, I don't think so. I mean, it depends on the specifics of the deposition process, which in the case of inkjet depends on the pixelation pattern, and the ink rheological properties. 11:11:51 11:11:52 11:11:56 11:12:01 11:12:12

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. What's the last part? 11:12:12

A. Ink rheological properties. 11:12:13

Q. Ink rheological properties. Okay. 11:12:18

What is rheological property? 11:12:39

A. So the rheological properties of an ink specifically refer to the set of physiochemical properties that describe its behavior, particularly under flow. 11:12:48 11:12:51 11:12:54 11:12:58

So those would include the sheer dependent viscosity, and also in the specific case of its movement on a surface, those depend on the surface energies and the internal energies of the ink. 11:12:59 11:13:06 11:13:09 11:13:13 11:13:16

Q. Earlier today, when we were discussing planarity, you also mentioned, I believe you used the term "topology." 11:13:16 11:13:25 11:13:28

What is topology? 11:13:30

A. Topology, as I was using the term, is variation in the surface height. 11:13:33 11:13:37

If we were referring from ground zero, a variation in the height relative to that ground zero as a function of position is topology. 11:13:40 11:13:43 11:13:47

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. How does that differ another term I've heard, "topography"? 11:13:50 11:13:53

A. In that context, actually, they're often used interchangeably. 11:13:55 11:13:59

So topography and topology in the context of talking about changes in surface heights are, in this field, almost always used interchangeably. 11:14:00 11:14:05 11:14:07 11:14:10

Q. Okay. 11:14:11

I've also -- what about, like, when people, say, like, the "contours of the surface." Is that also another term used to describe topology and topography? 11:14:12 11:14:15 11:14:18 11:14:23

MR. GARR: Objection. 11:14:25

A. It could or it could not. If in that terminology, "contours" is used to refer to the physical height contours, then it is fair that that is a description of the topology. But if it's used to refer to some other property, then it depends on the specifics. I would need more information to answer that. 11:14:25 11:14:34 11:14:38 11:14:41 11:14:43 11:14:46 11:14:48

Q. So if you go to Weaver, which is 11:15:49

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Exhibit 1008, Paragraph 35. 11:15:55

(Exhibit 1008, Weaver Patent Application, 11:16:04

2002/0140347, was marked for identification.) 11:16:04

Q. Read to yourself the first sentence. 11:16:05

A. Okay. I've done that. 11:16:17

Q. Do you see the phrase "irregular 11:16:18

contours of the underlying surface"? 11:16:21

A. Yes. 11:16:23

Q. What does the contours of the underlying 11:16:29

surface mean here? 11:16:32

A. Here it's describing the physical 11:16:33

contours. So I think it is essentially using the 11:16:34

term as I was using the term "topology" previously. 11:16:37

Q. Okay. 11:16:40

Do you also see that in 11:16:49

Paragraph 35, it mentions a non-conformal liquid? 11:16:51

A. Yes. 11:16:57

Q. What does "conformal" mean in this 11:16:57

context? 11:17:01

A. In the context here, a conformal liquid 11:17:02

would be a liquid that replicates the topology of 11:17:07

the underlying structure. A non-conformal liquid 11:17:12

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

will be a liquid that does not. 11:17:15

So, for example, if I have a sharp 11:17:18

right-angle corner, a conformal liquid placed over 11:17:25

it, would replicate that sharp right-angle corner. 11:17:30

A non-conformal liquid would not, it would for 11:17:34

example, round the corner or create a sloped 11:17:39

section. Those are the examples of a 11:17:44

non-conformality. 11:17:45

Q. What is "conformal coating"? 11:17:46

A. A conformal coating? 11:17:50

Q. Yes. 11:17:52

A. Oh, a conformal coating, given the same 11:17:52

context, would be a coating that replicates the 11:17:55

topology of the underlying surface in that context. 11:18:02

Q. What if it largely follows the contours 11:18:04

of the topology of the surface, but it may round 11:18:12

the -- like at sharp corners, it may end up having a 11:18:19

slightly more rounded edge. 11:18:24

Is that still conformal coating -- 11:18:26

MR. GARR: Objection. 11:18:28

Q. -- or that becomes a planarization 11:18:29

layer? 11:18:33

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. So it depends on the specifics. 11:18:33

Given that we are -- you know we're talking about real-world systems, if the rounding is significant, then that this not be conformal. That would be non-conformal, and could be used to -- or it may be used to achieve planarization. 11:18:39 11:18:40 11:18:43 11:18:46 11:18:49

Q. Is there a common understanding as to when the rounding is considered to be significant versus it's just within the, you know -- within the ability of Mother Nature. 11:18:56 11:18:59 11:19:02 11:19:08

A. Not -- yeah. I don't understand that question, so... 11:19:14 11:19:15

Q. Okay. 11:19:16

So, like, is there a common understanding as to when the rounding is considered to be significant versus not? 11:19:17 11:19:19 11:19:22

A. Sure. 11:19:25

So for the purposes of talking about conformality, we can look at the spatial frequency of the topology variations we are talking about, and we can compare it to the radius of curvature of the rounding that we are talking about. 11:19:26 11:19:28 11:19:36 11:19:39 11:19:44

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

If the radius of curvature of the rounding is significant relative to the topology; so in other words, we produce rounding that is a significant fraction of the spatial frequency of the corners, then we would say that it is non-conformal. 11:19:45 11:19:48 11:19:54 11:19:57 11:20:00

So a good example would be if we were to look at -- I can give you an example -- could I -- 11:20:04 11:20:06 11:20:38

THE WITNESS: Could I have the other pieces of art, please? 11:20:39 11:20:40

MR. GARR: Yes. 11:20:41

THE WITNESS: Thank you. 11:20:43

A. So as an example, there's a piece of art that I referred to in the declarations that I have submitted called Fujimori. 11:20:59 11:21:01 11:21:04

In Fujimori, you can see that there are layers that are clearly significantly rounded, compared to the sharpness of the topology below it, so that would be a non-conformal coating, which then could be used for planarization. 11:21:09 11:21:12 11:21:15 11:21:19 11:21:22

Sorry. I think I said Fujimori, I meant Suzuki. If that's what I said. 11:21:27 11:21:32

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. So for Suzuki is Exhibit 1012; correct? 11:21:34

A. Correct, yes. 11:21:40

(Exhibit 1012, Suzuki Patent 6,198,217, was marked for identification.) 11:16:04

Q. Which layer are you referring to, in particular? 11:21:45

A. So for example, if we look at the figure on the cover page. 11:21:48

Q. Okay. 11:21:57

A. Which is, I guess, a replication of Figure 1 of Fujimori. You can see that layer 20 has significant rounding relative to the topology of the very sharp rectangular structure below it. You can see you have a significant variation in film thickness that does not correspond to the topology of the structure below it. 11:22:00

So that would be an example of something where it's very clear that that is non-conforming. 11:22:28

Q. What about 22? Layer 22. 11:22:33

A. So layer 22 in this case largely replicates the topology of the top of layer 20. So 11:22:36

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

within the scale of this, it appears to be fairly conformal. 11:22:46 11:22:49

MS. ZHONG: Can we go off the record. I'm having some internet issues on my end. 11:26:03 11:26:04

(RECESS, 11:26 a.m. - 11:27 a.m.) 11:26:08

BY MS. ZHONG: 11:27:36

Q. Dr. Subramanian, can you please refresh your Exhibit Share, and see whether there is an Exhibit 2100. 11:27:36 11:27:38 11:27:41

(Exhibit 2100, Cok, Patent 6,770,502, was marked for identification.) 11:27:43 11:27:44

A. Yes, I see it. 11:27:44

Q. Can you please open it. 11:27:45

A. I have it open. 11:27:49

Q. Okay. So just for the record, Exhibit 2100 is a presentation that I've downloaded from the Energy.gov with the title "Inkjet Technology for OLED SSL Mass Production" by Dr. Madigan of Kateeva. 11:27:50 11:27:53 11:27:59 11:28:06 11:28:10

Do you know Dr. Madigan? 11:28:15

A. I do. I've met him before. He was a PhD student at MIT in the lab of Vladimir Bulovic. 11:28:19 11:28:21

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

I knew Vladimir very well. He and I are very similar seniority levels. 11:28:28 11:28:32

As I recall, Conor and Vladimir founded Kateeva together. So I don't know Conor very well, but I have met him. 11:28:34 11:28:38 11:28:42

Q. Can you please go to page 18. 11:28:44

Let me know when you're there. 11:28:46

A. Okay. I'm there. 11:28:59

Q. Do you see that there are four figures on that page; correct? 11:29:06 11:29:13

A. Yes. 11:29:19

Q. Focus on the two top ones. 11:29:19

A. Okay. 11:29:25

Q. And the title Typical VT Organic Layer. 11:29:25

Do you consider the Typical VT organic layers -- strike that. 11:29:31 11:29:34

Do you consider the Typical VT organic layers as depicted here planarization layers? 11:29:38 11:29:42 11:29:46

MR. GARR: Objection. 11:29:50

A. I don't think there's -- so there isn't a lot of information here, so these are, you know, 11:29:52 11:29:54

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

sort of sketches, and there's obviously no textual description saying whether it covers defects or anything like that. 11:29:57 11:30:01 11:30:07

I mean, they do say that it's partially conformal. So what that does mean is it is conceptually possible by exploiting the partial conformality. If you use the appropriate thicknesses to it could be used to achieve planarization. 11:30:08 11:30:11 11:30:16 11:30:21 11:30:23 11:30:26

Here they don't specifically address it. These are just sort of cartoon sketches to compare what they call a VT organic layer and compare it to the Kateeva organic layer. 11:30:27 11:30:28 11:30:32 11:30:36

So I couldn't say for sure. 11:30:39

Under specific process conditions based on the partial conformality, it probably is possible to use it for achieving planarization. 11:30:41 11:30:43 11:30:47

Q. Okay. 11:30:50

Just as depicted here, would you consider them to be planarization layer? 11:30:51 11:30:54

MR. GARR: Objection. 11:30:57

A. Again, these are sketched figures. So 11:30:58

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

it doesn't really show the details. Certainly with respect to the fact that there is a significant difference in variation and step height, there is Conor rounding, and it does look like it's eliminating high-frequency roughness. It could conceptually be used to form a planarization layer. 11:31:04 11:31:10 11:31:14 11:31:18 11:31:20 11:31:24

With respect to these figures, given that these are just cartoon sketches, I couldn't say for sure, and there's no textual description. 11:31:28 11:31:30 11:31:33

Q. Can you please go to page 20. Can you take a look at the second bullet point. 11:31:55 11:32:06

A. Okay. 11:32:11

Q. Here, R2R means roll-to-roll; is that correct? 11:32:12 11:32:18

A. That's right. 11:32:18

Q. The second bullet point states that, "For the inorganic layer, the only option in R2R is blanket coating followed by remove the material at the end of the process." 11:32:19 11:32:29 11:32:37 11:32:39

Do you see that? 11:32:41

A. Yes. 11:32:41

Q. Does that mean according to the authors 11:32:41

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

of this presentation, in R2R, the inorganic materials can only be deposited nonselectively? 11:32:44 11:32:51

A. That's what they say. They're wrong at this time. 11:32:56 11:32:58

So this is dated 2015. I had personally already published papers showing inorganic deposition in R2R with spatially specific deposition and selectively. 11:32:58 11:33:01 11:33:05 11:33:10

They may have said that. They were wrong, so... 11:33:13 11:33:15

Q. Do you think there are persons of ordinary skill in the art? Strike that. 11:33:15 11:33:20

Do you consider Dr. Madigan to be a person of ordinary skill in the art as we define it? 11:33:22 11:33:26

A. I don't remember his specific background, but he got his PhD from Vladimir's lab. 11:33:29 11:33:32

I don't remember what his PhD topic was, but I would assume just because Vladimir's lab did a lot of work on OLEDs, I assume he probably did a lot of work on OLEDs. He probably could be. But that doesn't mean he could be wrong. I mean, I will tell you, factually, this statement is wrong. 11:33:36 11:33:38 11:33:41 11:33:45 11:33:48 11:33:51

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Okay. 11:33:54

A. And you can look at my own personal 11:33:55

publications to see that this is wrong. 11:33:58

Q. When did you perform the selective 11:34:00

deposition of the inorganic layer in roll-to-roll 11:34:06

fashion? 11:34:10

A. I started working on roll-to-roll 11:34:10

gravure, it must have been 2005-2006. So I don't 11:34:17

remember, but it would have been sometime after 11:34:23

that. Certainly before 2015. 11:34:25

Q. How did you do the spatial selective 11:34:26

deposition? 11:34:32

A. We used gravure printing. We developed 11:34:32

a technique called gravure printing, and we showed 11:34:35

that this could be used in roll-to-roll, and we 11:34:39

showed it could be used for printing in inorganic 11:34:42

materials. 11:34:44

Q. What did you say, printing grill? 11:34:45

A. G-R-A-V-U-R-E. 11:34:48

Q. What is gravure printing? 11:35:00

A. It's a roll-based printing technique. 11:35:02

What you have is you have a hard cylinder which has 11:35:06

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

features etched into it. The cylinder is typically made out of metal. We made it out of metal, for example. You deposit ink on the cylinder and then you wipe it with a doctor blade. And then the cylinder rolls on the substrate that you are trying to print on, and it transfers the ink to put ink only where the features were etched. 11:35:11 11:35:15 11:35:16 11:35:21 11:35:21 11:35:24 11:35:25

So it essentially is a printing technique that works on roll-to-roll at very high speeds with very high resolution. 11:35:27 11:35:30 11:35:33

As an example, it's commonly used to print money. A lot of money is printed using gravure. 11:35:35 11:35:40 11:35:44

Q. That's what I was about to say. 11:35:45

(Clarification requested by the Realtime Stenographer.) 11:35:57 11:36:03

Q. So is it also called "bar coding," that method? 11:36:03 11:36:07

A. No. They're separate. 11:36:07

Q. What is spray coating? 11:36:10

A. Well, I mean, spray coating there's many different types of spray coating, so it depends on 11:36:15 11:36:19

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

the specifics. 11:36:22

But generally speaking, spray 11:36:23

coating is a technique where you generate a spray in 11:36:25

a gas phased carrier. The spray means it's a 11:36:29

selection of tiny drops, and then you direct that 11:36:34

spray onto a substrate. 11:36:37

But there's a bunch of different 11:36:40

ways of doing it. 11:36:41

So it's very contextually specific. 11:36:42

Q. Is inkjet printing -- how -- strike 11:36:44

that. 11:36:50

Is spray coating the same or 11:36:50

different from inkjet printing? 11:36:58

A. So I personally, in -- given my huge 11:37:01

background in inkjet printing, and to some degree in 11:37:07

spray coating do not read them as the same. 11:37:10

But I would guess it would depend on 11:37:13

the specific context and the source document. In 11:37:14

that inkjet is a droplet based technique, and each 11:37:17

nozzle is firing one drop at a time. 11:37:24

You can have a large number of 11:37:26

nozzles in parallel. In fact, that's a big 11:37:28

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

advantage of inkjet. 11:37:31

Spray, in contrast, a singular 11:37:33

nozzle is usually pushing out a bunch of much 11:37:38

smaller droplets to form a spray. 11:37:42

So I personally, given that context, 11:37:45

treat them as different, but I think to answer it 11:37:47

generally, we'd have to look at the context. 11:37:50

Q. So in inkjet printing, are the particles 11:37:55

charged? 11:37:59

A. It depends on the type of inkjet, 11:37:59

actually. You can do both. There are inkjet 11:38:01

printers that use charge particles. There's a large 11:38:04

number of inkjet printers that do not. 11:38:07

Q. What about in Yamazaki? 11:38:10

A. So in Yamazaki, again, if we are talking 11:38:30

about the specific case where it discusses inkjet, 11:38:32

there is a specific discussion of inkjet, in, for 11:38:39

example, the section related to Figure 12, which you 11:38:44

and I discussed previously, and that's 11:38:49

Paragraph 179. 11:38:52

In that system, where an inkjet is 11:38:52

discussed in relation to Figure 12, it specifically 11:38:57

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

calls out the use of MLP, or ML-chip which is basically specific implementations of piezoelectric inkjet printing. In those systems, the droplets are not charged. 11:39:00 11:39:08 11:39:16 11:39:20

Q. What about in Paragraph 137? 11:39:22

A. Yes. So in Paragraph 137, it says, "The electric field application method controlled by an electric field has been shown here in Embodiment 2; however, other methods such as the inkjet method, or a method for the EL" -- sorry, "or a method in which the material for the EL layer is controlled and applied as charged particles may also be applied. 11:39:39 11:39:48 11:39:52 11:39:56 11:40:00 11:40:05 11:40:09

So it's using an "or" there, so it's not specifying whether the inkjet is discussing here uses charged particles or does not. So this could, arguably cover both with respect to inkjet. 11:40:12 11:40:17 11:40:20 11:40:24

The second clause is definitely about using charged particles. 11:40:26 11:40:28

So as I said earlier, inkjet, depending on the approach may or may not be charged. 11:40:30 11:40:33

This paragraph says use inkjet. It's silent as to whether charging is required or 11:40:36 11:40:39

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

not, and then it gives an alternative using the charged particle approach. 11:40:41 11:40:44

Q. What about for the electric field application method; are the particles or droplets charged in that case? 11:40:46 11:40:48 11:40:53

A. Yes. I think they are. In the discussion of that, and that's Embodiment 2, which, for example, is shown in Figure 1C. In that system, it's definitely charged. They're discussed as such. 11:40:54 11:40:56 11:40:58 11:41:05

Q. Does the trajectory of those charged particles depend on the electric field strength as well as positioning? 11:41:12 11:41:15 11:41:17

A. Sorry. Does the trajectory and positioning depend on electric field strength; is that your question? 11:41:18 11:41:24 11:41:27

Q. No. Does the trajectory of the charged particles depend on the field strength, as well as the positioning of the electrical field? 11:41:27 11:41:30 11:41:32

A. Oh. I understand. 11:41:35

Yes. 11:41:37

In that the deviation of the particles increases with the increased strength of 11:41:38 11:41:41

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

the transverse electric field, and depending on the position of said transverse electric field, the further away you are from the final target location, all else being equal, the more deviation you will get. 11:41:47 11:41:52 11:41:58 11:42:01 11:42:04

Q. Okay. 11:42:05

What if -- so those particles are going to be deposited on the substrate; right? 11:42:07 11:42:13

A. In the example in Figure 1C, I agree. 11:42:17

Q. What if you apply a magnetic field to the back of a substrate? 11:42:20 11:42:28

Would that -- how would that affect the trajectory of the particles? 11:42:32 11:42:34

A. So it depends. 11:42:38

I mean, the short answer is if you have a magnetic field that is right up against the surface, it will have almost no impact on the trajectory, because the velocity of the electrons at that point is extremely high, and they have a very high momentum towards the substrate. 11:42:40 11:42:42 11:42:45 11:42:47 11:42:52 11:42:55

So any magnetically induced deviation will be minuscule. 11:42:57 11:43:02

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

So if, on the other hand, you motion the magnetic field, so it's closer to the ejection point, which is not the case if it's right up against the substrate, then the deviation will be more. 11:43:06 11:43:08 11:43:11 11:43:14 11:43:16

But in your hypothetical, where it's up against the substrate, the deviation is minuscule. It's really not an issue, because when the electrons see that -- sorry, when the ions -- the charged particles, see that magnetic field, they're already moving at very high velocity, and therefore, the momentum vector is extremely oriented. 11:43:16 11:43:19 11:43:22 11:43:24 11:43:28 11:43:33 11:43:37 11:43:39

I know Dr. -- or Mr. Humphrey addressed that, and he's just wrong. I mean, that's just incorrect. 11:43:40 11:43:44 11:43:46

Q. Are you aware of the use of a magnetic shadow mask in conjunction with the electric field application method? 11:43:47 11:44:05 11:44:12

A. I couldn't say one way or another. As I said, I use that in an obviousness combination. I if found a single reference that used both of those, 11:44:16 11:44:21 11:44:25

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

I wouldn't have needed to do the combination. 11:44:27

I couldn't say. 11:44:29

I would certainly say, however, that 11:44:30
given what I just told you previously, it would be 11:44:32
obvious to do that, to make that combination. 11:44:34

Q. So you have never seen anyone using the 11:44:37
combination of electric field application method 11:44:43
together with a magnetic shadow mask, even after the 11:44:47
priority date? 11:44:55

A. Certainly, I cannot, off the top of my 11:45:02
head, recall any singular piece of art that has 11:45:04
those. 11:45:06

Again, it's not something I 11:45:07
specifically found in my analysis because I was 11:45:08
doing an obviousness analysis, and the combination 11:45:11
was sufficient. 11:45:16

But I have not found a singular 11:45:16
piece of art that has both of them in the same piece 11:45:19
of art. 11:45:21

Q. Okay. 11:45:22

What about -- let's expand the time 11:45:23
horizon. Let's not confine ourselves to 2001-2002. 11:45:29

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Have you seen any art or articles that actually combine the magnetic field -- strike that. 11:45:37 11:45:41

That actually combines the electric field application method, together with the use of a magnetic shadow mask? 11:45:43 11:45:46 11:45:50

A. Not that I can recall, but again, I didn't look for art significantly after, so I couldn't say whether it's there or not. 11:45:53 11:45:58 11:46:00

I don't know. 11:46:01

Q. Okay. 11:46:02

You are familiar with this field; correct? The OLED field? 11:46:03 11:46:04

A. Yes, very much so. 11:46:08

Q. Are you aware of any group that actually uses that combination in their research? 11:46:10 11:46:12

A. Not that I can specifically recall, but again, I haven't looked. 11:46:14 11:46:16

Q. Okay. 11:46:18

Are you aware of any commercial -- strike that. 11:46:18 11:46:25

Are you aware of any commercial manufacturing activity, like -- sorry. 11:46:25 11:46:28

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Are you aware of any, like, industrial practice in which the electric field application, together with the magnetic shadow mask are used in combination? 11:46:32 11:46:34 11:46:37 11:46:47

A. Again, your question is specific to OLEDs; correct? 11:46:49 11:46:50

Q. Sure. 11:46:53

A. Again, my answer is the same. I couldn't say one way or another, and I certainly haven't looked. 11:46:54 11:46:56 11:46:59

Q. Okay. 11:47:00

What about outside of the field of OLEDs? 11:47:00 11:47:02

A. My answer would be the same. I don't know. I haven't looked. 11:47:05 11:47:07

Q. Okay. 11:47:08

The answer would be the same in research context, whether it's for the OLEDs or in some other optoelectronic device field; right? 11:47:09 11:47:11 11:47:16

A. Yes. That's fair. I don't know, and I haven't looked. 11:47:20 11:47:23

Q. You said you personally have never 11:47:28

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

combined the electric field application method together with the magnetic mask; correct? 11:47:31 11:47:36

A. You mean in my personal research? 11:47:39

Q. Correct. 11:47:41

A. Yes. That's true. I have not done it. 11:47:42

Q. But you have used masks in other contexts? 11:47:44 11:47:47

A. Of course. 11:47:49

Q. Have you used magnetic -- strike that. 11:47:50

Have you used magnetic masks in any of your deposition? 11:47:54 11:47:57

A. Yes. 11:48:00

Q. Have you ever used electrical field application method? 11:48:00 11:48:06

A. Not the same electric field application method shown in Figure 1C, but methods that are somewhat similar, yes. 11:48:09 11:48:12 11:48:20

Q. Okay. 11:48:22

Do you use masks in those application methods? 11:48:22 11:48:25

A. Yes. 11:48:26

Q. But you've never used a magnetic one? 11:48:26

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. That's correct. Not in that. 11:48:29

Q. Okay. 11:48:32

Are inkjet printing methods a 11:48:50

maskless process? 11:48:52

A. They can be or they may not be. 11:48:53

I mean, in general, one use of 11:48:56

inkjet is to avoid the use of masks, that's for 11:49:00

sure. 11:49:02

But you can also use it with masks, 11:49:02

and I'm sort of aware of both. 11:49:05

Q. When do the people use inkjet printing 11:49:09

with masks? 11:49:14

A. So there are certain characteristics of 11:49:16

inkjet printing that are disadvantageous and would 11:49:18

then lead to an interest or a need for masks. 11:49:21

Specifically, if you shoot a million 11:49:23

drops out of an inkjet printer, they don't all hit 11:49:27

the same spot. There's an angle of uncertainty of 11:49:32

injection that is an intrinsic part of inkjet. 11:49:37

Where when you keep shooting drops out of an inkjet, 11:49:40

they don't always go to the same location. 11:49:42

Secondly, there is the possibility, 11:49:44

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

and in fact sometimes it can be quite common to produce something called a satellite drop, which is a small drop that is much larger than the intended droplet size of the main drop. And because that drop is really small, it can undergo brownian motion while moving towards the substrate. 11:49:46 11:49:49 11:49:52 11:49:57 11:50:01 11:50:05

The net result is because of the two non-idealities you can end up with drops that don't exactly go where you want them. So you can create outliers, so to speak. 11:50:09 11:50:11 11:50:14 11:50:18

In those situations, if you are sensitive to outliers, a mask can be used to solve those problems. 11:50:20 11:50:21 11:50:25

In other words, you use inkjet in combination with the mask, the inkjet is now used to take advantage of the fact that it allows you to very precisely control the volume of material that is ejected, but the fidelity of the pattern you are being produced, is now being ensured by the mask. 11:50:26 11:50:28 11:50:30 11:50:33 11:50:37 11:50:42

Q. At the time of the invention, were masks used for inkjet printing? 11:50:45 11:50:58

A. I believe so. I believe, if I recall 11:51:01

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

correctly -- I'm struggling with the exact dates, but I think it's in the right time frame. 11:51:04 11:51:07

There were early attempts to make color filters for liquid crystal displays. In those color filters for liquid crystal displays, inkjet was used in combination with in situ shadow masking to produce different colored filters in different locations. 11:51:09 11:51:13 11:51:17 11:51:21 11:51:25 11:51:27

The reason they used the mask was exactly related to what I just told you. 11:51:28 11:51:30

Q. Were the resolutions for those color filters -- strike that. 11:51:32 11:51:35

Do those color -- do those color filters have higher resolutions than for encapsulation purposes? 11:51:38 11:51:44 11:51:53

A. Well, it depends on the specifics. If you're comparing to encapsulating full display device which constitutes multiple pixels, then the answer would be yes, because the color filter resolution was on a subpixel-by-subpixel basis for an LCD. 11:51:55 11:51:57 11:52:02 11:52:07 11:52:10 11:52:14

Q. So for the scale in Yamazaki, would a 11:52:16

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

mask be used with the inkjet printing process? 11:52:24

A. I mean, it depends on the specifics. 11:52:27

You certainly could. You know, if 11:52:31

you are concerned about the errors introduced by 11:52:33

outliers, which you could be in this situation, and 11:52:38

in fact, you would be in this situation, one of 11:52:41

skill would say, one way to address that is to use a 11:52:43

mask. 11:52:46

Q. What about for the electrical field 11:52:49

application method? 11:52:52

A. Yeah. My answer would be the same. 11:52:53

For example, if you look at 11:52:55

Figure 1C, you see a that there's a cone of 11:52:56

uncertainty of placement of the charged particles, 11:52:59

and that's indicated by that conical structure. 11:53:02

So that's sort of representing the 11:53:05

fact that there's a Gaussian distribution. Gaussian 11:53:08

is G-A-U-S-S-I-A-N. 11:53:12

It's sort of a very 11:53:15

naturally-occurring distribution that happens in a 11:53:17

lot of these processes. 11:53:19

So there's sort of a Gaussian 11:53:20

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

distribution of the spatial placement of the drops, and there will be outliers beyond the bounds of that conical structure shown. 11:53:23 11:53:25 11:53:29

If you are sensitive to the outliers, which you could be and, in fact, would be in this situation, a mask would be beneficial to prevent those outliers from landing in regions where you don't want them. 11:53:31 11:53:33 11:53:35 11:53:38 11:53:41

Q. When you use a shadow mask, where are the shadow masks positioned? 11:53:42 11:53:45

A. I'm not sure I understand the question. Do you mean with respect to Figure 1C? 11:53:47 11:53:50

Q. Sure. We can start there. 11:53:54

A. Okay. Well, you mean it depends on -- there's various choices. 11:53:56 11:53:59

If you -- one place you can place the shadow mask is higher up, so closer to the emission zone. 11:54:00 11:54:01 11:54:04

But another place, which actually gives of course you the best spatial accuracy, is to place it as close to the target application as possible. So you place it up against the substrate. 11:54:07 11:54:09 11:54:12 11:54:15

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. When you put it up against the substrate, the mask is in contact with the substrate? 11:54:18 11:54:28 11:54:30

A. That's certainly an option, yes. You can place it in contact with the substrate. 11:54:30 11:54:32

Q. Would that be undesirable in the sense there is going to be context contamination, and when you remove it, there may be potential damages? 11:54:36 11:54:40 11:54:43

A. So there's advantages and disadvantages. It is true that when you have contact, there is a higher risk of contamination, but on the other hand, you get the benefit of much better spatial control. 11:54:49 11:54:52 11:54:55 11:54:57

So if you are able to keep your masks clean, which is a well-known process to keep them clean, you get the benefits of spatial control with minimal risk of contamination. 11:55:00 11:55:02 11:55:05 11:55:08

With respect to damage, that's pretty much not a major issue because we know how to control that. 11:55:10 11:55:12 11:55:17

I mean we're not putting strong adhesion. We're making it so it's not sticking, and then damage is not the issue. 11:55:18 11:55:21 11:55:24

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

I agree that there is a risk of contamination anytime you have contact, but it's a tradeoff. And you're trading off a risk of contamination for the benefits of spatial positioning control. 11:55:25 11:55:27 11:55:30 11:55:32 11:55:35

Q. When do you use inkjet printing for applying the organic layer versus other application methods? 11:55:37 11:55:50 11:55:55

A. I'm sorry. I need more context. I don't know what your question is in relation. 11:55:58 11:56:00

Q. I'm just asking a general question. 11:56:01

When do people choose inkjet printing over other solution-based methods? 11:56:04 11:56:07

A. I mean, it's very contextually specific. 11:56:11

I mean, I can answer the question in relation to my own work, but I -- you know, it's very context-specific. 11:56:14 11:56:16 11:56:20

Q. We can start with your own work. 11:56:24

A. Okay. 11:56:26

So in my lab, we had a huge focus on developing inkjet printing for making electronics, including displays. That was my research focus for 11:56:26 11:56:32 11:56:36

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

the better part of two decades. 11:56:39

We used inkjet when the application 11:56:41
worked within the resolution limits of inkjet, which 11:56:46
when we were working on it was generally minimum 11:56:49
resolution was in the range of 10 to 20 micrometers 11:56:54
and when the inks we were developing had the right 11:56:58
viscosity range to be printable. 11:57:02

On the other hand we used -- and 11:57:04
when we could make the structures we wanted to make 11:57:07
using inkjet. 11:57:10

On the other hand, we used other 11:57:10
techniques. For example, I used aerosol jet which 11:57:12
is a spray technique. I've already mentioned I used 11:57:16
gravure printing, when those techniques had 11:57:19
advantages. So there was advantages and 11:57:21
disadvantages to each, and we picked based on the 11:57:24
specific context we were working on them. 11:57:27

As I said, I have actually used all 11:57:29
of those techniques, so clearly, it depended on the 11:57:31
context. 11:57:33

Q. So what is the advantage of inkjet 11:57:42
printing? 11:57:44

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Again, it's contextually specific, but at a high level. So one of the advantages of inkjet is, on its own, you keep the inkjet head away from the target substrate. So there's no contact between the inkjet head and the target substrate, which can be advantageous with respect to contamination. 11:57:46 11:57:48 11:57:52 11:57:56 11:58:01 11:58:06

Inkjet works with low viscosity inks. The viscosity range of inkjet is in the range of say, 1 to 10 millipascal seconds, which means you can make inks that are very simple to formulate which could be an advantage. 11:58:08 11:58:15 11:58:17 11:58:24 11:58:28

Inkjet, depending on the time of inkjet you use, can be controlled in a droplet on-demand way, so it's a so-called digital printing technique which you can use to put ink where you want it and ideally not put it where you don't, though that may not be guaranteed. 11:58:29 11:58:33 11:58:38 11:58:41 11:58:44 11:58:47

Inkjet has one big advantage. The technology for putting large numbers of heads in parallel is very advanced right now. 11:58:49 11:58:54 11:58:58

You can buy commercial heads, and have been able to for decades, that put a large 11:59:00 11:59:03

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

number of heads in parallel. 11:59:06

Like, I believe in the late '90s 11:59:07

there were already inkjet heads available that had 11:59:10

500 different nozzles in parallel, which means you 11:59:13

could create large patterns very quickly, which was 11:59:16

an advantage, and that's -- the numbers have gone 11:59:19

up. Today that's even more so. There's thousands 11:59:21

of heads in parallel available. 11:59:24

So those are some examples of the 11:59:26

benefits of inkjet. 11:59:29

Q. Didn't spray coating have those 11:59:30

characteristics as well? 11:59:39

A. Not necessarily all of them, but some of 11:59:41

them. 11:59:43

I mean, the spray does a much poorer 11:59:43

job of digital control. Because you generate the 11:59:50

aerosol, and then you direct it. So there's a sort 11:59:55

of a time lag between when you turn it on and turn 12:00:01

it off. So it's a little harder to control. 12:00:04

The other disadvantage of spray is 12:00:10

the massive parallelism of inkjet has never been 12:00:12

achieved, and it's not been achieved even today. 12:00:15

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

You cannot get spray or aerosol deposition systems that put a thousand nozzles in parallel or even 100. I don't think there's even systems that have tens of them in parallel, so inkjet is much more advanced for parallelism of nozzles. 12:00:18 12:00:20 12:00:23 12:00:27 12:00:30 12:00:34

Q. But for inkjet printing, as you mentioned before, each nozzle can only eject a single droplet; correct? 12:00:35 12:00:38 12:00:44

A. At a time, yes. That's true. Mm-hmm. 12:00:46

Q. But for spray coating, each nozzle can eject multiple droplets? 12:00:49 12:00:54

A. That's correct, but the drop in general in spray, the size of the drop is much smaller than the droplet in inkjet. 12:00:59 12:01:00 12:01:03

So the volumetric deposition flow rates can be very similar. 12:01:04 12:01:08

In fact, in general, inkjet can actually achieve higher volume buildup than spray. 12:01:09 12:01:11

Q. Was inkjet printing used mostly for depositing the OLED stacks back in 2000, 2001, and 2002? 12:01:15 12:02:04 12:02:12

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. You mean in commercial products or in research, or -- I mean, I need more context to answer that. 12:02:16 12:02:19 12:02:22

Q. Either. 12:02:22

A. So in commercial products -- so the first commercial OLED product was by Kodak. Well, it was actually by Sanyo, and Sanyo made a car audio player that had an OLED display, which used Kodak technology. That was actually not done by inkjet. I mean, I worked very closely with the team that did that. It was actually evaporated. 12:02:28 12:02:31 12:02:36 12:02:42 12:02:45 12:02:47 12:02:49

As far as I know, all the early OLEDs that were made did not use inkjet. They were all -- the stacks themselves were all done by evaporation. Because the performance at that time of the ink jetted stack material, specifically, you know, the -- the emissive layers, the transport layers, et cetera, was worse. 12:02:52 12:02:54 12:02:59 12:03:02 12:03:09 12:03:13 12:03:22

But at that time already, there were publications from various research groups -- they were not in commercial products, but they were in the art -- showing ink jetted organic semiconductor 12:03:24 12:03:28 12:03:33 12:03:35

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

materials, including, I think, OLEDs. As I recall, it may have even have been Jim Sturm's group that published some of the early ink jetted OLEDs. 12:03:44 12:03:47 12:03:50

I think the first time we printed -- ink jet printed an OLED in my lab, must have been -- it was definitely before 2005, but you know, I don't remember exactly when it was. 12:03:56 12:03:58 12:04:02 12:04:07

On the other hand, encapsulation, inkjet printing already existed because, for example, we were in my lab already inkjet printing epoxys for encapsulation long before that. I mean, we started working on that in 2000, when I became a professor, and there was literature on inkjet printing of polymer encapsulates, by that time, not for OLEDs specifically, but general printing of encapsulates. 12:04:13 12:04:19 12:04:21 12:04:26 12:04:30 12:04:34 12:04:35 12:04:39 12:04:41

Q. Were those encapsulates planarization layers? 12:04:45 12:04:49

A. In our work, certainly, because we did develop inkjet printed polymers that we used specifically for encapsulation, and to achieve planarization. 12:04:51 12:04:54 12:05:01 12:05:04

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Because in the particular project I'm referring to, which was one of my first PhD students, so that would have been between 2000 and 2005. We were printing multi-layer metallization. So multilayer interconnection for large area electronics, including displays, and we needed to planarize so that one layer of metal could cross another layer of metal with without forming an open circuit. 12:05:05 12:05:08 12:05:12 12:05:15 12:05:22 12:05:24 12:05:28 12:05:32 12:05:35

So we were specifically doing that. I don't remember the exact year. It would not have been 2000. It would have been probably closer to 2005. 12:05:35 12:05:37 12:05:39 12:05:42

Q. Okay. 12:05:43

So did you publish anything before 2002 on that? 12:05:50 12:05:52

A. I don't recall. I don't know when our first paper on multilayer metal inkjet printing happened. I don't remember, but again, since I'm not citing it as prior art, that's not something I looked at. I mean, that's easy enough to find, but I don't remember the date. 12:05:53 12:06:00 12:06:05 12:06:07 12:06:09 12:06:12

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Were you aware of other groups' work using inkjet to print planarization layers? 12:06:13 12:06:28

A. I mean, I think the general -- so if you are asking me about my onus at that time, I guess there were lots of us who were working on inkjet printing polymers with properties that could be used for planarization. 12:06:40 12:06:48 12:06:55 12:06:59 12:07:01

At that time, I don't recall if anybody was specifically using it for planarization prior to the work that I just referred to that came from my own group. 12:07:02 12:07:05 12:07:11 12:07:12

Q. You said your recollection, is that that work was closer to 2005 than 2000; correct? 12:07:13 12:07:17

A. Yeah. I think that's right because the student I'm referring to who did that work, his name was David Reddinger [ph]. He started in my lab in 2000, and he finished in like 2006. 12:07:20 12:07:23 12:07:26 12:07:29

I think the publications came out closer to the second half of his PhD than the first half of his PhD. 12:07:32 12:07:35 12:07:39

Q. Okay. 12:07:40

MS. ZHONG: I think right now it's 12:07:43

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

just past noon in DC. 12:07:45

Do you want to take your lunch break 12:07:49
now, or do you want to go a little further? 12:07:52

THE WITNESS: I'm personally fine to 12:07:54
keep going, but I know the court reporter has been 12:07:56
typing for a while, so it's kind of up to her. 12:07:58

MS. ZHONG: Why don't we take our 12:08:02
lunch break then. 12:08:04

MR. GARR: We could also just take a 12:08:06
short break now and take lunch break in an hour, 12:08:07
because -- 12:08:11

MS. ZHONG: It's fine either way for 12:08:12
me. Whatever the court reporter wants to do. Let's 12:08:13
just get off the record and discuss. 12:08:18

(RECESS, 12:08 p.m. - 12:15 p.m.) 12:08:18

BY MS. ZHONG: 12:08:18

Q. Dr. Subramanian, can you pull up 12:15:54
Exhibit 1005, Yamazaki. 12:15:56

A. Okay. I have it. 12:16:01

Q. Can you please go to Paragraph 185, 12:16:02
Embodiment 4. 12:16:09

A. Okay. 12:16:17

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. So under Embodiment 4, there are two figures, Figures 13 and 14; correct? 12:16:17 12:16:20

A. So Figure 13 is specifically discussed in relation to Embodiment 4 in the section that you pointed to. Figure 14 is largely speaking, similar, and showing a similar cross-section. 12:17:27 12:17:29 12:17:31 12:17:37

So I agree that they're both generally related to the embodiment of Figure 13, which is Embodiment Number 4. 12:17:39 12:17:41 12:17:46

Q. Okay. In Figure 13 -- strike that. 12:17:48

In Figure -- in Embodiment 4, the EL materials are formed by using the electric field application method; correct? Paragraph 188. 12:18:00 12:18:08 12:18:11

A. Yes. 12:18:32

In Paragraph 188, it specifically says, in relation to Embodiment 4, subsequently, EL layers 1304A through 1304C made of an EL material are formed by using the electric field application method described in Embodiment 1. 12:18:33 12:18:35 12:18:38 12:18:46 12:18:51

Q. Okay. 12:18:53

And the cover layers, in Embodiment 4, are formed using the same method as 12:18:53 12:18:56

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

used for forming the EL layer; is that correct? 12:19:03

A. In Paragraph 202, it says, "A cover 12:19:07
layer 1308 made of an organic resin film is 12:19:15
subsequently formed by the same method used for 12:19:20
forming the EL layer." 12:19:22

Q. Okay. 12:19:24

So if the EL layer was formed by 12:19:25
using the electric field application method, then 12:19:27
the cover layer 1308 would also be made using the 12:19:32
electric field application method; is that correct? 12:19:38

A. With respect to this disclosure, I 12:19:40
agree. That's what that -- that seems to indicate 12:19:44
here in Paragraph 202. 12:19:45

Q. Okay. 12:19:47

Would that also be true for 12:19:48
Figure 14? 12:19:50

A. To Figure 14, the disclosure appears in 12:20:02
Paragraph 203, where it says, "However, as shown in 12:20:05
Figure 14, the structure in which a barrier layer 12:20:13
1408 is formed after forming a cover layer 1407 may 12:20:17
be adopted." 12:20:21

So it doesn't provide any additional 12:20:22

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

description on how the cover layer is form, so that would generally follow, given that it's continuing from Figure 13, that the cover layer there is formed using the EL method as well. 12:20:25 12:20:28 12:20:31 12:20:40

Because the discussion in Figure 13 is that it's formed using the EL method. 12:20:42 12:20:44

Sorry. I said the EL method. I meant electric field method. 12:20:47 12:20:51

Q. So for Figure 14, the cover layer 1407 would also have been formed using the electric field application method; is that correct? 12:20:54 12:20:58 12:21:02

A. I mean, it doesn't specifically say that, but I agree, that it doesn't provide disclosure to the contrary, and given that it's referring to the same structural material, it follows that it would -- that the disclosure would point to it being formed using the same method as used for forming the EL layers. 12:21:03 12:21:19 12:21:22 12:21:24 12:21:28 12:21:30 12:21:33

Q. In Figure 11, that's the active matrix OLEDs; correct? 12:21:36 12:22:08

A. Yes. I agree. Figure 11 is an embodiment where that specifically is an embodiment 12:22:08 12:22:12

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

that is an active matrix version of the OLED display. 12:22:14 12:22:18

Q. Okay. 12:22:19

So isn't it true that the active matrix OLED surface are generally more flat than the passive matrix OLED? 12:22:19 12:22:24 12:22:31

A. No. That doesn't necessarily have to be the case. There are situations where that could be the case, but it's not always the case. 12:22:36 12:22:38 12:22:40

Q. I'm just comparing Figure 11 with Figure 14, for example. 12:22:42 12:22:47

A. Yeah. I understand, but again, I repeat what I said earlier. That's not necessarily the case. 12:22:56 12:22:58 12:23:00

If you look at Figure 11 and compare to Figure 14, the orientation is different. 12:23:00 12:23:06

In Figure 14, you can see the ribs of the pixels sort of in and out of the page, whereas in Figure 11 they're running left to right on the page. But that doesn't mean that that they have different levels of flatness. It depends on the specifics of the layer thicknesses. 12:23:08 12:23:15 12:23:18 12:23:21 12:23:22 12:23:25

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. In your experience, do they have similar planarity? 12:23:28 12:23:34

A. In my experience, it depends on the specifics. 12:23:35 12:23:39

So I mean the main difference between an active matrix and a passive matrix display is that in the active matrix, you have pixel circuitry made of transistors to address each pixel. 12:23:39 12:23:40 12:23:45 12:23:50

Depending on the specifics, it may be a different number of transistors per pixel. 12:23:54 12:23:56

If you planarize after forming the transistors, then the OLED elements themselves don't have to be very different. On the other hand, if you don't planarize after forming the transistors, then it depends on the relative spatial positioning of the OLED pixel, emissive element vis-a-vis the transistor based circuitry. 12:24:01 12:24:05 12:24:09 12:24:11 12:24:16 12:24:18 12:24:23

If they are placed on top of each other, generally, it would be reasonable to expect the active matrix to have even more topology. If they are placed side by side, then they could be more, less, or similar, depending on the specific 12:24:25 12:24:27 12:24:29 12:24:33 12:24:36

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

thicknesses used for the layers. 12:24:39

Q. In the context of Figure 11, you claim 12:25:26

that the cover layer 1105 is a planarization layer, 12:25:29

because it covers up the step of the underlying 12:25:37

structure; is that correct? 12:25:43

A. Sorry. Could you repeat your question, 12:25:44

please. 12:25:46

Q. Okay. 12:25:46

You contend that the cover layer 12:25:47

1105 in Figure 11 is a planarization layer because 12:25:50

that cover layer hides the step of the underlying 12:25:57

structure; is that correct? 12:26:04

A. So actually, the reason that I call it a 12:27:25

planarization layer is -- well, the figures show it, 12:27:30

but also it specifically says that. 12:27:33

If we look at Paragraph 178 of 12:27:36

Yamazaki, which I point to on page 49 of my 12:27:38

report -- of my declaration, where I say, "Yamazaki 12:27:42

says in Paragraph 178" -- sorry, "As a material for 12:27:46

forming the cover layer 1105, made of an organic 12:27:51

resin, it is appropriate use of material that has a 12:27:57

high degree of hardness, is unlikely to allow 12:28:01

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

substances such as moisture and oxygen to permeate, and has planarity." 12:28:05 12:28:08

So it's telling us that it's providing the planarity. 12:28:13 12:28:15

Q. What does it mean by "it has planarity"? 12:28:16

A. Well, here what it means is that it's providing planar surface. 12:28:22 12:28:25

So in other words, as you can see from this case from as you can see from the figure, it's relatively flat on top. 12:28:30 12:28:32 12:28:36

Q. The cathode itself is also relatively flat; right, other than the two steps. 12:28:45 12:28:48

A. If you are referring to Figure 11, the top of the cathode as shown in Figure 11 is relatively flat in that -- in the specific cross-section that's shown in Figure 11, but even in there, you see that it does have the two steps, and those two steps do not mimic themselves in the surface of layer 1105. 12:28:51 12:29:05 12:29:08 12:29:14 12:29:17 12:29:19 12:29:24

Q. When you say Yamazaki teaches that the uneven surfaces are planarized, and by the uneven surface you're referring to the steps; is that 12:29:32 12:29:35 12:29:42

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

correct? 12:29:45

MR. GARR: Objection. 12:29:45

A. No. Actually, my statement is more 12:29:46

general. I'm referring to the uneven surface. 12:29:48

It's true that one aspect of the 12:29:51

uneven surface, which I highlight in the annotation 12:29:54

that I provide in Figure -- in the annotated 12:29:58

Figure 11 that I show on page 49 of my declaration, 12:30:01

is the steps. 12:30:06

But the statement is more general. 12:30:07

Q. Then what other uneven surface are there 12:30:10

in Figure 11. 12:30:14

A. So in the specific cross-section of 12:30:16

Figure 11, I agree. The -- the ones that are shown 12:30:19

are the steps, and that's why I highlight those. 12:30:22

But the description in Paragraph 178 12:30:25

that I read you is a general statement. It's not 12:30:29

just to the cross-section of Figure 11. It's saying 12:30:33

use a material that gives you the planarity. 12:30:36

Q. The material can have planarity. It 12:30:42

doesn't mean it forms a planarization layer; 12:30:45

correct? 12:30:48

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. I mean, a conceptual basis I agree with that statement, but in the case of Yamazaki, it's very clear, it tells you not that it could have planarity. It tells you it has planarity. 12:30:53 12:30:57 12:30:59 12:31:03

And it's specifically in the context of the layer that is the planarization layer that's shown in other -- in various places, including specifically in Figure 11. 12:31:07 12:31:08 12:31:11 12:31:13

Q. What is the function of the cover layer in the Yamazaki? 12:31:16 12:31:57

Why don't we take a look at Paragraph of Paragraph 8 of Yamazaki? 12:32:16 12:32:19

A. Okay. So Paragraph 8 gives us a few different reasons, or a few different purposes of the cover layer. By the way, those are largely replicated in the Paragraph 178 that I referred to previously. 12:32:43 12:32:46 12:32:50 12:32:53 12:32:57

Specifically, it says in Paragraph 8, "It is to be noted that the cover layer is a layer made of an organic material, and which will be formed over the cathode of the EL element composed of an anode, an EL layer and a cathode. 12:32:59 12:33:01 12:33:04 12:33:08 12:33:13

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

The provision of this cover layer is effective for the stress relaxation of the TFT or the EL element. 12:33:18 12:33:22

"Further, the permeation of moisture and oxygen into the EL layer can be prevented, whereby the degradation of the EL layer can be prevented." 12:33:26 12:33:29 12:33:33 12:33:37

It then goes on to say that you can put another layer on top of that for even better performance. 12:33:39 12:33:41 12:33:43

Q. Okay. 12:33:44

Do you have to have a planarization layer in order to have the stress relaxation property? 12:33:46 12:33:48 12:33:51

A. Divorced from the specifics, no. You don't have to have planarization to provide stress relaxation, but you can, and specifically in the case of the disclosure of this layer in Yamazaki, you can have a planarization layer, and in this case do have a planarization layer, that also provides stress relaxation. 12:33:55 12:33:57 12:34:02 12:34:06 12:34:12 12:34:16 12:34:19

Q. But does -- does the stress relaxation have anything to do with having a smooth or flat 12:34:21 12:34:26

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

surface? 12:34:30

A. It may, or it may not. 12:34:31

In other words, to be clear, you can achieve stress relaxation without providing planarization. That is certainly possible. 12:34:34 12:34:36 12:34:39

But in the case of Yamazaki. Yamazaki says that you have this layer, which is based on its own disclosure, is a planarization layer, and it also happens to provide stress relaxation. 12:34:41 12:34:43 12:34:45 12:34:47 12:34:50

Q. So what is a property that provides the stress relaxation? 12:34:51 12:34:55

A. It is contextually specific. 12:34:57

So broadly speaking to achieve stress relaxation, what you have to do is provide the appropriate mechanical conditions to dissipate regions of high stress. Those are often associated with corners, which is why often, actually, planarization benefits stress, but it's not the only way to do it. 12:35:01 12:35:05 12:35:07 12:35:11 12:35:15 12:35:20 12:35:22

You can also achieve stress relaxation, for example, by doing very careful 12:35:23 12:35:26

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

matching of thermal expansion coefficient, and that may or may not require planarization. 12:35:28 12:35:32

But in the specific example of Yamazaki, the layer that is the planarity providing layer is what is used, and the benefit of it -- or one of the benefits of it is indeed stress relaxation. 12:35:34 12:35:36 12:35:42 12:35:44 12:35:47

Q. Okay. 12:35:47

By providing a planarization layer, you don't decrease the sharpness or the corner of the underlying layers; correct? 12:35:49 12:35:56 12:36:00

A. That's correct. 12:36:03

Q. Where you aid here -- where the cover layer aid heres to the underlying layer, there will all still be that pretty sharp edge, or step; correct? 12:36:03 12:36:10 12:36:14 12:36:18

A. I think I understand. 12:36:18

Just to clarify, also with respect to your previous question, you're saying it doesn't change the underlying topology, even though the top surface topology may be changed. 12:36:21 12:36:24 12:36:26 12:36:29

Q. Correct? 12:36:31

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Yeah. So that's true. 12:36:31

But just to be clear, that can still 12:36:33
provide stress relaxation because stress is 12:36:35
distributed across both sides of that interface. 12:36:38

So if I have a structure that is 12:36:40
free-standing in air, and has a certain stress, I 12:36:43
can put another layer on top of it, without changing 12:36:46
the underlying topology, and because now the stress 12:36:49
gets distributed across both sides of the interface, 12:36:53
I can reduce the stress. 12:36:56

Q. But the stress concentrator will still 12:37:00
be at that sharp corner; right? 12:37:02

A. Correct, but the magnitude of the stress 12:37:06
will be reduced because now it's distributed through 12:37:08
the addition of this other layer. 12:37:11

Q. Okay. 12:37:14

So wouldn't the stress be reduced, 12:37:15
even if you still have a sharp corner in the organic 12:37:24
layer? For example, if you put a silicon -- not 12:37:32
silicon dioxide, but silicone layer, which is one of 12:37:38
the most elastic materials; right? 12:37:43

A. Okay. 12:37:46

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

So to be clear. 12:37:47

Q. Even if you have a pretty, like, sharp 12:37:48
corner, it will still, like, dissipate the stress; 12:37:51
right? 12:37:54

A. Yeah. I understand the question. 12:37:54

Okay, so first, you don't -- just to 12:37:56
clarify, you don't necessarily, and in fact in many 12:37:58
cases you don't want to use the most elastic 12:38:01
material. You want to match the stresses very 12:38:03
carefully. 12:38:06

Q. I understand, because of the thermal -- 12:38:06
thermal coefficient expansion match and all of those 12:38:12
other considerations. 12:38:16

A. Right. Okay. 12:38:17

So given that context, but I 12:38:17
understand your question. 12:38:19

Your question is if I had a layer on 12:38:20
top, which still had a sharp corner, could it still 12:38:22
reduce the stress. And I think the answer is yes. 12:38:25
But that's again -- remember, that's not the sole 12:38:30
point of the layer 1105. 1105 provides multiple 12:38:33
benefits. It provides planarity, as explicitly 12:38:43

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

called out in Yamazaki. It provides stress relaxation, and it provides some reduction of the likelihood of permeation of moisture and oxygen. 12:38:46 12:38:53 12:38:57

So it provides multiple functions. 12:39:00

Q. Why is it appropriate to use a material with a high degree of hardness for the cover layer? 12:39:05 12:40:43

A. I mean, so with respect to the description, which is Paragraph 178, where it calls out using a material of a high degree of hardness, it doesn't specifically call out in that section the reason for using a material of a high degree of hardness, but of course, the main -- sort of one of skill would know the benefit of that is it provides mechanical protection, so... 12:41:01 12:41:06 12:41:12 12:41:15 12:41:18 12:41:20 12:41:24 12:41:26

That's a clear reason to do so. 12:41:29

Q. Does that help with stress relaxation? 12:41:31

A. It may or it may not. This is what I was saying earlier. 12:41:38 12:41:41

If the hardness is achieved at the expense of expansion coefficient mismatch, then it may be bad. 12:41:42 12:41:46 12:41:49

If the hardness is achieved while 12:41:51

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

providing the appropriate expansion coefficient matches and providing a good stress distribution zone, then it may help. 12:41:54 12:41:57 12:42:00

Q. Okay. 12:42:01

For a roll-to-roll process, can you use plasma-enhanced chemical deposition to -- 12:42:02 12:42:28

A. Yes. 12:42:35

Q. -- to selectively deposit? 12:42:36

A. Oh, to selectively deposit? Yes. 12:42:39

Q. How? 12:42:41

A. Using a shadow mask. That actually, that technology is commercial. There are roll-to-roll shadow masks that are used in conjunction with PECVD to deposit layers. 12:42:43 12:42:48 12:42:50 12:42:54

I'm not sure -- well, I was going to say that some decorative elements -- so as you know, potato chip bags are made using roll-to-roll processes, and I recall some companies actually used PECVD to put down -- to put down layers for food hermetic sealing, not for potato chip bags, but for more high-value items, and those are actually done, as I recall, through a combination of PECVD and 12:43:00 12:43:04 12:43:11 12:43:16 12:43:21 12:43:28 12:43:32 12:43:35

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

shadow masking. 12:43:39

But more generally, the combination 12:43:39

of PECVD, roll-to-roll and shadow masking does 12:43:42

exist. 12:43:47

Q. When was that technology first become 12:43:47

available? 12:43:50

A. Oh. Actually, it was available when I 12:43:51

was a graduate student. 12:43:53

I remember, there was a company in 12:43:54

the Bay Area that I visited when I was at Stanford. 12:43:56

So that would be between 1994 and 1998. That 12:44:00

already did roll-to-roll PECVD with shadow -- 12:44:05

flexible shadow masks. 12:44:08

Q. What about for OLEDs? 12:44:10

A. I don't know. I'm not aware of a 12:44:12

specific case where that was done. 12:44:13

Q. Okay. 12:44:15

In the case of OLEDs, when was 12:44:18

selective deposition -- strike that. 12:44:45

For roll-to-roll process for OLEDs, 12:44:48

when was selective deposition using thermal 12:44:50

evaporation first become available? 12:44:54

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. I'm sorry. You stepped away from the microphone, so I didn't hear you. 12:44:57 12:44:58

Q. Sorry. For the roll-to-roll process for OLEDs, when was the thermal evaporation -- when was selective thermal evaporation first become available? 12:45:00 12:45:04 12:45:10 12:45:15

A. So I couldn't say when it first became available, but the use of selective deposition in conjunction with roll-to-roll was certainly disclosed in Weaver, which I had referred to in my declaration. 12:45:17 12:46:11 12:46:16 12:46:18 12:46:23

And that was -- I guess it was filed in 2001. 12:46:29 12:46:31

Q. So were you aware of any actual practice of using thermal evaporation to selectively deposit an encapsulation layer in the roll-to-roll process? 12:46:31 12:46:40 12:46:48

MR. GARR: Objection. 12:46:54

A. In terms of actual practice, if I assume you mean commercial products, no, I don't specifically know one way or another, and certainly not for OLEDs. 12:46:54 12:46:58 12:47:01 12:47:05

Q. What about research labs? 12:47:05

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Trying to think. 12:47:08

So as I recall, there was a company 12:47:14
called Add-vision that came out of the lab of Sue 12:47:28
Carter, who at the time was at University of 12:47:34
California Santa Cruz. 12:47:37

And her lab, and the company, by 12:47:40
2000 -- because she was already there, and had 12:47:48
already started showing this when I was a new 12:47:50
professor. Her lab was doing screen-printed OLEDs 12:47:53
on flexible foils, and they were, at least in their 12:48:05
early demonstrations, were using evaporated 12:48:09
electrodes. 12:48:13

I don't remember the year, but it 12:48:14
would have been in the early 2000s. 12:48:17

Now, I don't know if her lab did 12:48:20
roll-to-roll by then, but they were doing it on 12:48:23
flexible foils. 12:48:26

So could have been done by 12:48:27
roll-to-roll, but I don't know if a lab explicitly 12:48:29
did it on roll-to-roll. That would have been early 12:48:32
2000s. 12:48:35

The company was called Add-vision 12:48:39

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

because the target application was for doing advertising billboard-type things. 12:48:43 12:48:46

Q. It was for cathode deposition or electrode deposition? 12:48:48 12:48:53

A. Yeah. They were using evaporation for electrode deposition, and they were using screen printing for doing the EL layers. The organic EL layers. 12:48:54 12:48:58 12:49:01 12:49:06

Q. What about for encapsulation? 12:49:06

A. I honestly don't remember. I don't know how they were doing it. 12:49:08 12:49:10

Q. So in the context of the OLEDs, and for encapsulation, when was selective deposition using sputtering first became available in a roll-to-roll process? 12:49:12 12:49:18 12:49:18 10:11:11

(Clarification requested by the Realtime Stenographer.) 10:11:11 12:49:47

A. Again, you mean commercial, not patent literature? 12:49:47 12:49:50

Q. Actual practice. 12:49:50

A. Yeah. I don't know. 12:49:51

Q. Or like a research lab? 12:49:53

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Yeah. I don't specifically know because I don't remember -- I mean, as I said, the one example that's coming into my head that I can remember is the work of Sue Carter, and I don't think she was using sputtering. 12:49:59 12:50:03 12:50:05 12:50:06 12:50:12

So I don't remember specifically. 12:50:14

Q. Can you selectively deposit an encapsulation layer using sputtering? 12:50:16 12:50:22

A. Conceptually, yes, if you use a shadow mask. 12:50:24 12:50:27

Now, sputtering does have, because of the mean free path of sputtering, it will have a little bit of creep under the shadow mask, but you can account for that in your design. 12:50:27 12:50:30 12:50:33 12:50:37

So conceptually, yes. So it doesn't mean all sputtering is selective, but it is conceptually possible to do so. 12:50:38 12:50:41 12:50:44

Q. But you were not aware of any research groups actually doing that at the time of the invention? 12:50:46 12:50:48 12:50:50

A. Yeah, off the top of my head I don't remember one way or another. 12:50:52 12:50:55

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Do you recall whether any group managed to do that since 2002? 12:50:55 12:51:03

A. For OLEDs, I don't know specifically. It's not a subject that I -- I certainly didn't review it in preparation for this deposition, so I shouldn't just volunteer something that I'm not sure of, so I don't remember. 12:51:05 12:51:14 12:51:17 12:51:19 12:51:22

Q. So you're not aware of any right now? 12:51:24

A. Correct. Sitting here, I cannot remember one specifically. 12:51:26 12:51:28

Q. Okay. 12:51:29

What about for PECVD, or Plasma Enhanced Chemical Vapor Deposition. 12:51:29 12:51:34

A. My answer would be the same. I don't specifically recall PECVD -- a research lab or a commercial example of the combination of PECVD plus shadow masking for OLEDs specifically. 12:51:38 12:51:41 12:51:46 12:51:53

Q. Okay. 12:51:56

Can you think of anything -- strike that. 12:51:58 12:52:01

Can you think of any other way of selectively depositing an encapsulation layer using 12:52:01 12:52:04

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

PECVD without using shadow mask? 12:52:08

A. So I'm pretty sure I have not seen this 12:52:24
used for OLEDs, but I am aware of work using 12:52:26
directed nozzles in conjunction with PECVD. 12:52:33

But not for OLEDs. It's actually 12:52:37
for inorganic semiconductor materials for other 12:52:39
applications, where you use what's called a remote 12:52:43
plasma to generate the species you are depositing, 12:52:48
and then you direct it through, essentially, a vent 12:52:53
or a nozzle, to deposit it in a spatially-specific 12:52:57
way. I know the technology exists, but completely 12:53:02
unrelated to OLEDs. 12:53:06

Q. So it's similar to one of the examples 12:53:07
in the '389 patent, right, where they were trying to 12:53:09
direct the flow of the materials using, I think, 12:53:13
gas? 12:53:15

A. Could you point me to what you are 12:53:19
referring to? 12:53:20

Q. Figure 7C. 7A, 7B, and 7C. 12:53:21

A. No. I mean, those are different in that 12:53:37
those are not using a remote plasma, but I mean, the 12:53:38
similarity in that is that they are directing the 12:53:43

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

vapor, but they're actually very different techniques. 12:53:46 12:53:48

Q. Are you aware of, in the concept of OLED, are you aware of selective deposition of an encapsulation layer using electron beam technology? 12:53:49 12:53:59 12:54:05

A. Again, your question is publication or commercial demonstration related? 12:54:12 12:54:20

Q. And by commercial demonstration, it also includes research labs? 12:54:23 12:54:27

A. I understand. 12:54:28

In terms of physical demonstrations, whether from research labs or companies at that time -- I can't recall off the top of my head. 12:54:37 12:54:40 12:54:51

Q. What about since 2002? 12:54:52

A. My answer would be the same. I don't recall specifically. 12:54:56 12:55:04

Q. Okay. 12:55:05

What about flash evaporation? 12:55:05

A. Yeah. I'm sorry. I understand your question, but I don't know what you're asking me. 12:55:14 12:55:16

Q. Okay. 12:55:18

So are you aware of any actual 12:55:19

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

practice of using flash evaporation to selectively deposit in the encapsulation layer in the context of roll-to-roll process? 12:55:25 12:55:33 12:55:39

A. Again, in the context of OLED specifically? 12:55:47 12:55:50

Q. Yes. 12:55:50

A. No, not specifically, no. 12:55:50

As I said, I don't recall how Add-vision and Sue Carter's lab did their encapsulation. They did do evaporation, but I don't know if they did their encapsulation that way. 12:55:52 12:55:54 12:55:59 12:56:03

So given that, I just don't recall. 12:56:06

Q. What about outside of the OLED context? 12:56:08

A. So actually, roll-to-roll evaporation of oxides and roll-to-roll sputtering of oxides did exist by that time. 12:56:21 12:56:26 12:56:31

In fact, for example, roll-to-roll sputtering and evaporation has been used to make capacitor foils for decades. 12:56:32 12:56:35 12:56:39

Q. Capacitor foils and OLEDs are quite different; correct? 12:56:44 12:56:48

A. Agreed. 12:56:48

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Can you use spraying to deposit an ink organic layer? 12:56:49 12:57:06

A. Yes. 12:57:06

Q. Have you done that -- are you aware of anyone doing that? 12:57:07 12:57:10

A. Yes. 12:57:10

Q. In the context of OLEDs? 12:57:11

A. Yes. 12:57:14

Q. In 2002? 12:57:15

A. I don't know for sure when the exact year was, but aerosol jet for spray of inorganics has been around since the early 2000s in the context of OLEDs because people have used it to deposit metals. For OLED context. 12:57:19 12:57:28 12:57:36 12:57:38 12:57:42

Q. How is the selected deposition done in that context? 12:57:46 12:57:50

A. In that context, it's done using a directed nozzle. There's actually a commercial -- there's a commercial tool that's available that provides that capability. 12:57:51 12:57:54 12:57:57 12:58:00

Q. So no masks are used? 12:58:01

A. Correct. 12:58:05

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. But not ink jetting? 12:58:11

A. It can also be done by ink jetting. 12:58:14

Your question was about spray, and not specifically 12:58:17

about inkjet. 12:58:19

But ink jetting of inorganic layers 12:58:20

is no problem. We have been doing that -- my own 12:58:25

lab has been doing that since 2000. 12:58:28

Q. Was it published in 2000? 12:58:34

A. I don't remember when our first paper 12:58:36

came out. Definitely by 2003, probably before, but 12:58:41

I'm not positive. 12:58:47

Definitely by 2003 because I had an 12:58:50

undergraduate student who finished his undergraduate 12:58:52

honors thesis on that topic, and I remember it was 12:58:56

in 2003, and we had already published by then, and 12:58:58

he had done some of the early work. 12:59:01

Q. Did you review the invention disclosure 12:59:04

for the '389? 12:59:12

A. I don't recall. If it was part of the 12:59:18

file history, I would have reviewed it, but I don't 12:59:20

remember specifically. 12:59:22

Q. It was not part of the file history. 12:59:22

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Okay. 12:59:25

Then I'd have to look at the list of 12:59:26

things that I reviewed. It's -- there's a lot, so I 12:59:28

don't remember specifically. 12:59:31

Q. It was discussed by Mr. Humphrey in his 12:59:32

declaration. 12:59:39

A. Okay. I have read Mr. Humphrey's 12:59:40

declaration, but of course, I read it after I 12:59:45

submitted my declaration. So I have read it more 12:59:47

recently. But then I probably looked at it, but I 12:59:50

don't remember specifically without looking at it. 12:59:54

Q. When you read that section on the 12:59:57

invention disclosure in the conception, do you have 01:00:10

any disagreement? 01:00:15

A. As I said, I wouldn't -- I probably -- 01:00:16

I'm sure I have disagreements, because I find a lot 01:00:19

of what Mr. Humphrey said to be wrong. With that 01:00:21

section specifically, I couldn't say without looking 01:00:25

at it. 01:00:27

Q. So why don't we go to Exhibit 2001. 01:01:02

A. 2001, you said? 01:01:11

(Exhibit 2001, Humphrey Declaration, was marked for 11:16:04

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

identification.) 11:16:04

Q. Correct. 01:01:13

A. Okay. Okay. I have it. 01:01:13

Q. Actually, have you reviewed the patent owner's primary response? 01:01:21 01:01:39

A. I did briefly in preparation for this deposition. I had -- obviously, I hadn't reviewed it when I submitted by declaration, but I have reviewed it since then. 01:01:42 01:01:46 01:01:48 01:01:51

Q. Okay. Can you please go to the Exhibit Share, and see whether there is POPR. 01:01:52 01:03:10

A. Yes. I see it. 01:03:18

Q. Okay. Can you open that document? 01:03:19

A. Yes. I actually think I have a paper copy of it. Can I use that? 01:03:21 01:03:23

Q. Sure. 01:03:25

A. Okay. Let me confirm. I'm pretty sure. Yes. I have a paper copy of it. 01:03:27 01:03:29

Q. Feel free to use that one, then. 01:03:33

A. Okay. 01:03:36

Q. Can you please go to pages 8 and 9. 01:03:37

A. Okay. 01:03:47

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Do you have any disagreement with the chart on pages 8 and 9? 01:03:47 01:03:50

MR. GARR: Objection, scope. 01:03:54

A. I honestly -- I mean, I probably do, but I haven't reviewed this in detail. This is not something -- since this is beyond what I have in my declaration, I didn't focus on this when I reviewed this document. 01:03:55 01:04:05 01:04:08 01:04:10 01:04:12

Q. Okay. 01:04:12

Do you have an opinion sitting here today as to when the claims were first conceived? 01:04:13 01:04:19

MR. GARR: Same objection. 01:04:22

A. Again, that's not something I offered an opinion on in my declaration. 01:04:23 01:04:26

So I haven't formulated an opinion yet. 01:04:27 01:04:30

I -- given time, I can, but certainly not sitting here today. 01:04:30 01:04:32

Q. Okay. 01:04:34

And do you still have Exhibit 2001 of Mr. Humphrey's declaration? 01:04:35 01:04:42

A. I do. I do. 01:04:45

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Do you recall what are your major disagreements with Mr. Humphrey? 01:04:46 01:04:55

A. Well, there's a lot. 01:04:56

I told you that -- I have only given you one. I mean, I think he was just wrong in his analysis with respect to the effect of magnetic field. 01:04:57 01:04:59 01:05:02 01:05:06

His reasoning related to ambient pressure exposure is also wrong. There's a lot of this I disagree with. 01:05:12 01:05:15 01:05:18

Q. When you say the "ambient exposure," which section are you referring to, or which paragraphs are you referring to in particular? 01:05:20 01:05:23 01:05:27

A. So actually, I think it's peppered throughout his declaration, but basically at a high level, he argues, and I know you provide opinions in your POPR based on that argument, that a problem with using the printing-based techniques is ambient exposure can cause degradation of the EL materials. 01:05:30 01:05:32 01:05:35 01:05:39 01:05:42 01:05:47

The problem is he assumes, in his analysis, which is actually incorrect, that just because you're using printing, you have to expose to 01:05:50 01:05:55 01:05:59

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

oxygen and moisture. That's actually not true. 01:06:03

It is routinely possible, and in 01:06:05

fact it was already done by 2000, to place printers 01:06:08

inside nitrogen glove boxes, so you could ensure 01:06:11

that was not an issue. Sturm did that. I did that. 01:06:15

We were all routinely doing that at the time. 01:06:18

So saying that somehow using a 01:06:20

printer is going to expose to ambient conditions 01:06:23

that would cause degradation is categorically wrong. 01:06:27

Q. Okay. Anything else? 01:06:32

A. I'm sure there's lots. We'd have to go 01:06:33

paragraph by paragraph. I have not memorized his 01:06:36

declaration. 01:06:39

Q. Feel free to review it and let me know 01:06:39

what other disagreements you have. 01:06:42

A. Okay. I will go paragraph by paragraph. 01:06:45

So I would comment -- just because 01:07:13

there's not information, I won't comment on his 01:07:15

qualifications and experience in relationship to 01:07:19

being a skilled artisan because it's not clear to me 01:07:22

what OLED experience he has. 01:07:25

So I don't know if I feel that's 01:07:27

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

sufficient or not. I just won't comment on it. 01:07:29

Then I note in Paragraph 14, he's 01:07:48

using Samsung's proposed constructions, and he says 01:07:50

he's been informed that he should -- he's been asked 01:07:54

to use those. I won't comment on the 01:07:57

appropriateness of it. I will note that I 01:08:01

understand that in the institution decision, that 01:08:03

was rejected by the Board. But again, I'm not going 01:08:06

to comment on that. 01:08:09

He makes a statement here in 01:08:19

Paragraph 15, "As a preliminary matter, it is my 01:08:24

view that because the publication date of the 01:08:28

Yamazaki was not until November 2003, it is unlikely 01:08:30

that the inventors of the '389 would have been aware 01:08:34

of the existence of the Yamazaki's disclosures." 01:08:38

(As read.) 01:08:41

I don't think he or I are in a 01:08:41

position to know what they knew, and I don't see how 01:08:43

that's relevant to knowing what one of skill in the 01:08:46

art would know. 01:08:49

So the section, this whole section 01:09:31

on not depositing cover layer under vacuum 01:09:33

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

condition, which is on Paragraph 16 through 21, I've already told you I disagree with. His analysis is wrong. 01:09:37 01:09:45 01:09:47

Q. Okay. 01:09:47

A. He's assuming in his analysis that just because you are exposing it to gas, it causes problems to the OLED device. He appears to be equating ambient conditions with oxidative and request moisture-filled conditions. That's not correct. 01:09:48 01:09:50 01:09:54 01:09:57 01:10:01 01:10:04

You can use ink jetting and the inkjet method, and it was already being used at that time to inkjet, or use spray techniques in nitrogen glove boxes. In fact, that was the standard for doing organic devices at the time. So the issue here is just incorrectly analyzed. It may be because he hasn't worked on OLED fabrication itself, but his analysis is just wrong. 01:10:05 01:10:08 01:10:10 01:10:17 01:10:20 01:10:23 01:10:25 01:10:30

Q. Okay. 01:10:32

A. So the next section he has, which is starting on Paragraph 22 and continuing to 26. Well, Paragraph 22 is just wrong. 01:10:35 01:10:37 01:10:56

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

He says that you cannot build up thick layers because you're using solution-based techniques. That's just wrong. 01:10:59 01:11:01 01:11:04

Inkjet can -- I have personally demonstrated and published in my lab that inkjet can be used to build up layers that are many microns thick. 01:11:06 01:11:08 01:11:12 01:11:16

Screen printing was already used to print layers since decades before that that are tens of micrometers thick. 01:11:16 01:11:19 01:11:23

So his analysis here is just wrong. 01:11:25

Then that leads to errors in his subsequent paragraphs regarding his whole analysis on the layers being too thin for effective protection. 01:11:26 01:11:30 01:11:34 01:11:37

He also carries over a suggestion related to the choice of materials, and this is his section -- it's -- I guess it's really -- in the same section on too thin an organic layer, but he goes into it in detail on Paragraphs 25 and 26 where he says that the resins can be too thin to provide protection. 01:11:37 01:11:40 01:11:43 01:11:47 01:11:52 01:11:56 01:11:59

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

That's, in fact, incorrect because just because you are using a resin, it doesn't mean it has the same chemical properties. There are a range of different resins with different physical and chemical properties, and so to assume just because Suzuki identifies a problem with a thin layer it will necessarily be the case for all such thin layers is incorrect. So I disagree with that section. 01:12:00 01:12:03 01:12:06 01:12:09 01:12:10 01:12:13 01:12:19 01:12:22 01:12:26

Q. Okay. 01:12:27

A. His analysis with respect to using a shadow mask with the ink jetting or electric field application method is incorrect, and I disagree with it. This is the section starting on Paragraph 27 and continues to 36. 01:12:33 01:12:45 01:12:49 01:12:51 01:13:01

I've already addressed that with you in your previous questions and answers where I told you why you would still choose to use a shadow mask in those applications. So I won't repeat that here, but I generally disagree with this section. 01:13:06 01:13:08 01:13:11 01:13:13 01:13:17

Q. Okay. 01:13:22

A. Then the next section, which is starting 01:13:30

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

in Paragraph 37 going through Paragraph 53, I disagree with. This is the section where, among other things, he's talking about the negative effects of magnetic fields. I've already told you why that's wrong. 01:13:33 01:13:43 01:13:47 01:13:49 01:13:53

So I disagree with his analysis here with respect to that. 01:13:54 01:13:58

Q. Okay. 01:13:59

A. Okay. Now we're moving on to the Weaver-based analysis, which you and I haven't talked about yet. 01:14:03 01:14:34 01:14:38

So we can go into it right now or we can wait until you ask me questions about Weaver. 01:14:39 01:14:42

Q. Feel free to go into it right now. 01:14:46

A. Okay. 01:14:48

So in the section where he talks about -- when he criticizes my application of Weaver's planarizing layer which is on Paragraphs 54 through 55, he's wrong because he's ignoring the explicit discussion of Weaver that says that is a planarizing layer. 01:14:51 01:15:21 01:15:28 01:15:34 01:15:39 01:15:42

So Weaver specifically says that 01:15:43

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

layer 151 forms a smooth, planar surface, and goes on to discuss that. 01:15:49 01:15:55

So I disagree with that. 01:15:56

Q. Okay. 01:16:00

But do you agree that as drawn, it appears that each of layers 121a through 121c, and 122a through 122c follow the contours of the underlying layer? 01:16:01 01:16:03 01:16:13 01:16:21

A. So with respect to Figure 5, as drawn, that's true, but there's explicit disclosure saying that it's a material that forms a smooth, planar surface upon application rather than forming a surface that reflects irregular contours of the underlying surface. 01:16:47 01:16:49 01:16:52 01:16:58 01:17:00 01:17:03

So he's ignoring the explicit textual description in an incorrect way. 01:17:04 01:17:08

Q. Okay. 01:17:11

For Figure 6, do you agree that each of layers 151a, 151b, and 151c follow the contours of the underlying layer, or structure? 01:17:14 01:17:19 01:17:26

A. So in the Figure 6, it follows the topology as drawn, but again, he's ignoring the 01:17:31 01:17:35

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

explicit disclosure where it says that it's a material that forms a smooth, planar surface upon application rather than forming a surface that reflects irregular contours of the underlying surface. 01:17:40 01:17:42 01:17:47 01:17:49 01:17:52

So there's explicit textual disclosure, and he's ignoring that. 01:17:52 01:17:56

Q. Okay. Please continue. 01:17:59

A. So his -- I'm not sure I understand what he's saying in 56, but his -- I definitely disagree with his conclusion. 01:18:10 01:18:18 01:18:21

He says in Paragraph 56, "that Weaver controls the coverage area by controlling the amount of material deposited," and then somehow from that concludes, "In other words, Weaver does not intentionally create a patterned deposition as an ink-jet printing or masked deposition of encapsulation layers." 01:18:24 01:18:29 01:18:32 01:18:37 01:18:39 01:18:44 01:18:48

The conclusion there is wrong. I mean, it does create pattern deposition, and I just don't understand from these statements how he's jumping from the sentence about the deposition 01:18:50 01:18:52 01:18:55 01:18:58

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

sources to this conclusion. Whatever it is, that seems to be incorrect. Or I mean, the conclusion is definitely incorrect. 01:18:59 01:19:02 01:19:06

Q. Okay. 01:19:07

By the way, do you know who is Weaver affiliated with? 01:19:37 01:19:39

MR. GARR: Counsel, I know we're sort of on an ongoing question here, but we're going to have lunch in about 10 minutes. So it would be helpful if we took a break by then. 01:19:44 01:19:45 01:19:50 01:19:54

MS. ZHONG: That's fine. 01:19:59

BY MS. ZHONG: 01:20:01

Q. Do you know who Weaver is affiliated with? 01:20:01 01:20:03

A. No, I mean, he's -- the inventor's address is listed at Princeton, New Jersey. I don't recall specifically who he's affiliated with. 01:20:10 01:20:14 01:20:18

Q. Would it surprise you that he is affiliated with UDC? 01:20:20 01:20:22

A. No, that wouldn't surprise me because UDC was in that geographical location, or close to that geographical location. 01:20:26 01:20:29 01:20:32

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. So we're on to Paragraph 57. Do you have any comments for that section? 01:20:34 01:20:45

A. So clearly, I disagree with the section between Paragraph 57 and 62, because there he is essentially arguing that they would not use -- that a person of ordinary skill would not have used inkjet in combination with the teachings of Weaver. I agree with that. The reasons for that, I already put in my declaration. 01:20:47 01:21:03 01:21:10 01:21:18 01:21:21 01:21:24 01:21:26

So I disagree with this whole section for the same reasons that I put in my declaration. 01:21:27 01:21:29 01:21:31

Q. Okay. 01:21:31

You agree that Weaver does not mention inkjet; correct? 01:21:33 01:21:37

Are you reviewing Weaver right now? 01:22:29

A. Yes, I am. 01:22:31

So I agree that I don't see the explicit disclosure of inkjet in there; however, Weaver does say in Paragraph 35, "Layers of such planarizing materials 121a through c can be provided using techniques known in the art, for example, by 01:23:17 01:23:21 01:23:24 01:23:34 01:23:38

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

dipping, spin-coating, sputtering, evaporative coating, spraying, flash evaporation and chemical vapor deposition, and so forth." 01:23:40 01:23:44 01:23:50

So he appears to be treating it as limiting. In fact, interestingly, he chose to ignore the last words of the sentence. 01:23:52 01:23:54 01:23:57

In his Paragraph 57, he cut it off at flash evaporation sources -- oh, he's quoting from a different section. He's quoting from Paragraph 57. He didn't quote from Paragraph 35, which does identify other techniques as well. 01:23:59 01:24:05 01:24:13 01:24:15 01:24:21

Now, I agree none of them explicitly call out inkjet, but they make clear the list is not limiting. They say specifically "and so forth." 01:24:23 01:24:27 01:24:32

Q. UDC is intimately involved in developing OLEDs; correct? 01:24:34 01:24:38

A. Yes. I agree, in general, UDC has been very active in OLEDs. 01:24:39 01:24:44

Q. And UDC would have been familiar with the typical processes used to deposit materials; correct? 01:24:46 01:24:49 01:24:53

A. Within the scope of what they work on, 01:24:53

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

yes. I mean, UDC has specific production agendas. 01:24:55
I'm sure they follow those. But as a general level, 01:25:00
I would expect them to be reasonably knowledgeable. 01:25:03
Q. Okay. 01:25:05
For the section starting from 01:25:06
Paragraph 63, what's your specific disagreement? 01:25:21
MR. GARR: So we're going to have to 01:25:29
break in couple of minutes here. 01:25:30
A. So in this section, he criticizes my 01:25:36
report on -- specifically related to the use of 01:25:50
screen printing in conjunction with the teachings of 01:25:55
Weaver. 01:25:58
He says screen printing would not be 01:25:58
suitable for web-based process. 01:26:02
That's false. Screen printing was 01:26:05
also being used for continuous web processing. That 01:26:07
already existed at that time, so he's just wrong. 01:26:10
He says it's not clear how screen printing could 01:26:13
yield progressively larger cooperative barrier 01:26:17
layers. That's -- I mean he's wrong. It is 01:26:20
obvious. You use larger screen patterns. It's 01:26:22
absolutely straightforward. Multi-layer screen 01:26:26

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

already existed at that time. 01:26:29

Q. Were they used in conjunction with 01:26:31

roll-to-roll OLEDs? 01:26:34

A. Actually, I guess the answer is yes, 01:26:36

because that's what Add-vision was doing. 01:26:38

Add-vision was using screen printing for OLEDs. 01:26:43

Now, I already told you, I don't 01:26:46

remember if Add-vision was doing it in roll-to-roll. 01:26:47

They were certainly doing it on flexible sheets that 01:26:50

could be roll-to-roll printed. 01:26:54

But yes, they were doing it in 01:26:56

OLED-specific ways. 01:26:59

Q. Did they use progressively larger 01:27:00

screens? 01:27:03

A. Yes. Because the way they made their 01:27:03

OLEDs to get the layers to align, they would have 01:27:07

different screen sizes -- or different screen 01:27:10

pattern sizes to create their OLED structure. 01:27:13

Q. But you are not sure whether they did 01:27:17

the roll-to-roll; correct? 01:27:19

A. Correct. I'm not sure. I don't 01:27:20

remember. 01:27:23

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. When did they publish their work? 01:27:23

A. I don't remember if Add-vision published or Sue Carter published. She was already active in this field, and had published by the time I started as a professor at Berkeley, which was in 2000. So it was around that time. 01:27:25 01:27:30 01:27:36 01:27:38 01:27:41

Q. Did she publish specifically using screen printing? 01:27:43 01:27:46

A. Yes. 01:27:46

Q. Okay. Paragraph 66. 01:27:47

A. So I'm not sure what he means here. He says it's one of a large number of choices, but a large number of choices can still be finite. So it doesn't change my opinion that inkjet would be an obvious solution to one of skill in the art for this. He seems to assume that just because there's more than a few choices, that it's outside the capability of one of skill, and I agree with that conclusion. 01:27:55 01:28:06 01:28:09 01:28:12 01:28:15 01:28:20 01:28:23 01:28:27 01:28:29

Q. Now, do you agree that in Weaver's figures in 8 and 9, no masks were used? 01:28:55 01:28:57

A. Beyond the nozzle diameter, there's no 01:29:00

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

additional masking provided. I agree with that. 01:29:12

Q. Is it your opinion that Weaver in 01:29:16

Figures 8 and 9 could already provide for selective 01:29:32

deposition? 01:29:37

A. I -- it is my opinion that Weaver on its 01:29:37

own does teach selective deposition, and I provide 01:30:11

details for that; for example, in Paragraph 188 of 01:30:15

my declaration. 01:30:19

Q. What's the -- 01:30:26

MR. GARR: We need to go soon. 01:30:22

Can we go off the record now? 01:30:24

I can break just for two minutes, 01:30:27

but I need to deal with the fact that they're 01:30:29

closing lunch here. 01:30:32

MS. ZHONG: Okay. 01:30:33

(RECESS, 1:30 p.m. - 1:31 p.m.) 01:30:37

BY MS. ZHONG: 01:31:47

Q. So in Weaver's Figures 8 and 9, do you 01:31:47

know what is the method of deposition they're using 01:31:50

there? 01:31:52

A. So with respect to Figures 8 and 9, the 01:31:52

discussion is provided starting in Paragraph 57 of 01:32:14

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Weaver. 01:32:18

Q. Mm-hmm. 01:32:20

A. Where it specifically says, "In relation to the sources, sources 221a through c, are used for the deposition of materials for planarizing layers, while sources 222a through c are used for the deposition of materials for high-density layers. Preferred sources are thermal evaporation, sputtering, PECVD and electron beam sources for the high-density layers, and thermal evaporation, organic vapor phase deposition, chemical vapor deposition, spraying and flash evaporation sources for the planarization layers." 01:32:22 01:32:24 01:32:30 01:32:35 01:32:38 01:32:42 01:32:45 01:32:48 01:32:55 01:32:58 01:33:03

Q. Isn't it the case that as depicted in Figures 8 and 9 looks like they were using nozzles? 01:33:08 01:33:13

A. In the -- in terms of the depiction, they are -- they look they're nozzle informed, but just to be clear, that doesn't mean that that's only spray. In other words, you can use nozzles to control the directivity of evaporation, et cetera, et cetera. 01:33:17 01:33:25 01:33:30 01:33:33 01:33:36 01:33:41

So all of the techniques that are 01:33:41

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

called out could be schematically drawn in this way, and others. 01:33:43 01:33:48

Q. So it's your opinion that the depiction in Figures 8 and 9 could be referencing the use of sputtering through more evaporation PECVD and electron beams? 01:33:49 01:34:02 01:34:07 01:34:13

A. Well, that's explicitly what it says. It says, "In this embodiment," and it's in relation to Figure 8 in Paragraph 57, it makes clear that for the two different material layers, and this is in reference to Figure 8, they could be for the high-density layers, thermal evaporation, sputtering, PECVD and electron beam sources, and for the other layers, the non-high-density layers, thermal evaporation, organic vapor phase deposition, chemical deposition spaying and flash evaporation sources. 01:34:15 01:34:18 01:34:19 01:34:22 01:34:27 01:34:30 01:34:34 01:34:37 01:34:40 01:34:45 01:34:48

So the point is each of those has a source inside it, and it is directed in the way that it is schematically shown in Figure 8. 01:34:48 01:34:51 01:34:53

Q. Figures 8 and 9 are described in conjunction -- strike that. 01:34:57 01:35:25

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Figures 8 and 9 are used to describe the formation of the structure shown in Figure 2; correct? Take a look at Paragraphs 22 and 23. 01:35:28 01:35:33 01:35:39

A. In a particular embodiment of the invention, yes, I agree. Figures 8 and 9 are associated with the structure of Figure 2. 01:35:52 01:35:53 01:35:57

Q. And in Figure 2, there are no OLED devices; correct? It's only for forming what they call a covered substrate; correct? 01:36:00 01:36:03 01:36:08

A. Figure 2 represents the covered structure prior to the formation of OLED devices, I agree. 01:36:24 01:36:26 01:36:29

Q. And Weaver does not specifically explain how the second barrier region 150 is formed; correct? 01:36:29 01:36:47 01:36:53

A. Sorry. Could you repeat your question. I didn't hear it. 01:36:53 01:36:55

Q. So Weaver does not expressly explain how the barrier region 150 is formed; is that correct? 01:36:56 01:37:01

A. So I disagree with that characterization in the following sense: So the discussion of the upper layers in Paragraph 53, Weaver says, "As with 01:37:07 01:37:43 01:37:47

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

barrier region 120, barrier region 160 is preferably composed of multiple cooperative barrier layers. 01:37:56 01:38:00

For example, layers of planarization material 161a through c and layers of high-density material 162a through c." 01:38:02 01:38:07 01:38:11

So it's calling out the use of the different layers. 01:38:15 01:38:18

Then it goes on to say in Paragraph 54, "The formation of planarizing and high-density layers over a substrate material will now be discussed in conjunction with the figures." 01:38:20 01:38:25 01:38:29 01:38:34

So that statement is not limiting it in this part, it's not limiting it to specific upper or lower layers. It's general to the planarizing and high-density layers. 01:38:36 01:38:38 01:38:41 01:38:44

So while it's true that the discussion of Figure 8 is specifically referring back to Figure 2, it's also explicitly calling out the sequence of high and low-density layers, which would then be addressed to both types of high and low-density layers. 01:38:47 01:38:48 01:38:51 01:38:54 01:38:58 01:39:01

Q. Okay. Let's take it a little bit deep. 01:39:02

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Go to Figure 7, and look at the stack 160. 01:39:05 01:39:09

A. Okay. 01:39:16

Q. 160 is not used to encapsulate the OLED device 140; correct? 01:39:17 01:39:22

A. If by that you mean it's below the device, I agree. But again, the key is the high-density layers and low-density layers which is also what's the case in 150. 01:39:24 01:39:26 01:39:29 01:39:32

Q. 54, when it describes planarization in high-density layers, that's in reference with Figures 4A to 4G, and Figures 8 and 9; correct? 01:39:34 01:39:38 01:39:40

A. I agree. 01:39:45

Q. Okay. 01:39:45

Let's take a look at Figures 4A to 4G. 01:39:47 01:39:50

In Figure 4G, where you have the OLED device on top, that layer -- that layer, like the 150 doesn't have a planarization layer; correct? 01:39:51 01:39:57 01:40:04

A. Sorry. I didn't understand your question. 01:40:14 01:40:15

Q. Take a look at 4G. 01:40:15

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Okay. 01:40:17

Q. 140 is the OLED device; correct? 01:40:17

A. Yes. The OLED device is 140 in 4G. I agree with that. 01:40:20 01:40:32

Q. Is there a planarization layer deposited on the OLED device in this 4G structure? Take a look at Paragraph 56. 01:40:33 01:40:37 01:40:46

A. I agree in the structure shown in Figure 4G, the layer that's put on top is 150, which is a barrier layer. There's no additional planarization layer shown explicitly in 4G. 01:41:01 01:41:04 01:41:07 01:41:11

I agree with that. 01:41:14

Q. So in 4A and 4G where they talk about the planarization layer, and the high-density layers, those are only in reference to the protective structure for the substrate, but not the structure over the OLED; is that correct? 01:41:15 01:41:18 01:41:21 01:41:27 01:41:31

A. I agree, but again, it's explicitly calling out high-density and low-density layers. 01:41:35 01:41:37

Q. The high-density and low-density layers are in reference to Figures 4A and 4G, and Figures 8 and 9, all of which are for the devices -- for the 01:41:43 01:41:45 01:41:51

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

structure that does not have a planarization layer over the OLED; correct? 01:41:55 01:41:58

A. So with respect to 4G, I agree, but again, to be clear, it's explicit that these -- that Figures 8 and 9 offer the high-density and low-density layers. Those are also called out as the respective individual layers of 150, but I agree that the disclosure on 4G is below the OLED. 01:42:05 01:42:09 01:42:12 01:42:17 01:42:19 01:42:24

Q. For Figures 8 and 9 according to Paragraphs 22 and 23 are in reference to Figure 2; correct? For forming the covered substrate of Figure 2; correct? 01:42:29 01:42:32 01:42:39 01:42:42

A. With respect to the discussion of Figure 8, the exemplar layers are the layers shown in Figure 2, and that is what's called out in Paragraphs 22 and 23. 01:42:58 01:43:00 01:43:06 01:43:10

Q. We have looked at Figure 2, and that is a structure that only has a covered substrate without the OLED device; correct? 01:43:13 01:43:18 01:43:22

A. Yes, I agree, but we actually did look at it before. I think you already asked me about it, but yes, I agree with that. 01:43:24 01:43:26 01:43:29

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

MS. ZHONG: Okay. We can take the lunch break. 01:43:30 01:43:31

(RECESS, 1:43 p.m. - 2:31 p.m.) 01:43:33

BY MS. ZHONG: 02:32:07

Q. Dr. Subramanian, can you please turn to Exhibit 1006, which is Ghosh? 02:32:07 02:32:01

A. Okay. I have it in front of me. 02:32:14

(Exhibit 1006, Gosh, Patent Application, 2001/0052752, was marked for identification.) 11:16:04 11:16:04

Q. We actually discussed this reference briefly and I think you agreed with me that in Ghosh, the encapsulation layer -- strike that. 02:32:16 02:32:22 02:32:29

In Ghosh, the second encapsulation layer 22, was deposited between the active pixel areas including over the scribing lines; correct? 02:32:34 02:32:36 02:32:48

A. If by that you're referring to the places between the islands annotated as 3 in Figure 3, yes, I agree that's true. 02:32:51 02:32:53 02:32:59

Q. Do you know why Ghosh deposits the second encapsulation layer between the -- what you call the islands? 02:33:00 02:33:12 02:33:17

A. Okay. Well in Paragraph 32, in Ghosh, 02:33:53

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

what Ghosh says is "The areas of oxide layer 22 that are laid down over the exposed portions of the substrate 2 form a seal and barrier to water so that there is much less possibility of moisture permeating from the edges of the display." 02:34:02 02:34:06 02:34:09 02:34:13 02:34:16

Q. Would that also be true for Yamazaki? 02:34:19

A. I'm sorry. I don't understand what you mean by that. 02:34:33 02:34:34

Q. Would a person of ordinary skill in the art adopt the same approach in case of Yamazaki? 02:34:35 02:34:45

A. No. I would say no, because the teachings of Yamazaki make clear, for example, if you look at the embodiments that are related to Figure 11, for example, it's already addressed the issue of lateral penetration through the use of the layers 1105 and then the encapsulation on top which extend past the edges of the OLED pixels. So it's already giving the protection that is needed laterally. 02:34:52 02:34:54 02:34:56 02:34:59 02:35:04 02:35:11 02:35:19 02:35:22 02:35:26

Q. But isn't it the case that the encapsulation layer 21 in Ghosh's Figure 3 also cover all of the active area? 02:35:27 02:35:33 02:35:38

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Sorry. The encapsulation layer -- I missed what you said. 02:35:43 02:35:46

Q. Encapsulation layer 21. 02:35:47

A. Yes. 02:35:50

Q. That encapsulates all of the active areas; right? 02:35:50 02:35:53

A. Yes. 02:35:55

Q. So -- it's not just the active area. It also extends out a little bit beyond the active area; correct? 02:35:56 02:36:04 02:36:08

A. Correct. Close-up is actually seen in Figure 4. 02:36:09 02:36:11

So in Figure 4, you can see it just barely extends past the active area where the pixels are, and the pixels are the 13s shown in Figure 4, for example. 02:36:12 02:36:14 02:36:22 02:36:25

Q. Okay. 02:36:26

So it's in that sense, it's similar to Figure 11; right? 02:36:26 02:36:29

A. No. 02:36:31

Q. It's not -- why not? 02:36:31

A. So you can see the difference. 02:36:34

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

The disclosure of Yamazaki, specifically points out that the choice of dimensions -- or the choice of materials, deposition techniques, et cetera, are used to provide the appropriate protection, as called out in Yamazaki. 02:36:35 02:36:44 02:36:47 02:36:50 02:36:53

In Figure 4, or Figure 3 of Ghosh, it says that additional protection is provided by the layer 22. 02:36:57 02:37:02 02:37:04

So just because structurally they show some similarities, it doesn't mean they provide the same protection. Yamazaki makes clear that the structure of Yamazaki provides the protection. 02:37:07 02:37:11 02:37:13 02:37:16

Q. In the case of Figure 3 of Ghosh, in order to provide the protection for the OLEDs, the encapsulation 22 need not fill out throughout all of the gap area between the islands of 3; right? 02:37:19 02:37:44 02:37:54 02:37:59

It could be just like Yamazaki, and just covers the first encapsulation layer, but does not extend all the way through? 02:38:04 02:38:07 02:38:13

A. That's conceptually possible, but that's not the disclosure of Figure 3. 02:38:16 02:38:19

But remember, what Ghosh does with 02:38:20

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

respect to encapsulation is not the teaching that I'm importing from Ghosh. It is true -- it is true that another way you could do it which is not shown in Figure 3 is to do something in Ghosh that's closer to Yamazaki. 02:38:25 02:38:26 02:38:30 02:38:32 02:38:34

I agree. That is true, and that probably would provide the protection. That's just not what's shown in Figure 3. 02:38:35 02:38:38 02:38:39

Q. So why isn't Ghosh doing that? 02:38:44

A. I cannot say why Ghosh is not doing that. He just didn't. 02:38:47 02:38:50

Q. Is it an advantage of Ghosh's way of doing this? 02:38:52 02:38:54

A. There's almost certainly tradeoffs in both ways. 02:38:55 02:38:57

So obviously, the thicker and more material you put, the better the encapsulation with respect to chemical impermeance [as spoken]. 02:38:58 02:39:02 02:39:05

But on the other hand, the thicker and more material you put, the more material you're using, the worse the -- sort of the visual appearance of the display. I mean, there's always 02:39:07 02:39:11 02:39:14 02:39:18

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

tradeoffs. 02:39:21

But I'm not importing the specific 02:39:22
structure of layers of Ghosh. I'm using the 02:39:25
teachings of Ghosh with relation to using multiple 02:39:29
displays fabricated in the way, for example, shown 02:39:33
in Figures 3 and 5. 02:39:36

Q. Okay. 02:39:39

I understand where you're coming 02:39:39
from, but I still would like to understand what are 02:39:41
the tradeoffs of Ghosh's way of applying the second 02:39:45
encapsulation layer versus the alternatives of not 02:39:53
applying the second encapsulation layer all the way 02:39:59
across. 02:40:01

A. Okay. I think I just answered that, but 02:40:02
I'll repeat my answer, which is: Ghosh's disclosure 02:40:04
of Figure 3 shows it completely filling the gap 02:40:09
between two adjacent display devices. 02:40:12

The disadvantage of that -- I mean, 02:40:18
there's advantages and disadvantages or tradeoffs. 02:40:20

The disadvantage of that is it takes 02:40:22
more material. It will make dicing different 02:40:24
because now you have to dice through a multi-layer 02:40:30

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

structure. Generally when you dice, you have to manage risks of cracking, et cetera, when you have multi-layer structures. Potentially that will affect the optical quality when you look at it, so the visual quality. 02:40:33 02:40:35 02:40:40 02:40:43 02:40:45

The advantage of doing it is it's arguably a more straightforward deposition because you're just doing it in one slot over the entire thing. 02:40:47 02:40:48 02:40:53 02:40:57

Ghosh says that by putting it there, it provides better protection; though, of course, Yamazaki makes clear that at least in the structure of Yamazaki, you get the protection by doing it the way of Yamazaki. It's just two different ways of doing things. They have their advantages and tradeoffs. 02:41:00 02:41:02 02:41:07 02:41:10 02:41:12 02:41:15 02:41:17

Q. Okay. 02:41:18

So at the time of the invention, what is the largest area -- strike that. 02:41:30 02:41:37

So at the time of the invention, what is the largest substrate size that one can use inkjet to deposit encapsulation materials? 02:41:43 02:41:46 02:41:56

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Oh, I don't know specifically, but I know that in the early 2000s, inkjet was already being used in display glasses that were a meter on a side, and I know that for sure -- 02:42:00 02:42:02 02:42:11 02:42:25

(Clarification requested by the Realtime Stenographer.) 02:42:25 02:42:25

A. I know that because at the time, Applied Materials was trying to sell an inkjet tool to the display industry. It was a commercial tool, which I had the opportunity to go see because they gave me a tour. 02:42:27 02:42:31 02:42:38 02:42:40 02:42:44

I remember being really impressed that at that time they already had commercial tools that could do inkjet printing over meter-sized pieces of glass. That was when I was a brand new professor at Berkeley. 02:42:45 02:42:47 02:42:49 02:42:53 02:42:56

Q. Was that public information? 02:42:57

A. I'm sure, yes. I mean, I didn't sign an NDA, and they gave me a tour, so they used to talk about it at display conferences. So I would imagine, yes, it was public. 02:42:59 02:43:03 02:43:06 02:43:09

Q. Was it used to deposit encapsulation 02:43:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

materials? 02:43:14

A. I don't -- I don't know what they used 02:43:16
it for. I don't know the answer to that. 02:43:18

I know the target application of 02:43:20
inkjet at that time was for color filters, but that 02:43:25
doesn't mean it was limited to color filters. 02:43:28

I actually don't know what they were 02:43:30
using it for beyond that. 02:43:32

Q. Okay. 02:43:33

Was it used to create multiple 02:44:01
panels on a substrate? 02:44:05

A. So I know that at that time that the 02:44:07
meter-sized pieces of glass were mother glasses 02:44:13
which were then subsequently diced. 02:44:20

I don't know if Applied ever used 02:44:21
it, and then subsequently diced it, but nobody was 02:44:23
making meter-size displays at the time. 02:44:26

So the meter-sized pieces of glass 02:44:28
were always diced up to smaller displays. 02:44:30

Q. Was it used to deposit the planarization 02:44:35
layer? 02:44:50

A. I think I already answered that. I 02:44:50

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

don't know. I don't know what they used it for beyond what I already told you. 02:44:52 02:44:54

Q. Beyond its likely for the color filters? 02:44:55

A. Correct. Because I had a specific discussion with them about color filters. So that's how I know that was one of their target applications. I don't know what the other ones were. 02:45:02 02:45:04 02:45:06 02:45:08 02:45:10

Q. Does the control become more complex if you have multiple display -- multiple devices on a substrate versus a single device on a substrate? 02:45:17 02:45:40 02:45:45

A. Not inordinately so. 02:45:50

As your display glasses get bigger, you have to manage the weight of the glass. You have to manage bending of the glass. So you have to support it during the printing process. 02:45:53 02:45:58 02:46:00 02:46:04

You have to provide linear translation motors that can print over -- that can move the print heads over larger areas, but none of those are major problems. I mean, that's not difficult. 02:46:07 02:46:11 02:46:14 02:46:17 02:46:19

Q. You were just not aware of any actual 02:46:21

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

application of using inkjet to print multiple devices on a single substrate before -- 02:46:56 02:47:05

A. That's not what I said. 02:47:09

Just to be clear, I think -- so Applied was making this tool. I know they were making it for color filters, and I know based on the size of the glass that the -- that in that application, the displays would have been diced, or the display glass would have been diced to produce multiple devices. 02:47:10 02:47:13 02:47:16 02:47:18 02:47:21 02:47:24 02:47:28

So as a general statement about using inkjet to print multiple devices, I think that your question -- that the answer to your question is no, you're incorrect. It was being used for that. 02:47:29 02:47:30 02:47:34 02:47:36

Q. But not for encapsulation or planarization layer in particular? 02:47:39 02:47:43

A. Yeah, that, I don't know. I have no way to know one way or another. 02:47:43 02:47:45

Q. Do you know when that particular practice was first used? 02:47:47 02:47:52

A. Sorry, which particular practice? 02:47:56

Q. By using inkjet for planarization layer 02:48:03

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

for multiple devices on a substrate? 02:48:06

A. If you are talking about real 02:48:08

applications, no, I don't know specifically because 02:48:09

I haven't looked at that. 02:48:13

Q. Do you know what the capability of 02:48:14

Seiko's inkjet printer -- 02:48:35

(Clarification requested by the Realtime 02:48:35

Stenographer.) 02:48:35

Q. Do you know what the capability of 02:48:51

Seiko-Epson's inkjet printer that's mentioned in 02:49:03

Yamazaki? 02:49:03

(Clarification requested by the Realtime 02:49:03

Stenographer.) 02:49:10

A. I'm not sure what you mean by that 02:49:10

question. Do you mean what the technology is, or 02:49:11

the size, or what are you referring to? 02:49:15

Q. Take a look at Paragraph 179 in 02:49:18

Yamazaki, which specifically mentions an equipment 02:49:22

from Seiko-Epson inkjet printer? 02:49:26

A. Yes. I know. This is a paragraph I had 02:49:30

read to you previously. 02:49:33

Yes. I'm familiar with the tool. 02:49:34

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. What is inkjet printing capability? 02:49:35

A. Well, I mean, this is pretty clear. 02:49:40

This is a piezoelectric inkjet 02:49:42

printer. That's what it's referring to. And it's a 02:49:46

particular Seiko-Epson head, which is the MLP and 02:49:47

the ML chip. They're both different variants of 02:49:53

Seiko-Epson's piezoelectric inkjet printing 02:50:00

technology. 02:50:04

I don't recall -- as I recall, the 02:50:05

MLP has less nozzles than the ML chip. That's what 02:50:08

I remember. But they're both basically variants of 02:50:11

the piezoelectric technology which Seiko Epson was 02:50:16

very advanced on. 02:50:22

I've actually use -- I don't 02:50:23

remember which head model we used, but I used 02:50:23

Seiko-Epson heads in my research in roughly that 02:50:28

time period. 02:50:31

Q. What is the printing area that it can 02:50:32

handle? 02:50:34

A. Well, I mean it's an inkjet head, so it 02:50:34

just depends on the translation stages. There's no 02:50:38

fundamental limit to the areas over which inkjet 02:50:42

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

heads can print. 02:50:44

In the tool we were using it was a 02:50:45
small form factor tool. So it was essentially 02:50:47
printing, as I recall, our translation stages were 02:50:51
roughly letter paper size. 02:50:55

So, you know, 30 centimeters by 20 02:50:57
centimeters. Something like that. 02:51:02

Q. Are there multiple OLED devices on 02:51:05
there? 02:51:09

A. Well, in ours, yes, absolutely. 02:51:09

We were printing multiple circuits, 02:51:11
within our circuits included OLEDs and transistors, 02:51:16
but yes, we printed large numbers of them in our 02:51:19
work. 02:51:22

Q. You mean multiple OLED display panels? 02:51:22

A. Yes. Correct. Well, we were doing -- 02:51:25
just to be clear, we were not doing highly 02:51:28
integrated panels. When we were doing printing, we 02:51:30
were printing multiple instances of small circuits. 02:51:34
The circuits in some cases had OLEDs. In other 02:51:38
cases they had thin film transistors. I think we 02:51:41
even did some where the transistors were driving the 02:51:44

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

OLEDs, but they were separate instances. 02:51:48

To be clear, it was not individual 02:51:50

pixels, it was multicomponent sub-circuits that we 02:51:52

would then split up. 02:51:56

Q. When you say you "then split up," you 02:51:57

mean dice them into individual devices? 02:52:01

A. For the purposes of testing, yes. 02:52:03

Q. You were not using them for 02:52:05

encapsulation. It's more for printing the circuitry 02:52:18

and the active regions; correct? 02:52:21

A. Correct. 02:52:25

Q. So according to Yamazaki, the inkjet 02:52:26

printing and the electric field application method 02:53:15

are new; correct? 02:53:17

A. Are new? I'm not sure what you are 02:53:18

talking about. Could you point me to what you're 02:53:22

referring to? 02:53:25

Q. What's the novelty? What's the novel 02:53:26

point for Yamazaki? 02:53:29

A. I mean, there's multiple novel points, 02:53:30

but in general, the inventive steps that are claimed 02:53:35

by Yamazaki, at least as called out in Yamazaki 02:53:39

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

itself, are specified by its claims. 02:53:41

But that doesn't mean that there 02:53:43

aren't other novel points that haven't specifically 02:53:46

been claimed by Yamazaki. 02:53:49

Q. What is the novel point that Yamazaki 02:53:51

claims? 02:54:00

A. I mean, the claims are what they are, 02:54:00

right. There's 22 claims at the back of Yamazaki. 02:54:02

That's what Yamazaki, in this application, claimed 02:54:04

as inventive points. 02:54:08

Q. Can you take a look at Claim 3 of 02:54:15

Yamazaki. 02:54:48

Do you agree that it is novel to 02:54:52

have a self light-emitting device having an EL 02:54:54

element that additionally has a film that is made of 02:55:02

an organic material covering the EL element, and 02:55:07

then a film that is made of inorganic material 02:55:10

covering that -- the film made of the organic 02:55:14

material? 02:55:17

MR. GARR: Objection. 02:55:20

A. So I haven't performed an analysis as to 02:55:20

the novelty of Yamazaki. 02:55:24

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

I use Yamazaki on the basis that it was prior art. Whether it's novel or not is irrelevant for my analysis. It's just known. 02:55:27 02:55:31 02:55:33

Q. So do you consider that to be a novel structure? 02:55:36 02:55:41

MR. GARR: Same objection. 02:55:42

A. I have the same point. 02:55:43

In other words, I haven't had to do -- I don't need to do that analysis, nor have I done that analysis. 02:55:44 02:55:46 02:55:50

It doesn't matter to me whether Yamazaki is novel or not. What matters to me is Yamazaki, in the disclosure of Yamazaki, represents something that would have been known to one of skill in the art at the time of Yamazaki. 02:55:51 02:55:53 02:55:56 02:55:59 02:56:01

Q. Okay. 02:56:03

Is the use of the electric field application method to apply the EL layer and the encapsulation layer a novel aspect of Yamazaki, in your opinion? 02:56:21 02:56:23 02:56:28 02:56:31

A. My answer is the same. I haven't performed that analysis. It doesn't -- for my 02:56:32 02:56:35

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

analysis, I don't need to know whether any aspect of Yamazaki, including the use of the electric field approach is novel or not. 02:56:38 02:56:43 02:56:48

Quite simply, it is sufficient for my analysis to know what is disclosed by Yamazaki, and what therefore would be known to one of skill in the art reading Yamazaki. 02:56:50 02:56:53 02:56:56 02:56:59

Q. Well, if it is relatively new at the time of Yamazaki, then less would have been known about it by a person of ordinary skill in the art about that specific method or application; correct? 02:57:00 02:57:10 02:57:13 02:57:16

MR. GARR: Objection. 02:57:22

A. I don't think that necessarily follows, and I don't think I could say that. No, I don't -- I don't have a way to evaluate that. 02:57:23 02:57:25 02:57:27

But one of skill in the art assumes to have -- assumes to have access to Yamazaki at the appropriate time frame of Yamazaki. 02:57:30 02:57:32 02:57:36

Q. Yamazaki does not teach how to apply the electrical field application method or the inkjet printing method to multi-device substrates; correct? 02:57:39 02:58:06 02:58:09

A. Just to understand your question. Your 02:58:14

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

question is with regard to the explicit disclosure of Yamazaki, not what one of skill in the art would know reading Yamazaki. 02:58:26 02:58:31 02:58:33

Q. Whatever Yamazaki is teaching. 02:58:34

A. I understand. 02:58:41

So if your question is is there explicit disclosure of multi-device substrates formed using the techniques that we've been discussing explicitly within the disclosure of Yamazaki where the multi-device substrates are formed on a mother glass, and each mother glass contains multiple displays, I have not offered the opinion that there is explicit disclosure of that in Yamazaki. 02:58:42 02:58:43 02:58:48 02:58:50 02:58:55 02:58:58 02:59:01 02:59:03 02:59:08

However, in the context of apparently one of skill in the art, because one of skill in the art has the knowledge of, for example, the admitted prior art to the patent at issue, and to other art such as Ghosh, those teachings would certainly be apparent to said person of skill in the art. 02:59:09 02:59:13 02:59:15 02:59:17 02:59:19 02:59:23 02:59:27

Q. We have established in the case of 02:59:27

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Ghosh, Ghosh intentionally actually deposits the second encapsulation layers between the active arias, including across the scribe lines; correct? 02:59:30 02:59:35 02:59:42

A. If you're referring to the disclosures associated with Figures 3 and 5 of Ghosh, I agree that the second encapsulation layer of Ghosh does exist in Figure 3 over where the scribe lines would exist, and therefore between the individual display devices. 02:59:50 02:59:53 02:59:58 03:00:02 03:00:06 03:00:09

But again, that's -- that's not the teaching of Ghosh that I'm applying. 03:00:09 03:00:12

Q. I understand your position. 03:00:14

In the applicant's admitted prior art, again, in the structures of the applicant's admitted prior art, both the planarization layer and the barrier layer are deposited non-selectively; correct? 03:00:17 03:00:24 03:00:31 03:00:34 03:00:40

A. With respect to the discussion in the '389 patent on the prior art technique, which is, for example, discussed in the section on the so-called PML, or polymer multilayer technique, as it calls out that in its description of the prior 03:00:41 03:01:48 03:01:51 03:01:55 03:02:03

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

art, it says, "The current" -- this is column 2, roughly, line 25, "Another potential problem with the current PML technique is that by having the PML layers over the scribe and break lines and/or the glue lines the integrity of the sealed package may be deteriorated, for example, by delamination of the PML layer over these lines." (As read.) 03:02:05 03:02:08 03:02:13 03:02:18 03:02:21 03:02:24 03:02:31

So at least with respect to that description, it's true similar to Ghosh, the encapsulation is also in the region between the display devices, and the admitted prior art. 03:02:34 03:02:35 03:02:40 03:02:43

Q. In the '389 AAPA, the PML structure is also deposited over the electrical contact pads; correct? 03:02:48 03:03:50 03:03:54

A. Yes, I believe so. I believe that was the paragraph above the paragraph I read you. 03:03:56 03:03:57

So this is in column 2, starting at line, roughly, 18. Or line 20. 03:04:01 03:04:04

It says, "The problem with the PML technique is that only part of the device that requires encapsulation is the OLED structure itself, and not, for example, the electrical contact pads. 03:04:11 03:04:15 03:04:17 03:04:21

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

In fact, the contact pad must typically be exposed for electrical mating with external driver circuitry. So at a minimum, additional processing must be performed for the removal of the PML structure over these areas." (As read.) 03:04:25 03:04:28 03:04:31 03:04:34 03:04:38

So it's true that in the AAPA, it covers the contact pads. But again, in Yamazaki itself, it teaches us the selective deposition. So when you array multiple rows and columns of elements of glass in the form of Yamazaki, based on the teachings of AAPA and/or Ghosh, you don't -- Yamazaki tells you not to cover the scribe lines and the pads. 03:04:40 03:04:43 03:04:46 03:04:51 03:04:57 03:05:03 03:05:06 03:05:10

Q. Yamazaki says nothing about how the -- Yamazaki does not expressly state anything about how the cover layer or the barrier layer should be applied when there are multiple devices on a substrate; correct? 03:05:11 03:05:37 03:05:40 03:05:46 03:05:50

MR. GARR: Objection. 03:05:52

A. In Yamazaki, there is no express disclosure of putting multiple devices, each of them being an individual display, to form rows and 03:05:52 03:05:57 03:06:01

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

columns over a larger piece of glass; therefore, to that extent, it doesn't provide disclosure of that. 03:06:04 03:06:07

However, one of skill based on their knowledge, for example, through the AAPA, or through our other references such as Ghosh, would understand that it's simply a matter of duplicating in an array form, the row -- the individual display structures of Yamazaki, and that duplication would then result in a structure similar to what I show, for example, in my declaration as an example on the bottom of page 51, or the top of page 52. 03:06:10 03:06:12 03:06:16 03:06:18 03:06:23 03:06:25 03:06:30 03:06:37 03:06:43

Q. Now, Ghosh actually teaches that patenting can be achieved through add shadow masking the four-layer formation. 03:07:29 03:07:32 03:07:37

Sorry. Strike that. 03:07:40

If you look at Ghosh, Ghosh Paragraph 32 actually teaches that patterning can be achieved with shadow masking the four-layer formulation and ablation following layer formation; correct? 03:07:43 03:07:47 03:07:50 03:07:57 03:08:02

A. It says, yes. Those are -- it lists -- it says, "Any well-known conventional means," and 03:08:02 03:08:05

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

then it calls out two of them. The first being shadow masking before layer ablation, and the next being -- sorry. 03:08:07 03:08:11 03:08:15

The first one being shadow masking before layer formation, and the second one being laser ablation following layer formation. So it calls out two possibilities, but says there are more. 03:08:16 03:08:19 03:08:22 03:08:26 03:08:29

Q. So conceivably, a structure shown in Figure 11 of Figure 14 can be done through -- post the deposition laser ablation; correct? 03:08:34 03:08:38 03:08:44

MR. GARR: Objection. 03:08:48

A. Not based on the teachings of Yamazaki. That's actually changing the -- or ignoring the teachings of Yamazaki. 03:08:49 03:08:57 03:09:00

Each of the individual laterally arranged display devices of Yamazaki, which are the Figure 11s or the Figure 14s, are essentially following exactly the teachings of Yamazaki, and then what we are doing in the combination is we are taking the teachings off, for example, Ghosh about using mother glasses with multiple displays to 03:09:01 03:09:05 03:09:09 03:09:13 03:09:16 03:09:21 03:09:24

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

essentially just replicate them over. 03:09:28

Yamazaki, in the disclosure on 03:09:30

Yamazaki, is doing the individual planarization and 03:09:32

barrier layers in selected deposition schemes. 03:09:41

Q. Okay. 03:09:44

For example, in Figure 1C of 03:09:45

Yamazaki, whether the material is -- how do you call 03:09:48

it -- spread out on a substrate, right, there's 03:10:01

nothing to preclude Yamazaki from including a 03:10:13

further step to remove those materials that's 03:10:18

deposited slightly over the desired area; correct? 03:10:24

A. That's not the teaching of Yamazaki. 03:10:32

Yamazaki never says that. 03:10:35

So the most straightforward reading, 03:10:36

I mean, the reading to one of skill in the art in an 03:10:39

obvious analysis is that you do exactly what 03:10:41

Yamazaki says, which is you use the technique of 03:10:45

Figure 1C to create the structure, for example, of 03:10:48

Figure 11 or Figure 14, and in that disclosure, 03:10:50

Yamazaki says nothing about removing material that 03:10:53

you have deposited using the electric field scheme. 03:10:58

Q. Just because Yamazaki many doesn't say 03:11:03

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

it doesn't mean that the material is deposited only where it's desired; correct? 03:11:05 03:11:15

A. I don't know how to answer that. 03:11:22

One of skill in the art. This is an obviousness analysis, so it's done through the eyes of one of skill in the art reading these teachings. 03:11:23 03:11:26 03:11:28

One of skill in the art would say it is certainly taught to do it without removal. 03:11:32 03:11:34

Is there express disclosure disavowing removal. It doesn't say that, but that's not the teaching. 03:11:37 03:11:40 03:11:42

Q. Okay. 03:11:43

So there is no express statement to say that there is no subsequent non-removal process? 03:11:45 03:11:48

A. I'm sorry. That was a double negative in that question, so I don't think I understood it. Could you repeat the question, please. 03:11:55 03:11:57 03:12:01

Q. Okay. 03:12:03

So nothing in Yamazaki says that its method eliminates any subsequent removal of the materials that are undesired positions; correct? 03:12:04 03:12:09 03:12:18

MR. GARR: Objection. 03:12:23

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Mischaracterizes. 03:12:24

A. I'm not sure -- again, I still -- yeah, 03:12:25
I don't understand the question. Could you ask it 03:12:30
again, please. 03:12:32

Q. Is there anything in Yamazaki that says 03:12:32
Yamazaki's method does eliminate any additional 03:12:38
steps to remove materials deposited in the unwanted 03:12:45
area? 03:12:51

A. I think I understand. 03:12:54

So you're asking me if there's some 03:12:55
express statement that says, because we use the -- 03:12:57
for example, the electric field method, we do not 03:13:02
perform a subsequent removal step to remove material 03:13:04
from somewhere else. 03:13:07

Those words do not appear, but 03:13:08
again, one of skill in the art reading Yamazaki, and 03:13:12
this is an obvious analysis, will use the teachings 03:13:15
of Yamazaki based on how one of skill in the art 03:13:18
would view it. 03:13:20

The most straightforward and obvious 03:13:21
way to read this is to read it exactly as shown 03:13:24
where it shows you use a directed deposition scheme, 03:13:28

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

and the result of that scheme is the production, depending on the embodiment, of something along the lines of Figure 11 or Figure 14. 03:13:31 03:13:34 03:13:37

Q. Is there an advantage of using the electrical field application method over the inkjet method or vice versa? 03:14:31 03:14:33 03:14:36

A. I don't think Yamazaki does a specific comparison to talk about the relative advantages or disadvantages of those two methods. It just calls out different embodiments. 03:16:08 03:16:13 03:16:15 03:16:18

I would note, by the way, that this is further in relation to your previous question or line of questions related to explicit disclosure -- or explicit disavowal of use of subtractive step. 03:16:19 03:16:21 03:16:25 03:16:30

If we look at Paragraph 40 of Yamazaki, that's where it's really describing how the electric field method is used and at Paragraph 40 and 41, and nowhere in there does it say anything about applying a subsequent subtractive step. 03:16:36 03:16:41 03:16:43 03:16:47 03:16:49 03:16:54

Q. What about for the barrier layer deposition step? 03:16:57 03:16:59

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. So with respect to the embodiment of Figure 11, it says that the barrier layer 1106 is formed by sputtering to cover the cover layer 1105. 03:18:55 03:18:56 03:19:00

It calls -- it then goes on to call out a few different choices for materials, and it says specifically at the bottom of Paragraph 183, "It is note that the barrier region 1106 is formed selectively using a shadow mask." 03:19:06 03:19:09 03:19:12 03:19:15 03:19:19

With respect to the disclosure associated with the embodiment of Figure 14, it uses similar language in Paragraph 201, where it says, "After the formation of the protective electrode 1306, a barrier region 1307 made of an inorganic material is formed." 03:19:20 03:19:23 03:19:35 03:19:40 03:19:45 03:19:51

It goes on to call out a few different materials, and then says, "The barrier layer can be formed by plasma CVD, sputtering, or evaporation." 03:19:54 03:19:56 03:19:58 03:20:03

It then -- that's in relation to Figure 13. Of course as we saw in Paragraph 203, it reverses the order, so that the barrier layer 1408 is formed over -- is formed after forming a cover 03:20:06 03:20:13 03:20:16 03:20:20

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

layer 1407. 03:20:26

Q. Nothing in 201, 202 or 203 mentions 03:20:28

using a mask to deposit the barrier layer; correct? 03:20:33

A. I agree. With respect to those it 03:20:37

doesn't say that, but when it talked about the 03:20:39

barrier layer in the embodiment of Figure 11, it 03:20:41

explicitly did call out using a shadow mask, and it 03:20:44

goes on to say that it is noted in Paragraph 204 03:20:47

that "the constitution of Embodiment 4 may be 03:20:52

implemented freely combining with any of the 03:20:57

constituent -- constitutions of Embodiments 1 to 3." 03:21:00

And I would point out that specifically the use of 03:21:03

the shadow mask is in Embodiment 3, for example. 03:21:07

Q. Bleeding under a shadow mask is 03:21:10

possible; correct? 03:21:35

A. Sorry. Could I have that again, please. 03:21:35

Q. Bleeding of the deposited material under 03:21:37

the shadow mask is possible; correct? 03:21:41

A. Yes. Absolutely. That's why to account 03:21:44

for that, we often had a bias into the sizing of our 03:21:46

shadow masks so that we still get material only in 03:21:50

the desired locations. 03:21:52

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Paragraph 183 doesn't say anything about using a bias; correct? 03:21:54 03:22:10

A. I agree. It also doesn't say anything about bleeding. 03:22:12 03:22:15

You don't have to get bleeding under a shadow mask. It is possible to design a shadow mask so there is no bleeding. 03:22:20 03:22:21 03:22:24

Q. Fujimori mentions that the adhesion between the substrate and the mask deteriorates due to warping and other factors; correct? 03:22:25 03:23:01 03:23:05

MR. GARR: I'm sorry. 03:23:09

(Exhibit 1014, Certified Translation of Japan Patent Application, JP H10-41069, was marked for identification.) 11:16:04 11:16:04 11:16:04

Q. Fujimori, Exhibit 1014, discusses that adhesion between the substrate and the mask deteriorates due to warping and other factors; correct? 03:23:11 03:23:14 03:23:18 03:23:20

A. Could you point me to what you are referring to, please. 03:23:20 03:23:22

Q. Paragraph 8 of Fujimori. 03:23:23

A. Yes. I agree. The second sentence of 03:23:37

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Paragraph 8 of Fujimori says what you just read. 03:23:40

Q. That's known to a person of ordinary 03:23:43

skill in the art; right? 03:23:45

A. Yes. I agree. That's certainly a 03:23:47

possibility one of skill in the art would be 03:23:50

aware of. 03:23:52

Q. A shadow mask is a type of mask; 03:23:53

correct? 03:23:56

A. Yes. 03:23:56

Q. The adhesion issue noticed by Fujimori 03:23:58

also applies to the shadow mask; correct? 03:24:07

A. If the shadow mask is in contact with 03:24:14

the structure on which you are depositing a layer, I 03:24:16

agree. Yes. That's certainly something that's 03:24:23

known. 03:24:27

Q. Is shadow mask usually applied to the 03:24:27

substrate? 03:24:31

A. That's certainly quite common. To get 03:24:32

the most accurate masking effect, generally, it's 03:24:36

desirable to get the mask as close as possible to 03:24:44

the target deposition zone, which is if you're 03:24:47

depositing on the substrate, as close as possible to 03:24:51

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

the substrate. 03:24:54

Q. Have you observed bleeding of deposited material under the shadow masking in your own work? 03:24:55 03:25:06

A. Yes, but I've also done plenty of work where we didn't have bleeding. It's a known issue, and it's relatively straightforward to deal with. 03:25:08 03:25:11 03:25:14

Q. How frequently does it happen? 03:25:16

A. It depends on your process. 03:25:22

I have made structures that are sub-10 nanometers in dimension with no bleeding, but I've also made structures that are much bigger and have bleeding. It's by optimizing the process. In known ways, it is possible to avoid it. 03:25:24 03:25:29 03:25:33 03:25:37 03:25:41

Q. Have you always managed to avoid it eventually? 03:25:44 03:25:48

A. In my work, yes. 03:25:50

Q. Those include OLEDs? 03:25:51

A. Yes. Certainly. 03:25:58

But our OLEDs are much bigger, so it's much less of an issue. 03:25:59 03:26:02

Q. So if Yamazaki does a deposition of the cover layer and barrier layer avoid the -- in 03:26:03 03:26:41

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Figure 11, does the deposition of the cover layer and the barrier layer avoid the compact pad area? 03:26:50 03:26:55

A. So the disclosure of Figure 11 doesn't actually show the contact pads and the contact pad area. So Figure 11 on its own doesn't show it. 03:28:13 03:28:16 03:28:25

However, if we look at Figure 13 and 14, it shows that the contact pads are not covered by the planarization layer/barrier layer combination. 03:28:29 03:28:31 03:28:33 03:28:41

Also, I would note that that's also true in Figure 9B, which is a different embodiment, but it shows it that way. 03:28:41 03:28:43 03:28:47

So one of skill looking at this, even though there's no cross-section shown of Figure 11 that shows the contact pads, doesn't show the contact pad area, would say that that would be certainly obvious to do. 03:28:48 03:28:51 03:28:54 03:29:03 03:29:08

I will note in Figure 12, it appears that the encapsulation is not over the contact pad area because the position of the attachment of the row and column drivers is over the contact pads. That's where the row and column drivers are 03:29:10 03:29:14 03:29:19 03:29:25 03:29:28

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

attached. 03:29:30

Q. Figure 12 goes with Figure 11 of 13 and 14. 03:29:30 03:29:35

A. So Figure 12 is in the discussion of Embodiment 3 as is Figure 11, so to that extent it's certainly applicable to Figure 11. 03:29:58 03:30:01 03:30:06

Specifically, to be clear, in Paragraph 179 it says, "Shown in Figure 12 is the method of forming a cover layer on a pixel portion on an active matrix substrate." 03:30:19 03:30:21 03:30:25 03:30:29

Of course, the active matrix embodiment that we have been discussing is that of Figure 11. 03:30:32 03:30:35 03:30:37

Q. Are the contact pads located in similar areas for the passive matrix OLEDs and active matrix OLEDs? 03:30:43 03:30:46 03:30:51

A. I don't understand what you mean by that. 03:30:53 03:30:54

Q. Are the contact pads in the passive matrix OLEDs also located where the column and the row drivers are? 03:30:54 03:31:02 03:31:05

A. Spatially, generally, yes. It turns out 03:31:06

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

the specific pads that you use might be a little different just based on resolution, et cetera. But spatially, the pads are put on the row and column edges of the display. 03:31:11 03:31:14 03:31:17 03:31:20

MS. ZHONG: Let's take a five-minute break. 03:31:42 03:31:44

(RECESS, 3:31 p.m. - 3:45 p.m.) 03:31:44

BY MS. ZHONG: 03:46:03

Q. In Yamazaki's electric field application method, do you have any idea what is the voltage at the electrodes in the electric field application method? 03:46:04 03:46:24 03:46:30 03:46:37

A. Do you mean a specific number? 03:46:40

Q. Yeah. Or a range of voltages that's used. 03:46:42 03:46:45

A. So I don't think within the disclosure of Yamazaki it calls out a specific voltage value or even, for that matter, any numerical range of values that I can recall. 03:49:05 03:49:07 03:49:09 03:49:13

Q. Based on your experience and expertise, what's the range of voltages do you think would be for the OLED application? 03:49:14 03:49:16 03:49:23

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. They're not coupled to each other. 03:49:24

In other words, the voltage that 03:49:26

they're using in the electrical field approach is 03:49:27

used to ionize and accelerate the charged particles. 03:49:29

That voltage is not seen by the OLED structures 03:49:35

themselves. 03:49:41

So you can use large voltages or 03:49:41

small voltages based on the geometry of the electric 03:49:44

field head. Those voltages do not affect the OLED. 03:49:50

What happened in the OLED is the charged particles 03:49:52

that are reaching it after having accelerated 03:49:54

upstream. 03:49:57

Q. So for the electric field application 03:49:58

method for depositing the encapsulation layer, what 03:50:06

do you believe would be the suitable voltage ranges? 03:50:10

A. My answer is the same as the answer that 03:50:15

I just gave you. There's no relationship between 03:50:17

the two. 03:50:19

You can use a high voltage if you 03:50:20

want, you can use a lower voltage if you want. It's 03:50:22

dependent on the specific geometry of the electric 03:50:27

field acceleration head. That voltage is not seen 03:50:32

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

by the structure that is being deposited. So it doesn't matter. 03:50:35 03:50:40

Q. So it can be any range of voltages? 03:50:40

A. It's the range of voltages to give the acceleration that is required, and that is upstream of the substrate on which you are doing the deposition. 03:50:48 03:50:52 03:50:57 03:51:01

So it's not any range of voltages. It's the field you need to get the amount of acceleration and focusing that you want, which you can calculate from the geometry, but that field is not seen by the OLED substrate. 03:51:02 03:51:04 03:51:07 03:51:09 03:51:12

Q. I understand that. 03:51:15

But if you were to design the Yamazaki system, what would be the voltage that you use for the specific materials it's using. 03:51:17 03:51:23 03:51:26

A. Again, my answer is the same. 03:51:32

It's entirely up to the design parameters that you target. 03:51:34 03:51:36

I could do a design where I was doing it at tens of volts. I could do a design where I was doing it at hundreds of volts. It 03:51:38 03:51:40 03:51:44

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

doesn't matter because those voltages are not seen by the OLED substrate. 03:51:47 03:51:49

Q. Okay. 03:51:51

What about the master charge ratio for the particles that's to be deposited? 03:51:52 03:51:54

A. So the -- actually, so again that's a design parameter. 03:51:57 03:52:04

In other words, if you are using heavy particles. So these are sort of atomized particles. If you are using heavy particles, their acceleration is slower but their momentum for the same velocity will be higher. 03:52:04 03:52:07 03:52:11 03:52:16 03:52:20

So essentially what you do is you can increase the spacing upstream of the final acceleration electrode pair, but then the advantage of that is their deviation when they're downstream of the electrode pair is very small because their momentum is so high. 03:52:22 03:52:24 03:52:32 03:52:35 03:52:39 03:52:42

On the other hand, if you are using a smaller particle with a lighter mass, then they will accelerate faster, so you can have the electrode pair closer to the atomizer, but you will 03:52:44 03:52:45 03:52:48 03:52:50

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

typically try to get them to a higher velocity to maintain the same momentum. 03:52:55 03:52:58

So it's entirely a design parameter that's tuneable through pretty basic calculations. 03:53:00 03:53:03

Q. What about for acrylates that's used as -- for the planarization? 03:53:06 03:53:15

(Clarification requested by the Realtime Stenographer.) 10:11:11 03:53:16

A. So acrylates are relatively -- they're sort of moderate weight. They're hydrocarbons. 03:53:16 03:53:19

So hydrocarbons are sort of the -- the mass of the hydrocarbon isn't what sets the mass of the particle. What sets the mass of the particle is the atomizer, which sets essentially the volume of the droplet. So really what determines the mass is the choice of the solvent, to a large degree. 03:53:26 03:53:27 03:53:31 03:53:33 03:53:36 03:53:39

Q. So is electric field application method a solvent-based method? 03:53:42 03:53:49

A. It's a solvent in that the aerosol, the atomizer is generated from a liquid, but once it's traveling, it's essentially a spray-based method. 03:53:52 03:53:55 03:53:59

So the solvent, actually -- one of 03:54:04

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

the points of these spray-based techniques is there's almost no solvent by the time the material reaches the substrate because the droplets are so small that they actually start drying in flight. This is actually a well-known characteristic of these techniques. 03:54:06 03:54:09 03:54:12 03:54:16 03:54:20 03:54:23

Q. Where do all of those solvents go? 03:54:24

A. They actually -- well, there's two things. One is the droplets themselves are extremely small. 03:54:29 03:54:30 03:54:32

Because if you look at the description of the technique, and this is in Paragraph 40. It says, "The organic resin liquid," which is where there would be solvent, "is atomized in the material chamber." 03:54:34 03:54:35 03:54:58 03:55:04 03:55:07

So what that does is that produces small droplets. Atomization is essentially formation of these really small drops, and that's done ultrasonically. 03:55:08 03:55:10 03:55:14 03:55:16

Then what happens is it's charged and accelerated towards its target. While it is moving, residual solvent actually evaporates because 03:55:18 03:55:20 03:55:24

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

the surface area to the volume ratio of the drops is so large that it actually evaporates in flight. 03:55:28 03:55:31

This is a known behavior of these systems. This is one of the reasons that the spray-based techniques are actually studied. Because it's an advantage, and this is why they're used. 03:55:35 03:55:37 03:55:39 03:55:41 03:55:44

Q. Is it the same behavior for inkjet printing? 03:55:44 03:55:50

A. No, inkjet drops tend to be much larger. 03:55:50

So generally there's minimal amounts of solvent evaporation during the flight of inkjet drops. 03:55:54 03:55:56 03:55:59

Q. Do the inks in the inkjet actually contain solvents? 03:56:00 03:56:06

A. Yes. 03:56:08

Q. If you -- 03:56:08

A. Yes. Inks in inkjet drops almost always contain solvents because the viscosity of requirements of inkjet, as I said, are in the range of 1 to 10 millipascal seconds, which then necessitates the use of solvents to tune the 03:56:09 03:56:12 03:56:16 03:56:17 03:56:21

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

viscosity. 03:56:25

But that's not a problem because the 03:56:26
volume of solvent is so small that when the drop 03:56:27
hits the surface, it evaporates very, very quickly. 03:56:31

Q. Can you please take a look at 03:56:42
Paragraphs 46 and 47 of Yamazaki. 03:58:37

MR. GARR: 36 and 37. 03:58:42

MS. ZHONG: 46 and 47. 03:58:44

MR. GARR: 46. Thank you. 03:58:46

A. Okay. 03:58:49

Q. Do you see that Yamazaki describes the 03:58:50
use of an insulating under film in the substrate, 03:58:56
especially when the substrate includes a moveable 03:59:03
ion or a conductive substrate? 03:59:11

A. Yes. 03:59:16

Q. Why is it necessary to use an insulating 03:59:17
under film 12 when there is a moveable ion or a 03:59:28
conductive substrate? 03:59:36

A. Sure. 03:59:37

So this is actually standard 03:59:38
practice in displays. So I'll address each of them 03:59:39
in turn. I will address the moveable ion, and then 03:59:44

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

I will address the conductive substrate. I will start with the conductive substrate because that's more straightforward. 03:59:48 03:59:51 03:59:54

In the case of using a conductive substrate, for example if you use steel foil. I have personally worked on displays with steel foil. So if you use steel foil as a substrate, if you were to put transistors and/or OLEDs directly on the steel foil, all your transistors would be shorted together. All of your OLEDs would be shorted together because the substrate is conductive. So therefore you are not able to individually address each OLED and/or transistor, so that's not useful for making a functional display. 03:59:55 03:59:57 03:59:59 04:00:02 04:00:04 04:00:10 04:00:14 04:00:17 04:00:20 04:00:23 04:00:26

Therefore, what you do is over the steel foil, which is a conductive substrate, you put down a thin layer of an insulating material to form this sort of bilayer substrate system that has the conductive substrate and an insulating film on top of it. In the work that I have done, we put silicon dioxide. 04:00:28 04:00:30 04:00:34 04:00:38 04:00:43 04:00:45 04:00:49

Now, that covers the first case. 04:00:50

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

The second case is in the case where we have a moveable ion, which also I have worked on. So if you use -- as an example, if you use a glass that has a high sodium concentration, which a lot of glasses do. For example, borosilicate glass often contain a lot of sodium. 04:00:52 04:00:57 04:01:01 04:01:06 04:01:10 04:01:14

The sodium is able to move around, and can -- if it gets into TFTs in particular, into transistors in particular, can degrade the transistor performance. 04:01:15 04:01:20 04:01:24 04:01:28

So to prevent the sodium ion from migrating into the transistors, as an example, you do the same thing. 04:01:29 04:01:34 04:01:39

You put an interlayer between where your transistors or your display elements are, and the borosilicate glass. Again, a common material to use is silicon dioxide. 04:01:40 04:01:43 04:01:47 04:01:50

Q. Okay. 04:01:53

A. I have done that as well. 04:01:54

Q. So it has nothing to do with the specific manners of applying the encapsulation layer or the EL layer? 04:01:55 04:01:57 04:02:02

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. No. Not with respect to the issues identified in relation to the moveable ion or conductive substrate. That's just related to dealing with the substrate properties itself. 04:02:05 04:02:09 04:02:13 04:02:15

Q. Okay. 04:02:17

Can you please take a look at Paragraph 202 of Yamazaki. 04:02:18 04:03:46

A. I have it. 04:03:54

Q. Okay. 04:03:56

So according to Paragraph 202, in the case of Embodiment 4, at least, the FPC 1310, which I believe are the contact pads, is formed after the encapsulation layer is created; is that correct? 04:03:57 04:04:00 04:04:06 04:04:09 04:04:15

A. No. That's not a correct description. 04:04:16

What this says is the FPC 1310 is attached. So the contact pads are there, and it's attached to the contact pads. 04:04:18 04:04:24 04:04:27

Q. What is FPC -- what does FPC stand for? 04:04:29

So if we look at Figure 13, is the FPC the wire that's sticking from the side? 04:05:18 04:05:23

A. Yes. So I'm trying to remember what FPC 04:05:28

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

stands for, but it's a connector. So it's basically a flexible connector. I recall the F and C stand for flexible and connector. 04:05:32 04:05:34 04:05:38

I just don't remember, and I don't remember it being described explicitly or expanded explicitly in Yamazaki. 04:05:39 04:05:41 04:05:46

Q. Okay. 04:05:49

Where is the contact? Is it below 1309? 04:05:49 04:05:53

A. Yes. So 1309 is the ACP, or the -- and I said -- well, the ACF, the anisotropic conductive foam, so the contact pad is physically below 1309 in Figure 13. 04:06:09 04:06:15 04:06:20 04:06:25

Q. Can you put up -- 04:07:20

A. Sorry. I found what FPC is. It's flexible printed circuit. It's referring to the ribbon cable that makes the attachment. 04:07:22 04:07:25 04:07:29

Q. Okay. Thanks. 04:07:31

(Exhibit 1021, Cok, Patent 6,770,502, was marked for identification.) 11:16:04 11:16:04

Q. Can you please take a look at Exhibit 1021, Cok. 04:07:32 04:07:36

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. 1021. 04:07:41

Q. Yes. C-O-K. 04:07:44

A. I don't have a physical copy of that, so I will have to open it up. Please bear with me. 04:07:46 04:07:48

It's not opening. It's just sort of sitting there and spinning. Let me try refreshing the Exhibit Share, and then I'll try it again. One second. 04:08:11 04:08:14 04:08:18 04:08:22

Okay. I got it this time. 04:08:25

Q. Okay. Can you please go to column 10, in particular the section starting with deposition of organic layers and the paragraph following it. 04:08:28 04:08:32 04:08:34

A. Sorry. Could you repeat that again, please. 04:08:38 04:08:41

Q. At column 10, do you see there is a section with the heading, deposition of organic layers? 04:08:41 04:08:46 04:08:50

A. Yes. 04:08:50

Q. And can you read the paragraph immediately following that heading? So column 10, lines 7 through 28. 04:08:50 04:08:55 04:09:00

A. Yes. I read it. 04:09:23

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Okay. 04:09:24

So the organic layers in this 04:09:25

paragraph refers to the organic layers in the OLED 04:09:26

stack; correct? 04:09:31

A. Yes. I agree. 04:09:44

Q. So it's not referring to the 04:09:45

encapsulation layer? 04:09:48

A. No. It does not appear to be. 04:09:50

Q. Okay. 04:09:52

So for Weaver, Figures 8 and 9, the 04:10:18

process described here, are you aware of any 04:10:21

commercial implementation of that process? 04:10:27

It doesn't have to be at the time of 04:10:34

the invention. It could be since the time of the 04:10:37

invention. 04:10:39

A. But your question is specifically for 04:10:41

OLEDs; correct? 04:10:43

Q. Yes. 04:10:45

A. No. I'm not aware specifically. 04:10:46

Q. And what about outside of the field of 04:10:48

OLEDs? 04:10:54

A. Yes. I am aware. 04:10:54

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

As I think I told you in response to a previous question, this approach of sort of sequential, multiple, spatially-specific deposition techniques is used to make multi-layer thin films for -- 04:10:56 04:11:00 04:11:03 04:11:09 04:11:14

Q. Capacitors? 04:11:15

A. -- for capacitors, and there's a few other applications like that, but it's unrelated to OLEDs. 04:11:16 04:11:17 04:11:20

Q. Okay. 04:11:20

Can you please take a look at the Exhibit Number -- Exhibit 1007, Palanisamy. 04:11:21 04:11:29

A. Okay. I have it. 04:11:57

(Exhibit 1007, Palanisamy, Patent Application, 2003/0011300, was marked for identification.) 11:16:04 11:16:04

Q. Can you take a look at the abstract. 04:11:58

A. Okay. 04:12:25

Q. Do you see the sentence, "By using organic passivity materials, incompatibilities between the organic light material and the passivation material may be reduced." 04:12:25 04:12:29 04:12:37 04:12:39

Do you see that sentence? 04:12:42

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Yes, I see that. 04:12:43

Q. Why the use of organic passivation 04:12:44

material would reduce the incompatibility between 04:12:50

the organic light material and the passivation 04:12:54

material? 04:12:57

A. So Palanisamy addresses this again in 04:12:58

Paragraph 5. 04:13:48

Q. Mm-hmm. 04:13:51

A. Where it says, "Another problem is that 04:13:52

the organic light emitting materials are not totally 04:13:54

compatible with conventional passivation materials. 04:13:59

Common passivation materials are inorganic materials 04:14:02

such as silicon nitride, phosphosilicate glass, and 04:14:05

silicon carbide." 04:14:11

So I guess Palanisamy is taking the 04:14:13

position that those materials, specifically 04:14:15

materials such as silicone nitride, phosphosilicate 04:14:18

glass, and silicon carbide could have 04:14:23

incompatibilities with the organic materials in the 04:14:27

OLED stack. 04:14:30

Q. But those materials never really 04:14:30

directly touch any of the organic layers; right? If 04:14:32

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

they interface, they would be interfacing with the electrode materials. 04:14:35 04:14:39

A. That's true on the top surface, but if they go on the sides of each OLED device, then they can make contact with the sides of the -- with the sides of the organic layers as well. 04:14:46 04:14:49 04:14:52 04:14:55

You can see that, for example -- just because this is a nice clean example, if you look at Figure 4 of Ghosh, and we'll just talk about what Ghosh refers to as the, I guess it's the first encapsulation layer. 04:14:59 04:15:02 04:15:09 04:15:17 04:15:20

You will see how it's true, it makes contact with the top of the device where you -- or the top of the OLED where you would have a contact, but it also makes contact with the sides of the OLED. 04:15:20 04:15:22 04:15:25 04:15:27 04:15:30

So that's kind of the problem that Palanisamy is pointing out. 04:15:30 04:15:33

Q. Okay. 04:15:39

In Palanisamy, it does not provide the final structure of the ink jetting and the spraying, correct, that the shape of the deposited 04:15:54 04:15:56 04:16:04

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

material? 04:16:06

A. So in answer to your question, with 04:16:17

respect to the disclosures of Palanisamy, I agree 04:18:18

that it doesn't show the final shape of the 04:18:26

structures deposited either by inkjet or by spray or 04:18:30

by screen printing. 04:18:39

But of course, I'm not using 04:18:41

Palanisamy for the shape of the structures. I'm 04:18:42

using it for its teachment [as spoken] of the 04:18:45

techniques, specifically inkjet and screen, with 04:18:47

respect to claim -- with respect to Claim 35, which 04:18:52

I address on Paragraph -- on page 109 of my 04:18:58

declaration, and with respect to Claim 36, which I 04:19:03

address starting on page 113 in my declaration. 04:19:09

Actually, I should correct my 04:21:02

previous answer. I should add something to my 04:21:04

previous answer. 04:21:07

Specifically with respect to the 04:21:07

screen printing example, Figure 6 of Palanisamy does 04:21:13

show what the final shape will be. You can see that 04:21:18

63 represents the blocking portion during the screen 04:21:29

printing process. And where the material ends up is 04:21:35

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

the material outside those regions. So it will be 04:21:40
the region 70, for example. So it's showing that 04:21:44
it's a planar, flat region. And it says that in 04:21:47
Paragraph 24 where it says, "the screen printed 04:21:54
passivization 70 ends up in region 62, and not in 04:21:58
the region 60." 04:22:02
Q. Understood. 04:22:03
Let me ask you a question: If you 04:22:03
already have a flat surface, and then you deposit 04:22:05
another layer with flat surface, is that layer a 04:22:11
planarization layer? 04:22:18
A. It may or may not be. 04:22:20
In other words, I don't think you 04:22:22
can say -- like, I'm not claiming from Figure 6 that 04:22:23
this is a planarization layer. Since the layer was 04:22:30
already planar, it's doing nothing to the planarity 04:22:35
of it, just to be clear. But that doesn't mean just 04:22:39
because it's on a flat surface that it's not a 04:22:41
planarization layer. 04:22:44
In other words if I use the same 04:22:45
material, and the same layer, and look somewhere 04:22:46
else on the substrate where a region where there's 04:22:48

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

non-planarity, if it does reduce that non-planarity, then you would say that it's still a planarization layer. 04:22:51 04:22:56 04:23:00

Q. If the same material is applied over a flat surface, then it would not be considered to be planarizing material or planarization layer; is that correct? 04:23:00 04:23:04 04:23:09 04:23:12

A. No. I didn't say that. 04:23:12

I said just looking at the flat region, I may not be able to determine if it's planarizing or not. If I had an independent basis to say it's a planarization layer, either because I can look at somewhere else where it's non-planar and find that it is planarizing or because there's some disclosure that tells me it's a planarizing layer then it could be a planarizing layer, and indeed it would be a planarizing layer. 04:23:14 04:23:20 04:23:23 04:23:25 04:23:28 04:23:31 04:23:35 04:23:38 04:23:43

Q. Can the materials be planarizing in some regions, but not in the other regions? 04:23:47 04:23:51

A. With respect to the layer, if there's some regions where, because of the topology, it helps with planarization, but the other regions are 04:24:02 04:24:05 04:24:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

completely flat, so it doesn't change anything, it's still a planarizing layer over the entirety of the layer, it's just that in some regions no further planarization was necessary. 04:24:14 04:24:17 04:24:22 04:24:26

Q. So your definition of planarization layer is, as long as it helps with flattening the surface in a portion of the region, then it's a planarization layer? 04:24:27 04:24:31 04:24:37 04:24:41

A. No. That's not what I said. You asked me this question right at start of the deposition, and I told you. Firstly, I don't have -- I didn't provide claim construction with respect to "planarizing layer." 04:24:41 04:24:45 04:24:47 04:24:49 04:24:51

I told you in general, one -- how I would understand a planarizing layer, and it was specifically related to the fact that it reduces or a characteristic of it would be that it reduces the non-planarity of a layer over which it is deposited. 04:24:52 04:24:55 04:24:58 04:25:01 04:25:05

But even in that specific context that I gave you, there would be regions of the underlying surface that are perfectly flat, and it may not alter the planarity there, but it's still a 04:25:10 04:25:13 04:25:15 04:25:18

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

planarizing layer. 04:25:24

Q. That's why I'm asking you. 04:25:25

If it only helps with reducing 04:25:28

the -- the non-planarity in some regions, you would 04:25:30

still consider that to be a planarization layer; 04:25:36

correct? 04:25:39

A. Again, I've answered that question, so 04:25:40

I'll say it again. 04:25:42

If I put a material down, and I'm 04:25:44

evaluating whether the material is a planarization 04:25:47

layer, if there's regions where it, for example, 04:25:50

reduces the non-planarity associated with underlying 04:25:53

topology, and in some areas there's underlying 04:25:57

topology resulting in non-planarity, and it reduces 04:26:01

that, and in other regions there's no underlying 04:26:05

non-planarity, so it makes no difference there, it's 04:26:08

still a planarizing layer. 04:26:11

Q. What if in some regions it actually 04:26:14

increases the non-planarity, but in some other 04:26:17

regions it either has no effect or reduces it? 04:26:20

MR. GARR: Objection. 04:26:24

A. I have no idea -- I don't even 04:26:25

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

understand that hypothetical, so I don't know how to answer that question. 04:26:27 04:26:29

Q. Which part of it don't you understand? 04:26:30

A. I don't understand your geometric construct. You're going to have to draw something for me or explain to me what you mean. 04:26:37 04:26:39 04:26:41

Physically, I don't know what you are talking about. 04:26:43 04:26:44

Q. So, for example, there is a particle on the underlying layer, and the deposited material doesn't really cover up the particle, but it covers up other -- other surface features. For example, surface roughness and make the flatter. 04:26:45 04:27:01 04:27:06 04:27:11 04:27:24

So is it still a planarization layer? 04:27:27 04:27:29

MR. GARR: Objection. 04:27:30

A. So to be clear, the hypothetical you've given me now is not the same. In fact, it's contradictory to the hypothetical you gave me earlier. 04:27:31 04:27:34 04:27:37 04:27:40

So I will answer your new hypothetical, so I will be clear, my answer, 04:27:40 04:27:42

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

therefore, does not relate to your previous hypothetical. 04:27:44 04:27:45

So in this situation, where I have an underlying structure that has surface roughness in some regions and a particle in another, and I deposit a layer over it, and I'm trying to evaluate whether that layer is a planarizing layer. You've told me in your hypothetical that it does reduce surface roughness, but it incidentally doesn't happen to cover up that particle. I'm going to assume -- your hypothetical is incomplete, but I will assume that it sort of abuts up to the particle, but doesn't go over it. 04:27:46 04:27:52 04:27:55 04:27:59 04:28:03 04:28:06 04:28:10 04:28:12 04:28:14 04:28:18 04:28:21

It would actually still reduce the topology around that particle, so that's why I said it's not inconsistent with your previous hypothetical. It certainly doesn't increase the topological variations. It would still be a planarizing layer in that situation. 04:28:23 04:28:27 04:28:30 04:28:31 04:28:33 04:28:36

MS. ZHONG: Can we take a five-minute break while I upload a document. 04:30:46 04:30:47

(RECESS, 4:30 p.m. - 4:35 p.m.) 04:30:50

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

BY MS. ZHONG: 04:36:06

Q. Can you please refresh Exhibit Share. 04:36:07

A. Okay. I see that there's a new exhibit. 04:36:09

Should I open it? 04:36:12

Q. Yeah. Exhibit 2103. 04:36:13

A. Yes. 04:36:15

Q. Okay. 04:36:16

(Exhibit 2103, Burrows, Patent 8,955,217, was marked 11:16:04

for identification.) 11:16:04

Q. For the record, Exhibit 2103 is Patent 04:36:18

Number 8,9555,217 to Burrows. 04:36:22

A. Yes. 04:36:28

Q. Can you please take a look at the cover 04:36:29

figures, in particular, 200. 04:36:35

A. Okay. 04:36:47

Q. Do you see there is a structure 210? 04:36:47

A. Yes. 04:36:49

Q. Where there's a slope? 04:36:51

A. Yes. 04:36:53

Q. An intentional slope. 04:36:53

So let's assume that the 205 is 04:36:56

substrate, and you create the structure 210 on top 04:37:06

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

of substrate 205. 04:37:16

So is structure 210 a planarization 04:37:18

layer? 04:37:24

A. Sorry. Say that again, please. 04:37:25

Q. Do you see the structure 210? 04:37:27

A. Yes. 04:37:31

Q. That's created on top of the 04:37:31

substrate 205? 04:37:39

A. I see it. 04:37:40

Q. So is 210 a planarization layer? 04:37:41

MR. GARR: Objection. Complete 04:37:47

hypothetical. 04:37:48

A. Sorry. I think I'm going to need more 04:39:34

information to answer that. 04:39:36

So in your hypothetical, 210 is 04:39:37

deposited in that shape over 205, and that's the 04:39:40

extent of the structure? 04:39:45

Q. Yes. 04:39:46

A. Okay. 04:39:48

So then I'm not -- I don't have -- I 04:39:48

will not in this instance have enough information to 04:39:51

answer. Simply because since 205 is completely 04:39:54

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

flat, I have -- and there's no textual description that you have given me in your hypothetical as to the properties of 210, just looking at 210 on top of 205, I cannot say it has planarization properties or not. 04:39:58 04:40:02 04:40:04 04:40:09 04:40:13

Q. Why not? 04:40:14

A. Because it's being put on top of a perfectly flat surface, and you haven't given me any description in your hypothetical to indicate that were it not perfectly flat would it cause planarization or not. 04:40:14 04:40:17 04:40:21 04:40:22 04:40:25

More importantly, there is no topography shown in 205 in your -- in the figure that we're discussing. 04:40:26 04:40:29 04:40:33

Q. But isn't it the case that you are actually creating a stepped structure on top of a flat surface? 04:40:35 04:40:38 04:40:47

A. I agree with that, and... 04:40:50

Q. Doesn't that mean that you actually decrease the planarity of the resulting -- the resulting structure actually has less -- has less planarity than the starting structure? 04:40:54 04:40:56 04:41:00 04:41:06

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. But again, you haven't told me if this is the extent of it, you haven't told me the properties of the layer. 04:41:09 04:41:11 04:41:15

If you told me explicitly, 205 is all we have, and I deposit the structure, for example, by putting down rigid material, and this is the shape of it, and the shape has explicitly introduced more non-planarity that I began with, and that's the extent of it, then I would agree, now you have given me the information to say that in this specific instance, it's not a planarization layer. 04:41:16 04:41:19 04:41:25 04:41:29 04:41:32 04:41:37 04:41:39 04:41:41

Q. What do you mean by it has "more non-planarity"? 04:41:44 04:41:48

A. Well, when I modified your hypothetical to take into account the further information, 205 was the extent of the structure. 04:41:48 04:41:50 04:41:54

Q. Correct. 04:41:56

A. So it was perfectly flat. 04:41:56

Q. Mm-hmm. 04:41:58

A. Then I put 210 down, and 210 is a rigid structure that I put down which introduced more non-planarity. 04:41:59 04:42:02 04:42:06

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

So therefore 205 was flat. After the imposition of 210, it's no longer flat. 04:42:07 04:42:09

Q. Okay. 04:42:13

Why does -- why is it important for you to say 210 is a rigid structure? 04:42:13 04:42:16

A. Because I'm imposing in this case, I'm saying in this application, the physical structure of 210 is not planarizing because you can see that in the form it has, it has this shape, and that's how I have imposed it. 04:42:20 04:42:23 04:42:29 04:42:34 04:42:37

Q. So it intentionally does have that sloped shape? 04:42:39 04:42:43

A. I understand, and that's why I said what I said. 04:42:44 04:42:46

Given all of the additional information and constraints that were provided through the course of our discussion of your initial hypothetical. 04:42:46 04:42:48 04:42:53 04:42:56

Q. So when you say it's a rigid structure, you are not talking about the hardness of the material. You are talking about the permanency of the shape; is that correct? 04:42:56 04:42:59 04:43:03 04:43:15

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

(Clarification requested by the Realtime Stenographer.) 04:43:15 04:43:17

A. Actually, in my initial answer, I was sort of talking about both, but it's true that the key point is I started with a flat structure, and I introduced additional non-planarity through the permanency of the shape of 210. 04:43:17 04:43:19 04:43:22 04:43:26 04:43:30

Q. Okay. 04:43:32

In this case, you believe that it is actually decreasing the planarity and increasing non-planarity, so it's not a planarization layer; is that correct? 04:43:34 04:43:36 04:43:40 04:43:44

MR. GARR: Objection. Mischaracterizes. 04:43:44 04:43:44

A. No, that's not what I said. 04:43:46

I mean, I gave the specific reasons. 04:43:47

It's not just because it coincidentally increases the non-planarity. It is -- this is the entirety of shape of the structure. The initial structure was entirely flat. That's 205. I introduced 210, and all it did was increase the non-planarity, and it did it through 04:43:49 04:43:52 04:43:56 04:43:59 04:44:02 04:44:07

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

the structure shown of 210, which looks sort of like a trapezium. 04:44:09 04:44:13

That structure would not be a planarizing shape in the absence of any other information related to something not shown here that would indicate it's planarizing, but here it's not planarizing as shown. 04:44:16 04:44:19 04:44:22 04:44:25 04:44:29

Q. Okay. 04:44:30

Now, if underneath the structure 210, you have something similar to -- let's say the shape in -- the shape of the OLED in Figure 14, would you then consider 210 to be a planarization layer? 04:44:31 04:44:57 04:45:05 04:45:12 04:45:19

A. I'm sorry. There's no Figure 14 in Burrows cite. I don't know what you are talking about. 04:45:19 04:45:22 04:45:25

Q. So Yamazaki Figure 14. And do you see the shape for the OLED pixel structures there? 04:45:25 04:45:29

A. Okay. 04:45:35

Q. And let's assume that the structure 210 in Burrows 217 is covering up that kind of the up-and-down structures of the OLED. 04:45:35 04:45:43 04:45:51

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Would it then become a planarization layer? 04:45:55 04:46:01

A. Okay. I'm not sure I understand. 04:46:02

So I will answer the question based on my understanding of what you said, and then perhaps if I'm not answering your question, you can ask it differently. 04:46:03 04:46:05 04:46:08 04:46:11

I'm understanding based on your hypothetical, that instead of having the perfectly flat structure of 205, what I have is a structure that effectively looks like the surface of what's shown in Figure 13 of Yamazaki where the surface is defined, for example, by the -- I call it the grid pattern. 04:46:13 04:46:16 04:46:19 04:46:24 04:46:35 04:46:43 04:46:48

Q. It's 206. Layer 1306. 04:46:49

A. Yes. Fair enough. I can use that. 04:46:53

Let's say it has the grid topology of 1306. 04:46:55 04:46:58

So now instead of having a flat 205, I have a grid structure analogous in shape to 1306 in Figure 13 of Yamazaki. 04:46:59 04:47:02 04:47:07

On top of that, I deposit 210. And 04:47:09

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

210 is perfectly flat over the grid regions, but it happens to have these tapers away from the grid regions. 04:47:13 04:47:18 04:47:21

Q. Yes. 04:47:21

A. That would be a planarizing layer, and the reason it is, is it is planarizing the topology of the grid structure, it's reducing the topology. In fact, what that look like is it -- I mean, without knowing the details of the deposition, it's either selectively deposited, or deposited and then subsequently etched, but it ends at the edges of the trapezium. But it's a planarizing layer. 04:47:22 04:47:25 04:47:30 04:47:35 04:47:36 04:47:38 04:47:43 04:47:45

But that's not different -- that's not conceptually different from Figure 13. If you look at Figure 13 of Yamazaki, the planarizing layer, which Yamazaki unequivocally says is a planarizing layer, it flattens the topology of 1306, but it does end next to, on the left edge of Figure 13, so there is that step at the edge of Figure 13, but that doesn't mean it's not a planarizing layer. 04:47:49 04:47:51 04:47:54 04:47:59 04:48:02 04:48:06 04:48:10 04:48:13 04:48:20

Q. Okay. 04:48:21

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

So whether it's planarization layer or not really depends on the underlying topology? 04:48:22 04:48:24

A. No. That's not what I said. In fact, you asked me this question before, and I already answered this question. 04:48:27 04:48:29 04:48:31

It is true that a test to determine if it's a planarizing layer is to see, does it reduce the underlying non-planarity. For example, reduce the topology. But it could be a planarizing layer if it does that in some regions, but in other regions where it happens to be over a completely flat underlying topology does nothing. It keeps it exactly the same. 04:48:32 04:48:34 04:48:39 04:48:45 04:48:49 04:48:51 04:48:55 04:48:58

Q. But it has to reduce the non-planarity at some point? 04:48:59 04:49:03

A. As a test to determine whether it's a planarizing layer, I've already said that I -- planarizing layer has to reduce -- or the purpose of a planarizing layer is to reduce non-planarity in some way of the underlying topology. So it's true that a test for that is does it do that. 04:49:06 04:49:10 04:49:15 04:49:20 04:49:26 04:49:29

But that doesn't mean it has to do 04:49:31

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

that everywhere. You could have regions where it's perfectly flat, in which case it won't alter the non-planarity in those regions. 04:49:34 04:49:37 04:49:40

Q. Okay. 04:49:43

You're not taking any position regarding Samsung's claim construction position -- (Clarification requested by the Realtime Stenographer.) 04:50:50 04:50:53 04:51:06 04:51:06

Q. You are not taking any position regarding the correctness of Samsung's claim construction proposals in the district court; is that correct? 04:51:06 04:51:07 04:51:11 04:51:17

A. In the district court, yes, that's true. I haven't offered an opinion related to that. 04:51:17 04:51:19

Q. Okay. 04:51:21

Do you have a -- do you have personal opinions that you have not offered? 04:51:24 04:51:27

A. Yeah. I mean, I think they're generally reasonable claim constructions. I think the analysis that I do would meet those claim constructions, but I haven't offered that opinion. 04:51:29 04:51:31 04:51:34 04:51:37

Q. You did not perform that analysis; 04:51:42

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

correct? 04:51:44

A. No. I agree. 04:51:44

Within my declaration, I did not 04:51:47

address those. I think, were I to have to address 04:51:50

them, I think they're reasonable, and I think the 04:51:57

structures that I have analyzed would meet those 04:51:59

claim constructions, or the analysis that I have 04:52:01

done would meet those claim constructions, but I 04:52:03

haven't addressed that within my declaration. 04:52:06

Q. Were you aware of those positions before 04:52:12

your declaration? 04:52:16

A. I don't think so. 04:52:17

At least not that I can recall. 04:52:22

Q. Did you ask Samsung what their 04:52:23

construction -- strike that. 04:52:32

Did you ask Samsung's counsel what 04:52:33

their claim construction positions are in the 04:52:35

district court? 04:52:39

MR. GARR: Object to form. 04:52:41

A. I don't recall doing that one way or 04:52:43

another, I mean, as I said, I was not aware of 04:52:51

Samsung's claim constructions in district court at 04:52:53

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

the time I submitted by declaration, as far as I know. 04:52:56 04:52:59

Q. You were just asked to apply the plain and ordinary meaning of the term? 04:52:59 04:53:04

A. Yes. I mean, I think -- I think that was appropriate when I applied it, so yes. 04:53:08 04:53:11

Other than the specific corrections that I made with respect to the typographical errors that I pointed out in the claims. 04:53:17 04:53:19 04:53:22

So that's the absence of the conjunction and the non-sucking versus non-sticking. 04:53:23 04:53:26

Q. Non-sticking. Okay. 04:53:31

For the skill level of a person of ordinary skill in the art, what knowledge do you assume they would have? 04:54:33 04:54:35 04:54:37

A. So I addressed this in Paragraph 44 of my declaration. 04:54:39 04:55:15

So a POSITA would have had a bachelor's degree in electrical engineering, materials science, or a related field and at least one year of experience in display technologies, additional education might compensate for a 04:55:15 04:55:17 04:55:20 04:55:22 04:55:25

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

deficiency in experience and vice versa. 04:55:27

Certainly, their knowledge from 04:55:30

would be from their educational perspective in 04:55:32

electrical engineering, materials science, or 04:55:35

related field, and specifically they would have one 04:55:38

year of experience in display technologies. 04:55:40

Q. So what would they know? 04:55:42

A. So they would know the technological 04:55:44

aspects related to displays. 04:55:47

So for example, they would know 04:55:49

things about the -- they would know display -- they 04:55:51

would have display-specific experience in the 04:55:55

fabrication technologies, the structural 04:55:58

technologies, the process technologies. Those sorts 04:56:00

of things. 04:56:06

Q. So they would have -- how deep of 04:56:07

knowledge would they have in those things? 04:56:11

A. I don't know how to answer that. I 04:56:15

don't know what you mean by that. 04:56:17

It's -- I mean, if you are asking 04:56:18

for something more specific than having a bachelor's 04:56:20

degree and one year of experience, I mean, that sort 04:56:23

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

of defines the depth. 04:56:26

Q. Would they know how to set up a 04:56:27

roll-to-roll deposition? 04:57:19

A. Not necessarily, but given information 04:57:21

about a roll-to-roll deposition process, they would 04:57:30

understand it based on their knowledge. 04:57:32

So remember, the one of skill in the 04:57:35

art sort of describes their background, and their 04:57:38

ability, and then they have access to the relevant 04:57:44

universe of prior art information. 04:57:46

So they'd be able to appreciate that 04:57:48

prior art. 04:57:51

That doesn't mean without reading 04:57:52

the prior art they already know these things, but 04:57:54

they have access to it, and they understand it. 04:57:56

Q. I think there is a difference between 04:57:58

you understand, you have the paper knowledge versus 04:58:03

you can actually implement it. 04:58:06

If you know what I mean. 04:58:09

A. No, I'm not sure I understand what you 04:58:11

mean. 04:58:14

Q. Okay. 04:58:14

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

So as a new graduate student, when you have a new project, right, usually there is a pretty steep learning curve. You kind of know, like, what are the general parameters you need to adjust in order to get certain things to work, but that you don't really know how to adjust them. 04:58:14 04:58:37 04:58:42 04:58:46 04:58:53 04:58:56

Fair characterization? 04:58:58

A. Depends. It varies from student to student, but I understand what you are saying. 04:59:03 04:59:05

Q. So is that the same? Like, what would be the level after one year of such -- 04:59:07 04:59:10

A. So one year -- 04:59:13

Q. -- experience? 04:59:14

A. I understand. 04:59:14

So remember, it's a very -- it's a very specific experience. It's one year of experience in display technologies. It's not general materials science. It's not something not related to displays. It's one year of experience in display technologies. 04:59:15 04:59:18 04:59:21 04:59:24 04:59:27 04:59:30

So at that level, that person -- so in answer to your question related to roll-to-roll, 04:59:31 04:59:34

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

they may never have done roll-to-roll before, but they have the skills that, given the teachings of something that talks about roll-to-roll, with a reasonably acceptable amount of experimentation and study, they would be able to do it. 04:59:38 04:59:40 04:59:48 04:59:51 04:59:54

That's not saying they have the information in their heads, but they have the skills to pick it up. 04:59:55 04:59:57 04:59:59

Q. So would they know what would be the right voltage to apply for electric field application method, and what would be the right mass-to-charge ratio in that application? 05:00:00 05:00:02 05:00:07 05:00:12

A. Not without -- not without either reading about it or doing a certain acceptable amount of experimentation, but they would have the skills to do that. 05:00:16 05:00:18 05:00:22 05:00:25

Q. How much experiments would they do and how long did they do them? 05:00:26 05:00:30

A. I don't know how to answer that question. If you are asking me to put a certain number of hours, I'm not able to do that. It's not an unreasonable amount. 05:00:31 05:00:33 05:00:35 05:00:38

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. When you say "not an unreasonable amount," what exactly do you have in mind? 05:00:39 05:00:41

A. It's not decades of work. It's not years of work. They could design an experiment and do the experiment. It might require some amount of time and expense, but it's not unreasonable. 05:00:44 05:00:45 05:00:48 05:00:51

Q. Would it be a year, a few days, or? 05:00:54

A. It depends on how much they're -- how much experimentation they're willing to put in parallel. 05:01:06 05:01:09 05:01:11

If they do it serially, it's not just a few days, but it's not unreasonable. 05:01:12 05:01:15

Q. How long would they -- how much experiments would they have to do in order to get to the right condition? 05:01:17 05:01:35 05:01:39

A. Again, you're asking a completely incomplete hypothetical, so I just don't know how to answer that. 05:01:40 05:01:44 05:01:47

Q. In the context of Yamazaki? 05:01:49

A. Still not enough information in your question for me to answer that. I need far more information to answer it. 05:01:53 05:01:54 05:01:57

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. As far as you know, I think you -- just to confirm, as far as you know, you are not aware of anyone combining the electric field application method with the use of a magnetic mask, at least in the field of OLEDs; correct? 05:01:58 05:02:09 05:02:14 05:02:17 05:02:25

A. That's fair. I'm not aware of anyone who has actually done that in practice in the area of OLEDs. 05:02:30 05:02:32 05:02:35

Q. What about inkjet together with a magnetic mask? 05:02:37 05:02:42

A. I don't know. I'm not -- off the top of my head, I cannot think of any real demonstration of that combination. 05:02:43 05:02:51 05:02:55

Q. Okay. 05:02:58

Just to be clear, I'm not limiting it to 2002 or the time of the invention, but since then. 05:03:00 05:03:02 05:03:06

A. I understand, and my answer would be the same. 05:03:06 05:03:08

Q. What's the difference between shadow mask and the open mask? 05:03:08 05:03:25

A. Sorry, between what and what. 05:03:27

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Shadow mask and open mask. 05:03:29

A. Could you point me to what you are referring to. 05:03:32 05:03:34

Q. I'm just asking you, have you heard of "open mask"? 05:03:35 05:03:38

A. I don't even understand what the word is that you're saying. I'm struggling to -- 05:03:38 05:03:40

Q. O-P-E-N, open mask. 05:03:42

A. I think I'm going to need more specificity on that. I'm not sure I understand the context of open mask. Shadow mask we have been talking about a lot, so I know exactly what you're talking about. I need some context for open mask. 05:03:45 05:03:52 05:03:54 05:03:56 05:04:00

Q. Have you heard of the term "open mask" before? 05:04:02 05:04:04

A. I think so, but I'm not sure of the context. This is why I need you to refresh me with the context that you are referring to. 05:04:05 05:04:07 05:04:09

Q. Okay. 05:04:10

In what context have you heard of the term "open mask"? 05:04:11 05:04:12

A. If I remembered the context, I would 05:04:14

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

tell you. I just told you I don't remember the context, so... 05:04:16 05:04:18

Q. Well, in the context of encapsulation deposition, have you heard of the term "open mask"? 05:04:19 05:04:25

A. Again, I am going to need you to be more specific. My answer doesn't change. 05:04:28 05:04:31

I don't remember the context, so I would need more specificity. If you have a document you want to put in front of me, so that I know exactly what you are talking about, I'm happy to answer that question. 05:04:33 05:04:37 05:04:39 05:04:42 05:04:43

Q. So "open mask" is not a term of art -- 05:04:44

MR. GARR: Objection. 05:04:56

Q. -- in encapsulation deposition technology? 05:04:57 05:04:59

A. Again, I would need to see the document to know exactly what you're talking about. Without -- I feel like I have heard the term, but I would need more specificity to answer. 05:05:01 05:05:04 05:05:06 05:05:08

Q. In the case of Yamazaki, what would be the shape of the opening for the shadow mask used for the barrier layer deposition? 05:05:11 05:05:46 05:05:54

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. So with respect to Yamazaki, for the barrier layer, the shadow mask would be placed such that it is essentially, it abuts right at the edge of where the barrier layer ends. 05:05:57 05:07:09 05:07:11 05:07:16

Q. So it would have a single opening? 05:07:24

A. I don't know what you mean. 05:07:25

Q. So the shadow mask has openings; correct? 05:07:26 05:07:32

A. Yes. 05:07:34

Q. In the case of Yamazaki, there is going to be only a single opening in that mask? 05:07:34 05:07:41

A. No, because remember, in my Yamazaki obviousness analysis, Yamazaki, in light of what one of skill would know and/or Ghosh, would be arrayed to create a mother glass with multiple -- with multiple display devices on it. 05:07:44 05:07:48 05:07:54 05:07:59 05:08:03

Each device would have associated with it an opening to allow the deposition of the barrier layer for said device. 05:08:06 05:08:09 05:08:14

Q. I'm talking about Yamazaki in and by itself. 05:08:19 05:08:22

So in that configuration, that would 05:08:22

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

be a single opening in the mask; is that correct? 05:08:27

A. I understand. 05:08:30

So if we look at the disclosure of 05:08:31
Yamazaki where it talks about using a shadow mask 05:08:33
for the barrier layer, for example, Figure 11, yes, 05:08:38
there would be a singular opening that would abut 05:08:42
the edges of where the barrier layer ultimately 05:08:45
ends up. 05:08:49

MS. ZHONG: Can we go off the record 05:09:22
for five minutes. 05:09:23

MR. GARR: I think we haven't been 05:09:25
going that long. 05:09:27

(RECESS, 5:09 p.m. - 5:16 p.m.) 05:09:31

MS. ZHONG: We can go back on the 05:16:30
record. 05:16:31

MR. GARR: I don't think we went off 05:16:32
the record. 05:16:33

MS. ZHONG: We were off the record. 05:16:36

MR. GARR: We did not agree to that. 05:16:37

MS. ZHONG: You can disagree with 05:16:39
it. 05:16:40

MR. GARR: Then we were on the 05:16:43

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

record. 05:16:44

MS. ZHONG: We were not on the 05:16:46

record. And I don't want to discuss this with you. 05:16:47

If you have a problem with it, raise it with the 05:16:51

Court. 05:16:53

MR. GARR: I do have a problem with 05:16:54

it, and if there's a disagreement, we were on the 05:16:55

record. 05:16:59

MS. ZHONG: You can keep -- we can 05:17:02

agree to disagree, and if you want, you can call the 05:17:04

Board, but I want to continue my deposition right 05:17:08

now, instead of arguing with you. 05:17:10

BY MS. ZHONG: 05:17:18

Q. Dr. Subramanian, in the electric field 05:17:19

application method, or in the inkjet method, are the 05:17:21

droplets uniform? 05:17:26

A. I need more information. What do you 05:17:28

mean by "are the droplets uniform"? 05:17:30

Q. In Yamazaki's electrical field 05:17:33

application method or inkjet method. 05:17:35

A. Yeah. I understand that part. I don't 05:17:37

know what you mean by "are the droplets uniform." 05:17:39

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Why don't you? 05:17:43

A. Are you referring to their volume? Are you referring to their diameter? I don't know what you are referring to. 05:17:44 05:17:45 05:17:47

Q. Anything. I mean -- do they have uniform diameters, volumes, charges, mass? 05:17:47 05:17:49

A. So in the spray technique -- in any of the spray techniques, no. Because atomization is used to generate the droplets, they are not perfectly uniform. They have a certain distribution. It tends to be Gaussian. 05:17:57 05:18:01 05:18:05 05:18:07 05:18:10

In inkjet, it is also Gaussian, but the volumetric uniformity is much better because the nature of how inkjet works means the variation in volume and therefore in radius and in mass is much tighter than in an atomizer. 05:18:12 05:18:15 05:18:17 05:18:22 05:18:26

Q. Okay. 05:18:29

So in electric field application method, the droplets will -- the property of the droplets will follow more or less a Gaussian distribution; is that correct? 05:18:29 05:18:34 05:18:42 05:18:46

A. Yes. I mean that's also true for 05:18:46

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

inkjet. Sort of the origin of Gaussian behavior, and there are multiple sources of error, and no single error source is dominant. Both of them are Gaussian. It's a question of the characteristic unit of the Gaussian, so the standard deviation. 05:18:48 05:18:54 05:18:56 05:18:59 05:19:02

In any atomizer-based technique, the standard deviation is larger as a fraction of the radius than it is in inkjet. Inkjet tends to have much tighter distributions. 05:19:04 05:19:08 05:19:11 05:19:14

Q. Okay. 05:19:16

What about the mass-to-charge ratio? Does that also follow a Gaussian distribution? 05:19:19 05:19:24

A. Generally, because the mass follows a Gaussian distribution, and since charge is quantized, yes. It will tend to follow a Gaussian distribution, but again, what matters -- what doesn't -- what's not relevant is the fact that it's Gaussian. It's the characteristic standard deviation of the Gaussian. 05:19:31 05:19:34 05:19:38 05:19:42 05:19:46 05:19:48 05:19:52

Q. Understood, but it's not going to be a single mass to charge value in the -- in whatever, like, it's being ejected from the nozzle; right? 05:19:53 05:19:56 05:20:02

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

A. Well, that's correct, and you can actually see that in the -- Yamazaki accounts for that. 05:20:06 05:20:07 05:20:11

Because if you look at Figure 1C, you see that all of the drops are not coming to the same spot. There's a certain cone of uncertainty. 05:20:11 05:20:13 05:20:15

The reason for that cone of uncertainty is because there is a certain variation in the mass. 05:20:18 05:20:20 05:20:25

Q. So when you design the experiments, you have to account for that Gaussian distribution? 05:20:27 05:20:35

A. It's not that you have to design the experiments to account for it, you characterize what your cone of displacement uncertainty is, and then when you are depositing, you just say, okay, when I deposit, all of my drops are not going to go to exactly the same spot. Statistically, they will cover a spot of a certain radius, and then you do all of your designs based on that. 05:20:39 05:20:41 05:20:44 05:20:48 05:20:52 05:20:55 05:20:58 05:21:01

Q. Do you know what is the velocity of the particles when they are near the substrate? 05:21:02 05:22:44

A. Are you asking me for a number? 05:22:50

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Well, a range of number. 05:22:53

A. No, I don't think that's specified. The specific velocity is not specified in Yamazaki. But the key point is the velocity is at its -- is close to its highest at that point, assuming ballistic transport, which will be true, or almost ballistic transport, which will essentially be true, they get accelerated through the electric field zone, and they pretty much maintain that velocity until they hit the target. 05:22:54 05:22:58 05:23:03 05:23:07 05:23:11 05:23:14 05:23:17 05:23:20 05:23:23

Q. But you don't know what the numerical range of those values are? 05:23:25 05:24:01

A. I think you just asked me that question, and I just answered it. But the answer was, yes, I don't know. 05:24:03 05:24:05 05:24:08

Q. Do you know what is the magnetic field of strength in Fujimori? 05:24:08 05:24:22

A. We have some information. There's specific examples given. 05:26:45 05:26:47

So first, if we look at Fujimori on page 5, on the right-hand column near the top, the bottom of the top paragraph, it says, "The magnitude 05:26:48 05:26:54 05:27:00

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

of magnetic force required depends on the shape, size, weight, strength, and other factors of the magnet opening." (As read.) 05:27:04 05:27:08 05:27:11

So a general indication cannot be given, but when the mask is affixed with mechanical contact, the magnetic force should be adequate to obtain the mask adhesion required. 05:27:12 05:27:14 05:27:18 05:27:21

Okay. Then it gives us specific examples. 05:27:24 05:27:26

In the case -- so if we look at the embodiments, on the bottom of page 6 on the right-hand side, here it doesn't give us the field strength, but it does give us information on what magnets are used, and the mask. It says specifically, it tells us what the mask is, and it says it's -- it gives us the dimensions of the holes of the mask, and then it tells us the plate magnet was a rare earth magnet made by Hitachi metals, and it tells us what it is. It doesn't give us the field strength there, but it does tell us that. 05:27:27 05:27:29 05:27:32 05:27:35 05:27:37 05:27:41 05:27:43 05:27:49 05:27:52 05:27:58 05:28:01

There's another example in Embodiment 3 where, again, it tells us about the 05:28:04 05:28:06

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

shape of the magnet. It doesn't give us the numbers. 05:28:08 05:28:10

There is one place where it gives us the actual magnet -- the field, and I will find it. I just saw it. Please bear with me. 05:28:10 05:28:12 05:28:20

Yep. Okay. 05:28:22

So in the top of page 8 in the left-hand column, it tells us about another embodiment. This is in relation to Embodiment 4 where it tells us, "Next, the mask for the light-emitting layers was arranged in front of the substrate, and a ferrite plate magnet," gives us the dimensions, "and having a residual magnetic flux density of 0.3 Tesla, was placed behind the substrate, and all of the elements are fastened." 05:28:32 05:28:38 05:28:44 05:28:47 05:28:50 05:28:54 05:28:58 05:29:02 05:29:06

(As read.) 05:29:09

So I think those are the specific examples that are here. 05:29:09 05:29:11

What it does make clear is that you choose the magnet based on the specifics, and it tells you sort of the decision rule that you use. In other words, you look for good adhesion. 05:29:12 05:29:14 05:29:17 05:29:21

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. So is the magnetic field uniform across the substrate? 05:29:24 05:29:30

A. So if you are using a plate magnet, depending on the dimensions of the plate magnet, when you get right to the edges of the plate magnet, there will be some non-uniformity, but over the dimensions of the plate magnet, it's generally going to be quite uniform. In terms of the plate magnet, the flux line from the plate magnet. 05:29:35 05:29:38 05:29:41 05:29:44 05:29:46 05:29:49 05:29:53

Then you have the mask, which is held on by that magnet. The mask will cause flux lines to terminate from the plate magnet underneath. 05:29:55 05:29:58 05:30:02

So the termination lines depend, to some degree on the shape of the magnetic shadow mask, but since all of the lines will terminate there, they're largely right up against the plate magnet. 05:30:05 05:30:09 05:30:14 05:30:16 05:30:20

Then that's one reason why I said that Mr. Humphrey's was just wrong. Because by the time you get to the region where there are magnetic flux lines from the plate magnet, the charged particles are moving at their maximum velocity, and 05:30:21 05:30:23 05:30:30 05:30:34 05:30:37

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

they're about to impinge on their target, so any deviation that occurs is minimal. 05:30:41 05:30:44

Q. How is a charged particle supposed to interact with a magnetic field? 05:30:47 05:31:20

A. So there's -- essentially, you get a resonance behavior where the particle will tend to spiral. There's a set of rules that we use that are called the left-hand and right-hand rules, which essentially describe how the particle moves. 05:31:23 05:31:27 05:31:29 05:31:32 05:31:35

But if you have a particle moving in an electric field that is perpendicular to a magnetic field, the particle will move in sort of a corkscrew motion as it approaches the surface. 05:31:37 05:31:40 05:31:43 05:31:45

But the important point is, the actual, lateral deviation will be small, particularly if the particle is moving at very high velocity, and the region of which the magnetic field is present is extremely small, which will be the case in the system because the particle is at its maximum velocity by the time it gets to the region of the magnetic field because the shadow mask is held up against the plate. 05:31:48 05:31:51 05:31:55 05:31:58 05:32:02 05:32:05 05:32:07 05:32:11 05:32:15

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. But would the corkscrew motion, given the distribution of the particles and their properties, would that increase the distribution or narrow the distribution? 05:32:16 05:32:34 05:32:38 05:32:41

A. So, in fact, it increases it a little bit, but it's a minuscule amount because, in fact, relative to the natural variation and distribution shown in Yamazaki in the figure we have been discussing, which I guess is Figure 1C, the deviation introduced by the corkscrew is minuscule, and can be ignored. 05:32:42 05:32:47 05:32:51 05:32:56 05:33:00 05:33:04 05:33:08

The natural variation in the spot size that comes from the electric field method is far more than any deviation introduced by the magnetic field corkscrew. 05:33:09 05:33:11 05:33:15 05:33:18

Q. Did you do any calculation? 05:33:21

A. No. I don't need to. It's -- having worked on these -- personally worked on acceleration and having used magnetic masks before, and knowing the geometry of the placement of the mask, it's -- there's no need for calculations. It's clear that this is not going to cause significant deviation. 05:33:24 05:33:27 05:33:31 05:33:35 05:33:39 05:33:41

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Q. Do you have -- can you give a bulk percentage change? 05:33:44 05:33:50

A. No. Because I haven't done the calculation, but it's minuscule. 05:33:52 05:33:53

Q. When you say "minuscule" -- I mean, it's pretty vague term; right? To you minuscule means what? 05:33:56 05:34:01 05:34:07

A. Enough that you can ignore it. So if you look, for example, at Figure 1C. If we look at what Figure 1C, we can use that as an exemplar. 05:34:09 05:34:12 05:34:15

If we assume it is to scale. The diameter of the nozzle opening just near where 113 is, is about one-third to a half of the dispersion of the bottom of the cone. 05:34:19 05:34:22 05:34:26 05:34:33

Any deviation introduced by the corkscrew is going to be far less than that. So in other words, the spreading in the cone far exceeds any deviation introduced by the corkscrew. 05:34:34 05:34:37 05:34:40 05:34:45

Just remember, Fujimori tells you to use a sufficient magnetic field to get the adherence. So it's really just having strong flux lines coupling to the mask, and that's it. 05:34:53 05:34:59 05:35:03 05:35:07

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

MS. ZHONG: Okay. I don't have any further questions regarding IPR 2024-01222. So I pass the witness. 05:35:09 05:40:02 05:40:07

MR. GARR: No questions from me. 05:40:08

REALTIME STENOGRAPHER: Are we off the record? 05:40:18 05:40:19

MR. GARR: I think so. 05:40:19

MS. ZHONG: Yes. 05:40:20

(CONCLUDED, 5:40 p.m.)

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

ACKNOWLEDGMENT OF DEPONENT

I, VIVEK SUBRAMANIAN PhD, do hereby acknowledge that I have read and examined the foregoing testimony, and the same is a true, correct and complete transcription of the testimony given by me and any corrections appear on the attached Errata sheet signed by me.

_____ _____

(DATE) (SIGNATURE)

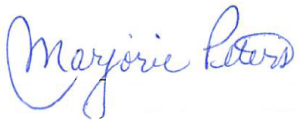
Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

CERTIFICATE OF COURT REPORTER

I, Marjorie Peters, Fellow of the Academy of Reporting, Registered Merit Reporter, Certified Realtime Reporter, Realtime Systems Administrator, and Notary Public in the District of Columbia, before whom the foregoing deposition was taken, do hereby certify that the witness was placed under oath according to the law; that the foregoing transcript is a true and correct record of the testimony given; that said testimony was taken by me stenographically and thereafter reduced to typewriting under my direction, and that I am neither counsel for, related to, nor employed by any of the parties to this case and have no interest, financial or otherwise, in its outcome.

I further certify that signature was not waived by the witness.

IN WITNESS WHEREOF, I have hereunto set my hand this 13th day of June, 2025.



Marjorie Peters, FAPR, RMR, CRR, RSA
My commission expires October 31, 2029.

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

David A. Garr, Esquire

dgarr@cov.com

June 13, 2025

RE: Samsung Display Co., LTD. v. Pictiva Displays International LTD.
5/30/2025, Vivek Subramanian, Ph.D., (#7377655).
The above-referenced transcript has been
completed by Veritext Legal Solutions and
review of the transcript is being handled as follows:

__ Per CA State Code (CCP 2025.520 (a)-(e)) – Contact Veritext to schedule a time to review the original transcript at a Veritext office.

__ Per CA State Code (CCP 2025.520 (a)-(e)) – Locked .PDF Transcript - The witness should review the transcript and make any necessary corrections on the errata pages included below, notating the page and line number of the corrections. The witness should then sign and date the errata and penalty of perjury pages and return the completed pages to all appearing counsel within the period of time determined at the deposition or provided by the Code of Civil Procedure. Contact Veritext when the sealed original is required.

__ Waiving the CA Code of Civil Procedure per Stipulation of Counsel - Original transcript to be released for signature as determined at the deposition.

__ Signature Waived – Reading & Signature was waived at the time of the deposition.

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

_X_ Federal R&S Requested (FRCP 30(e)(1)(B)) – Locked .PDF Transcript - The witness should review the transcript and make any necessary corrections on the errata pages included below, notating the page and line number of the corrections. The witness should then sign and date the errata and penalty of perjury pages and return the completed pages to all appearing counsel within the period of time determined at the deposition or provided by the Federal Rules.

__ Federal R&S Not Requested - Reading & Signature was not requested before the completion of the deposition.

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Samsung Display Co., LTD. v. Pictiva Displays International LTD.

Vivek Subramanian, Ph.D. (#7377655)

E R R A T A S H E E T

PAGE_____ LINE_____ CHANGE_____

_____

REASON_____

PAGE_____ LINE_____ CHANGE_____

_____

REASON_____

PAGE_____ LINE_____ CHANGE_____

_____

REASON_____

PAGE_____ LINE_____ CHANGE_____

_____

REASON_____

PAGE_____ LINE_____ CHANGE_____

_____

REASON_____

PAGE_____ LINE_____ CHANGE_____

_____

REASON_____

_____ _____

(Vivek Subramanian, Ph.D.) Date

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

&

& 3:3,9 239:24 240:9

0

0.1 13:15
0.3 231:14

1

1 30:14 31:2 32:19 33:3 41:2 56:11 82:9 90:19 172:11 184:21 240:1
10 81:5 82:9 129:9 175:10 184:21 190:10 190:15,20
100 12:19 13:16,18 14:12 24:1 84:3
1003 4:11 6:15 6:17
1005 4:12 24:6 24:7 89:18
1006 4:19 143:6,8
1007 5:7 192:12,14
1008 4:14 52:1 52:2
1012 4:16 56:1 56:3
1014 5:3 173:12,15
1021 5:6 189:19,22 190:1
109 195:12
10:00 1:12 2:11
10:23 25:2
10:34 25:2
11 26:1,9 92:19 92:21 93:10,15 93:19 95:2,10 96:13,14,16 97:8,12,14,18 98:8 144:14 145:19 166:10 167:19 170:3 171:2 172:6 176:1,3,5,15 177:2,5,6,13 224:5
1105 95:3,10,20 96:19 103:21 103:21 144:16 171:3
1106 171:2,7
113 195:14 235:12
117 4:18
11737 238:21
11:26 57:5
11:27 57:5
11s 166:18
12 43:3,5 44:2 44:3,6,12,16 45:2 65:18,22 176:18 177:2,4 177:8 185:17
120 139:1
1200 43:5,8 44:6,12,13,15 44:20
121a 127:6 130:21
121c 127:6
122a 127:7
122c 127:7
12:08 89:15
12:15 89:15
13 90:2,3,8,10 92:3,5 171:20 176:6 177:2 188:20 189:13 209:12,21 210:14,15,19 210:20 239:3
1304a 90:17
1304c 90:17
1306 171:13 209:15,18,20 210:17
1307 171:13
1308 91:3,9
1309 189:9,10 189:12
1310 188:11,16
137 66:5,6
13s 145:15
13th 238:19
14 26:5,9 90:2 90:5 91:16,17 91:19 92:9 93:11,16,17 122:2 166:10 167:19 170:3 171:10 176:7 177:3 208:12 208:14,17
140 140:5 141:2,3
1407 91:20 92:9 172:1
1408 91:20 171:21
143 4:19
14s 166:18
15 122:11
150 138:14,19 140:9,19 141:9 142:7
151 127:1
151a 127:19
151b 127:19
151c 127:19
16 123:1
160 139:1 140:2,4
161a 139:4
162a 139:5
173 5:3
178 95:16,19 97:16 98:16 104:8
179 43:8 45:3 65:20 154:17 177:8

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

18 58:6 163:18
1800 3:9
183 171:6 173:1
184 45:5
185 89:20
188 90:13,15 135:7
189 5:6
192 5:7
1994 106:11
1998 106:11
1:30 135:16
1:31 135:16
1:43 143:3
1c 67:8 68:9 73:16 77:13 78:12 167:6,18 228:4 234:9 235:9,10

2

2 41:18 66:8 67:7 138:2,6,7 138:10 139:18 142:10,12,15 142:17 144:3 163:1,17
20 56:11,22 60:10 81:5 156:6 163:18
200 202:14
2000 84:21 86:12 87:3,12 88:13,17 108:7 116:7,8 121:3 134:5
20001 1:18 3:5
2000s 108:14 108:21 115:12 150:2
2001 4:18 84:21 107:13 117:20,21,22 119:20
2001-2002 70:22
2001/0052752 4:20 143:9
2002 84:22 87:16 111:2 113:14 115:9 220:16
2002/0140347 4:15 52:3
2003 116:10,12 116:15 122:13
2003/0011300 5:8 192:15
2003/0206322 4:13 24:8
2005 86:6 87:4 87:13 88:13
2005-2006 62:8
2006 88:17
201 171:11 172:2
2015 61:5 62:10
202 3:6 5:9 91:2,13 172:2 188:7,10
2024-01222 1:5 6:13 9:2 236:2
2025 1:12 2:10 238:19 239:3
2025.520 239:9 239:12
2029 238:22
203 91:18 171:20 172:2
204 172:8
205 202:21 203:1,8,16,22 204:4,13 205:4 205:15 206:1 207:21 209:10 209:19
206 209:15
21 35:22 36:4 41:19 123:1 144:21 145:3
210 202:16,22 203:2,5,10,15 204:3,3 205:20 205:20 206:2,5 206:8 207:7,21 208:1,10,12,20 209:22 210:1
2100 4:17 57:9 57:10,16
2103 5:9 202:5 202:8,10
217 208:21
22 36:7,11,22 38:9,19 39:13 40:1,22 41:7 42:11 43:2 56:20,20,21 123:21,22 138:3 142:10 142:16 143:14 144:1 146:8,15 158:8
221a 136:4
222a 136:6
23 36:7,12,22 39:10,14,20,22 40:1 138:3 142:10,16
237 4:5
238 4:6
239 4:7
24 4:12 196:4
25 41:22 124:20 163:2
26 123:21 124:20
27 125:14
28 190:21
2:31 143:3

3

3 35:18 36:1 38:17,19 41:6 41:13 42:6,9 143:17,18 144:21 146:6 146:13,16,21 147:4,8 148:6 148:16 158:11 162:5,7 172:11

Veritext Legal Solutions
Calendar-CA@veritext.com 866-299-5127

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

172:13 177:5 230:22
30 1:12 2:10 156:6 240:1
31 238:22
310.203.7183 3:11
32 36:4,10 38:14 41:17 143:22 165:17
34 10:11 19:2 24:15 25:4,7 25:19 33:4,4
35 33:4 52:1,16 130:20 131:10 195:11
36 125:15 185:7 195:13
37 2:4 33:4 126:1 185:7
389 9:10,13,17 10:4,8 18:12 19:16 45:16,17 112:14 116:18 122:14 162:19 163:12
3:31 178:7
3:45 178:7

4

4 89:21 90:1,4 90:9,11,16,22 145:12,13,15 146:6 172:9 188:11 194:9 231:9
40 33:4 170:15 170:18 183:13
41 170:18
42.53 2:5
44 214:16
46 25:20 26:2 27:11 185:6,8 185:9
47 26:5 185:6,8
48 26:10
49 95:17 97:8
4:30 201:22
4:35 201:22
4a 140:12,15 141:13,21
4g 140:12,16,17 140:22 141:3,6 141:9,11,13,21 142:3,8

5

5 12:21 13:19 13:20 14:13,21 15:13,14 35:18 41:15,17,22 42:7 127:9 148:6 162:5 193:7 229:21
5/30/2025 239:5
50 15:15
500 83:4
51 165:11
52 4:14 165:11
5250 3:6
53 126:1 138:22
54 126:18 139:9 140:10
55 126:19
56 4:16 128:10 128:12 141:7
57 4:17 130:1,4 131:7,10 135:22 137:9
58 37:12
5:09 224:13
5:16 224:13
5:40 236:9

6

6 4:4,11 127:18 127:21 195:19 196:14 230:11
6,198,217 4:16 56:3
6,770,502 4:17 5:6 57:10 189:19
6,949,389 1:6
60 196:6
62 130:4 196:5
63 132:6 195:21
66 134:10
662 3:6

7

7 140:1 190:21
70 196:2,5
73 25:17
7377655 1:22 239:5 241:2
75 34:10,12
7a 112:19
7b 112:19
7c 112:19,19

8

8 98:12,13,19 118:21 119:2 134:21 135:3 135:18,21 136:15 137:4,9 137:11,20,21 138:1,5 139:17 140:12 141:21 142:5,9,14 173:21 174:1 191:10 231:7
8,955,217 5:9 202:8
8,9555,217 202:11
83 35:10,13,16
850 1:17 2:9 3:4

9

9 118:21 119:2 134:21 135:3 135:18,21 136:15 137:4 137:21 138:1,5 140:12 141:22 142:5,9 191:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

90067 3:10
90s 83:2
9b 176:11

a

a.m. 1:12 2:11 25:2,2 57:5,5
aapa 27:1,5,14 27:21 28:7,11 28:12,15,20 29:9,17 30:3,5 30:21 31:13,15 32:4,17 33:1 33:11,17 34:3 163:12 164:6 164:11 165:4
ability 54:10 216:9
ablation 21:16 22:21 23:15 165:19 166:2,6 166:11
able 79:13 82:22 186:12 187:7 197:10 216:11 218:5 218:21
above 163:16 239:6
absence 208:4 214:10
absolutely 132:22 156:10 172:19
abstract 192:16
abut 224:6
abuts 201:12 223:3
academic 8:17
academy 238:2
accelerate 179:4 181:21
accelerated 179:11 183:21 229:8
acceleration 179:22 180:5 180:10 181:11 181:15 234:18
acceptable 218:4,14
accepted 40:9
access 160:17 216:9,15
accessed 45:21
account 23:9 110:14 172:19 205:15 228:11 228:13
accounted 23:6
accounts 228:2
accuracy 78:20
accurate 174:19
acf 189:11
achieve 36:20 54:6 59:8 84:19 86:21 100:4,14,21
achieved 83:22 83:22 104:19 104:22 165:13 165:18
achievement 11:16
achieves 10:15
achieving 15:19 59:17
acknowledge 30:3 237:4
acknowledging 30:20
acknowledg... 4:5 237:1
acp 189:10
acrylates 182:5 182:9
active 43:9 92:19 93:1,4 94:6,7,20 131:18 134:3 143:14 144:22 145:5,8,9,14 157:10 162:2 177:10,11,15
activity 71:22
actual 107:14 107:18 109:20 113:22 152:22 231:4 233:15
actually 14:4 17:19 19:21 27:9 36:17 39:5 43:17 45:5 46:15 51:3 65:11 71:1,3,14 78:19 81:18 84:19 85:7,9 85:11 95:13 97:3 100:18 105:11,18,21 106:7 110:19 112:5 113:1 114:14 115:18 118:4,14 120:14,21 121:1 133:4 142:20 143:10 145:11 151:7 155:14 162:1 165:12,17 166:14 176:4 181:6 182:22 183:4,5,8,22 184:2,5,14 185:20 195:15 199:18 201:14 204:16,19,21 207:3,10 216:18 220:7 228:2
add 108:3,22 114:9 133:5,6 133:8 134:2 165:13 195:16
addition 102:15

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

additional 34:20 91:22 135:1 141:10 146:7 164:3 169:6 206:15 207:6 214:22
additionally 27:15 28:13 33:21 158:15
address 27:9 33:3 35:16 59:10 77:7 94:8 129:16 185:21,22 186:1,12 195:12,14 213:4,4
addressed 40:8 41:12 69:15 125:16 139:20 144:14 213:9 214:16
addresses 193:6
adequate 230:6
adherence 235:21
adhesion 79:21 173:8,16 174:10 230:7 231:22
adhesive 46:20
adjacent 148:17
adjust 217:5,6
administrator 238:4
admit 32:3
admitted 27:21 34:14,18 161:18 162:13 162:15 163:11
adopt 144:10
adopted 91:21
advanced 82:20 84:5 155:13
advantage 65:1 75:16 81:21 82:11,18 83:6 147:12 149:6 170:4 181:15 184:6
advantageous 82:6
advantages 79:9 81:15,15 82:2 148:19 149:15 170:8
advertising 109:2
aerosol 81:12 83:17 84:1 115:11 182:19
affect 68:12 149:4 179:9
affiliated 129:6 129:13,17,19
affixed 230:5
agendas 132:1
agree 33:17 37:22 41:7 42:17 43:1 68:9 80:1 90:7 91:12 92:13,21 97:14 98:1 127:5,18 130:8 130:14,18 131:12,17 134:18,20 135:1 138:5,12 140:7,13 141:4 141:8,12,18 142:3,7,20,22 143:18 147:6 158:13 162:5 172:4 173:3,22 174:4,14 191:5 195:3 204:18 205:9 213:2 224:19 225:10
agreed 40:12 114:22 143:11
aid 101:13,14
air 102:6
ald 38:20,20
ale 38:20,20
align 133:16
allow 95:22 223:18
allowed 40:14
allows 75:16
alter 198:22 212:2
alternate 27:6
alternative 33:7 67:1
alternatives 148:11
ambient 120:8 120:11,18 121:8 123:8
amount 128:14 180:9 218:4,15 218:22 219:2,5 234:6
amounts 184:11
analogous 209:20
analysis 17:18 18:12 29:13,14 30:13,14,15,17 30:17 31:20 32:13,15,22 34:5 36:18 37:5 38:2 45:19 70:14,15 120:6,21 123:2 123:5,18 124:11,13 125:11 126:6 126:10 158:21 159:3,9,10,22 160:1,5 167:16 168:5 169:17 212:20,22

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

213:7 223:13
analyzed 123:16 213:6
analyzing 19:17
angeles 3:10
angle 53:3,4 74:18
anisotropic 189:11
annita 3:8
annotated 26:1 26:9,11 97:7 143:17
annotation 97:6
anode 12:13 98:22
answer 17:19 22:22 31:18 32:5,9 37:7 40:3 44:5 49:6 51:21 65:6 68:15 72:8,14 72:17 76:19 77:11 80:15 85:3 103:19 111:14 113:15 133:4 148:15 151:3 153:13 159:21 168:3 179:16,16 180:17 195:2 195:16,17 200:2,21,22 203:14,22 207:3 209:4 215:18 217:22 218:19 219:18 219:21,22 220:18 222:6 222:11,19 229:14
answered 22:6 29:11 148:14 151:22 199:7 211:5 229:14
answering 209:6
answers 125:17
anybody 88:9
anytime 80:2
apparent 161:20
apparently 161:16
appeal 1:2
appear 9:17 40:18 44:4 45:7 169:15 191:8 237:7
appearance 147:22
appearing 1:14 2:8 239:18 240:7
appears 40:17 41:7 44:15 57:1 91:17 123:7 127:6 131:4 176:18
applicable 177:6
applicant 27:21 29:18 40:5
applicant's 37:19 40:13 162:13,14
applicants 30:2 30:19 40:15
application 4:13,14,19 5:4 5:8 24:7 52:2 66:7 67:4 69:19 70:7 71:4 72:3 73:1 73:14,15,20 77:10 78:21 80:7 81:2 90:13,18 91:8 91:10 92:11 109:1 125:13 126:17 127:12 128:3 143:8 151:4 153:1,8 157:13 158:9 159:18 160:11 160:20 170:5 173:13 178:9 178:11,22 179:13 182:17 192:14 206:7 218:11,12 220:3 225:15 225:20 226:18
applications 112:7 125:19 152:7 154:3 192:8
applied 17:18 18:11,18 66:12 66:12 150:7 151:15 153:5 164:17 174:16 197:4 214:6
applies 174:11
apply 20:12 68:10 159:18 160:19 214:3 218:10
applying 38:3 80:7 148:10,12 162:11 170:19 187:21
appreciate 216:11
approach 66:20 67:2 144:10 160:3 179:3 192:2
approaches 233:13
appropriate 59:7 95:21 100:16 104:5 105:1 146:5 160:18 214:6
appropriaten... 122:6

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

arc 19:22
area 41:1 87:5 106:10 128:13 144:22 145:8 145:10,14 146:16 149:19 155:18 167:11 169:8 176:2,5 176:16,20 184:1 220:7
areas 42:12 143:15 144:1 145:6 152:19 155:22 164:5 177:15 199:13
arguably 66:16 149:7
argues 120:16
arguing 130:5 225:12
argument 40:16 120:17
arias 162:3
arranged 166:17 231:11
array 164:9 165:6
arrayed 223:14
art 7:18 18:17 26:19 27:14,20 27:22 28:2 29:16,17 30:22 31:12,22 32:1 33:1,7 34:14 34:18 55:10,13 61:12,14 70:11 70:18,19 71:1 71:7 85:22 87:20 122:20 130:22 134:16 144:10 159:2 159:15 160:7 160:10,16 161:2,16,17,18 161:19,21 162:14,15,19 163:1,11 167:15 168:4,6 168:7 169:16 169:18 174:3,5 214:14 216:8 216:10,12,14 222:12
articles 71:1
artisan 121:20
ash 21:12,15 22:15,19 23:15
ashen 21:5
ashing 22:14
aside 10:17 33:2
asked 122:4 142:21 198:9 211:4 214:3 229:13
asking 41:4 44:11 80:11 88:4 113:20 169:10 199:2 215:20 218:20 219:16 221:4 228:22
aspect 97:5 159:19 160:1
aspects 215:9
asperities 11:14 15:21 16:1
assembly 42:3
asserted 9:2
associated 100:17 138:6 162:5 171:10 199:12 223:17
assume 14:2 15:14 34:3,17 48:13 61:18,19 107:18 125:5 134:16 201:11 201:12 202:21 208:20 214:15 235:11
assumed 32:1 32:16
assumes 120:20 160:16,17
assuming 123:5 229:5
atomic 38:21 38:21
atomization 183:17 226:8
atomized 181:9 183:14
atomizer 181:22 182:14 182:20 226:16 227:6
attached 177:1 188:17,18 237:7
attachment 176:20 189:17
attempts 76:3
audio 85:7
authors 60:22
available 7:1 7:12 83:3,8 106:6,7,22 107:6,8 109:14 115:19
avenue 3:9
avoid 74:7 175:13,14,22 176:2
aware 69:17 71:14,19,21 72:1 74:10 88:1 106:15 107:14 110:18 111:8 112:3 113:3,4,22 115:4 122:14 152:22 174:6 191:11,19,22 213:10,21 220:2,6
axis 16:14,14 16:14,15

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

b

b 4:9 5:1 240:1
bachelor's 214:19 215:21
back 39:7 68:11 84:21 139:18 158:8 224:14
background 61:16 64:15 216:8
bad 104:21
bags 105:17,20
ballistic 229:5 229:6
bar 63:17
barely 145:14
barrier 9:22 18:19,20,21,22 19:2,2,5,6,10 19:14,18 91:19 132:19 138:14 138:19 139:1,1 139:2 141:10 144:3 162:16 164:16 167:4 170:21 171:2,7 171:13,16,21 172:3,6 175:22 176:2,8 222:22 223:2,4,19 224:5,7
based 7:5 8:13 26:19 27:13,15 29:8 31:3,22 34:14 40:16 45:7 59:16 62:21 64:19 80:13 81:16 94:17 100:8 120:17,18 124:2 126:10 132:14 153:6 164:10 165:3 166:13 169:18 178:2,20 179:8 182:18,21 183:1 184:5 209:4,8 216:6 227:6 228:19 231:20
bases 28:5
basic 182:4
basically 10:22 66:2 120:15 155:11 189:1
basing 34:5
basis 27:15 30:5 31:3,15 34:4,11,20 76:20 98:1 159:1 197:11
batch 34:13 36:19
bay 106:10
beam 113:5 136:9 137:13
beams 137:6
bear 190:4 231:5
began 6:21 205:8
behavior 50:7 184:3,8 227:1 233:6
believe 7:16 9:19 10:2 24:6 27:2 32:22 50:15 75:22,22 83:2 163:15,15 179:15 188:12 207:9
bending 152:15
beneficial 78:6
benefit 79:12 101:5 104:13
benefits 79:15 80:4 83:10 100:19 101:6 103:22
berkeley 134:5 150:16
best 78:20
better 79:12 81:1 99:8 147:17 149:11 226:13
beyond 78:2 119:6 134:22 145:9 151:8 152:2,3
bias 172:20 173:2
big 64:22 82:18
bigger 152:13 175:11,19
bilayer 186:18
billboard 109:2
bit 12:4 23:20 110:13 139:22 145:9 234:6
blade 63:4
blank 14:10
blanket 60:18
bleeding 23:7,9 172:14,17 173:4,5,7 175:2,5,10,12
bleeds 23:3
blocking 195:21
board 1:2 122:8 225:11
bonded 46:18
borosilicate 187:5,16
bottom 26:2 165:10 171:6 229:22 230:11 235:14
boundaries 22:12
bounds 44:11 78:2
boxes 44:18 121:4 123:14
brand 150:15
break 89:2,8,10 89:10 129:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

132:8 135:12 143:2 163:4 178:6 201:21
briefly 118:6 143:11
broadly 100:14
brownian 75:5
build 124:1,6
building 47:1
buildup 84:19
bulk 235:1
bullet 33:5 60:11,16
bulovic 57:22
bunch 64:7 65:3
buried 47:20
burling 1:15 2:8 3:3
burrows 5:9 202:8,11 208:15,21
buy 82:21

c

c 3:1 6:1 27:1,2 130:21 136:4,6 139:4,5 189:2 190:2
c.f.r. 2:4
ca 1:22 3:10 239:9,12,21
cable 189:17
calculate 16:18 180:11
calculation 234:16 235:4
calculations 182:4 234:21
california 108:5
call 18:15 59:12 95:13 104:10 131:13 138:9 143:21 167:7 171:4,15 172:7 209:13 225:10
called 2:3 6:3 9:22 55:15 62:14 63:17 75:2 82:14 104:1 108:3,22 112:7 137:1 142:6,15 146:5 157:22 162:21 233:8
calling 139:6 139:18 141:19
calls 10:11 19:10 66:1 104:8 162:22 166:1,7 170:9 171:4 178:17
capability 115:20 134:18 154:5,9 155:1
capacitor 114:19,20
capacitors 192:6,7
car 85:7
carbide 193:14 193:18
careful 100:22
carefully 103:10
carrier 64:4
carries 124:16
carter 108:4 110:4 134:3
carter's 114:9
cartoon 59:11 60:8
case 1:5 18:22 23:9 40:17 44:15 46:4 49:20 50:10 56:21 65:16 67:5 69:3 93:8 93:9,9,14 96:9 98:2 99:17,18 100:6 106:16 106:18 125:7 136:14 140:9 144:10,20 146:13 161:22 186:4,22 187:1 187:1 188:11 204:15 206:6 207:9 212:2 222:20 223:10 230:10 233:19 238:14
cases 47:9 103:8 156:20 156:21
categorically 121:9
cathode 12:3,9 12:12,13 48:13 96:11,14 98:21 98:22 109:3
cause 120:19 121:9 204:10 232:11 234:22
causes 123:6
ccp 239:9,12
center 1:16 2:9 3:4
centimeters 156:6,7
certain 74:13 102:6 217:5 218:14,20 226:10 228:6,8 228:18
certainly 8:1 18:9 40:17 45:15 47:9,10 60:1 62:10 70:3,10 72:9 77:3 79:4 86:19 100:5 107:9,20 111:4 119:18 133:9 147:14 161:20 168:8 174:4,14 174:18 175:18

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

176:17 177:6 201:17 215:2
certificate 4:6 238:1
certified 2:6 5:3 173:12 238:3
certify 238:7,16
cetera 11:14 85:18 136:20 136:21 146:4 149:2 178:2
challenge 32:19
chamber 183:15
change 17:12 17:14 101:20 134:14 198:1 222:6 235:2 241:4,7,10,13 241:16,19
changed 101:21
changes 51:6
changing 102:7 166:14
characteristic 18:10 183:5 198:17 227:4 227:18
characteristics 74:13 83:12
characterizati... 37:19 40:13 138:20 217:7
characterize 11:5 228:13
characterized 15:5,6 23:8
charge 65:12 181:4 218:12 227:11,14,21
charged 65:9 66:4,12,15,18 66:20 67:2,5,9 67:10,16 69:10 77:14 179:4,10 183:20 232:21 233:3
charges 226:6
charging 66:22
chart 119:2
chemical 19:4,6 39:15 105:6 111:13 125:3,5 131:2 136:11 137:16 147:18
chip 66:1 105:17,20 155:6,10
chips 46:17
choice 124:17 146:2,3 182:16
choices 78:15 134:12,13,17 171:5
choose 80:12 125:18 231:20
chose 131:5
circuit 87:9 189:16
circuitry 94:8 94:17 157:9 164:3
circuits 156:11 156:12,19,20 157:3
cite 208:15
cited 8:2 35:18
citing 87:20
city 1:16 2:9 3:4
civil 239:19,21
claim 10:1,11 10:13,18 18:15 19:2,9,10 24:15 25:4,7,8 95:2 158:11 195:11,11,13 198:12 212:6 212:10,19,20 213:7,8,17,22
claimed 157:21 158:4,9
claiming 196:14
claims 9:20 10:10 19:17 33:2,4 40:14 119:11 158:1,6 158:7,8 214:9
clarification 12:4 14:18 16:20 30:8 41:10 63:15 109:16 150:5 154:7,12 182:7 207:1 212:7
clarify 21:10 43:18 101:18 103:7
clause 66:17
clean 24:9 79:14,15 194:8
clear 12:6 28:2 37:14 56:18 98:3 100:3 102:2 103:1 104:15 121:20 131:13 132:18 136:18 137:9 142:4 144:12 146:11 149:12 153:4 155:2 156:17 157:2 177:7 196:17 200:17,22 220:15 231:19 234:21
clearly 26:11 29:3 30:2 55:17 81:19 130:3
close 78:21 129:21 145:11 174:20,22 229:4
closely 85:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

closer 69:2 78:17 87:12 88:13,19 147:5 181:22
closing 135:14
coating 53:9,10 53:12,13,19 55:19 60:18 63:20,21,22 64:3,12,16 83:11 84:11 131:1,2
code 239:9,12 239:19,21
coding 63:17
coefficient 101:1 103:12 104:20 105:1
coincidentally 207:18
cok 4:17 5:6 57:10 189:19 189:22
collectively 46:7
color 76:4,5,11 76:13,13,19 151:5,6 152:3 152:5 153:6
colored 76:7
columbia 2:7 238:5
column 45:8,10 45:22 46:3,5,5 46:11,14,16 163:1,17 176:21,22 177:20 178:3 190:10,15,20 229:21 231:8
columns 164:9 165:1
combination 26:18 27:7 28:16,22 31:9 31:10,11 33:10 40:7 69:21 70:1,5,7,15 71:15 72:4 75:15 76:6 105:22 106:2 111:16 130:7 166:20 176:9 220:13
combine 71:2
combined 73:1
combines 71:3
combining 172:10 220:3
come 11:10,12 25:17,18 33:8 39:7
comes 234:13
coming 38:7 46:20 110:3 148:8 228:5
comment 121:17,18 122:1,5,9
comments 130:2
commercial 46:19 71:19,21 82:21 85:1,5,6 85:21 105:12 107:19 109:18 111:16 113:7,8 115:18,19 150:9,13 191:12
commission 238:22
common 54:7 54:14 75:1 174:18 187:16 193:12
commonly 42:21 63:11
compact 176:2
companies 105:18 113:12
company 106:9 108:2,6,22
compare 54:21 59:12,13 93:15
compared 55:18
comparing 76:17 93:10
comparison 170:8
compatible 193:11
compensate 214:22
complete 43:10 203:11 237:6
completed 239:7,17 240:6
completely 11:17,18 112:11 148:16 198:1 203:22 211:11 219:16
completion 42:2 240:10
complex 152:9
composed 98:22 139:2
computer 23:20
conceivably 166:9
conceived 119:11
concentration 187:4
concentrator 102:11
concept 113:3
conception 117:13
conceptual 98:1
conceptually 47:13 59:6 60:6 110:9,15 110:17 146:20

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

210:14
concerned 19:12,13 77:4
concluded 236:9
concludes 128:15
conclusion 128:11,19 129:1,2 134:19
condition 123:1 219:15
conditions 59:15 100:16 121:8 123:8,9
conductive 185:14,18 186:1,2,4,11,16 186:19 188:3 189:11
cone 77:13 228:6,7,14 235:14,17
conferences 150:20
configuration 223:22
confine 70:22
confirm 118:17 220:2
confirmation 33:20
conformal 52:16,18,20,22 53:3,5,9,10,12 53:19 54:4,5 55:5,19 57:2 59:5
conformality 53:8 54:19 59:7,16
conforming 56:19
conical 77:15 78:3
conjunction 38:16 69:18 105:14 107:9 112:4 132:11 133:2 137:22 139:11 214:11
connector 189:1,2,3
conor 58:3,4 60:4
consider 58:15 58:17 59:20 61:13 159:4 199:5 208:12
considerations 103:13
considered 54:8,15 197:5
consistent 24:19
constituent 172:11
constitute 7:18 25:11 46:7
constitutes 30:3 44:13 76:18
constitution 172:9
constitutions 172:11
constraints 206:16
construct 200:5
construction 18:15 47:19 198:12 212:6 212:11 213:15 213:17
constructions 122:3 212:19 212:21 213:7,8 213:22
contact 79:2,5 79:10 80:2 82:4 163:13,22 164:1,7 174:12 176:4,4,7,15,16 176:19,21 177:14,19 188:12,17,18 189:8,12 194:5 194:13,14,15 230:6 239:9,20
contain 184:15 184:19 187:6
contains 161:12
contamination 79:7,11,16 80:2,4 82:6
contend 26:13 34:4 36:14 95:9
context 10:4,8 19:1,1,11,16 22:2 23:5 24:13,18 45:13 45:15,16 47:8 51:3,6 52:19 52:20 53:13,14 64:18 65:5,7 72:18 79:7 80:9,17 81:17 81:20 85:2 95:2 98:5 103:15 109:12 114:2,4,13 115:7,12,14,16 115:17 161:15 198:19 219:19 221:11,13,17 221:18,20,22 222:2,3,7
contexts 45:14 45:14 47:10,12 73:7
contextually 48:6 64:9 80:14 82:1 100:13
continue 128:8 225:11

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

continues 125:15
continuing 45:3 92:2 123:21
continuous 132:16
contours 51:11 51:16,17 52:7 52:9,12 53:15 127:7,13,19 128:4
contradictory 200:19
contrary 92:14
contrast 65:2
control 75:17 79:12,15,19 80:5 83:16,19 136:20 152:9
controlled 20:19 66:7,11 82:13
controlling 128:13
controls 128:13
conventional 165:22 193:11
cooperative 132:19 139:2
copies 24:10
copy 25:13 118:15,18 190:3
corkscrew 233:13 234:1 234:10,15 235:16,18
corner 53:3,4,6 101:10 102:12 102:18 103:3 103:18
corners 53:17 55:5 100:18
correct 6:13,14 6:15,16,16 9:4 9:15,18,20,21 12:13 15:17 18:6,12 19:7 19:20 20:17 27:1,22 28:1,1 28:7,17 31:4 31:16 32:6 34:6 35:4,14 35:19 36:2,9 36:16 37:21 40:10,14 41:2 42:14 43:6,10 44:8 56:1,2 58:10 60:14 71:12 72:6 73:2,4 74:1 84:9,13 88:13 90:2,13 91:1 91:10 92:11,20 95:5,12 97:1 97:22 101:11 101:12,16,22 102:13 111:9 114:21 115:22 118:2 123:10 130:15 131:16 131:21 133:20 133:21 138:3,8 138:9,15,19 140:5,12,19 141:2,17 142:2 142:11,12,19 143:15 145:10 145:11 152:4 156:16 157:10 157:11,14 160:11,21 162:3,17 163:14 164:18 165:20 166:11 167:11 168:2 168:21 172:3 172:15,18 173:2,10,18 174:8,11 188:14,15 191:4,17 194:22 195:15 197:7 199:6 205:17 206:22 207:12 212:12 213:1 220:5 223:8 224:1 226:21 228:1 237:5 238:9
corrections 214:7 237:7 239:14,15 240:3,4
correctly 21:13 76:1
correctness 212:10
correspond 56:15
counsel 7:14,22 8:13,13 129:7 213:16 238:13 239:18,22 240:7
couple 132:8
coupled 179:1
coupling 235:22
course 7:7,8 73:8 78:20 104:12 117:8 149:11 171:20 177:11 195:7 206:17
court 4:6 9:7 49:11 89:5,13 212:11,13 213:18,22 225:5 238:1
cov.com 3:5 239:2
cover 27:16 42:19 46:10 56:8 66:16 90:21 91:2,9 91:20 92:1,3,9 95:3,9,11,20

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

98:9,15,19 99:1 101:13 104:6 122:22 144:22 164:12 164:16 171:3,3 171:22 175:22 176:1 177:9 200:11 201:10 202:13 228:18
coverage 128:13
covered 46:18 138:9,10 142:11,18 176:8
covering 42:13 42:15 158:16 158:18 208:21
covers 59:2 95:4 146:18 164:7 186:22 200:11
covington 1:15 2:8 3:3
cracking 149:2
create 53:6 75:9 83:5 128:16,20 133:18 151:10 167:18 202:22 223:15
created 188:13 203:7
creating 204:16
creep 110:13
criticizes 126:17 132:9
cross 87:7 90:6 96:16 97:13,18 176:14
crr 1:21 238:21
cruz 108:5
crystal 76:4,5
current 163:1,3
curvature 54:21 55:1
curve 217:3
cut 42:1 131:7
cvd 171:17
cylinder 62:22 63:1,3,5

d

d 4:1,9 5:1 6:1
damage 79:17 79:22
damages 79:8
dashed 41:22 42:13 44:18
date 70:9 87:22 122:12 237:13 239:16 240:5 241:24
dated 61:5
dates 76:1
david 3:3 88:16 239:1
day 238:19
days 20:22 219:7,12
dc 1:18 2:10 3:5 89:1
deal 135:13 175:6
dealing 188:4
decades 81:1 82:22 114:19 124:9 219:3
decision 122:7 231:21
declaration 4:11,18 6:12 6:17,20 7:6,8 7:10 8:2 18:14 27:11 32:22 35:11 37:12,22 95:18 97:8 107:11 117:6,8 117:9,22 118:8 119:7,14,21 120:15 121:13 130:9,12 135:8 165:10 195:13 195:14 213:3,9 213:11 214:1 214:17
declarations 55:14
decorative 105:16
decrease 101:10 204:20
decreasing 207:10
deep 139:22 215:16
defects 59:2
deficiency 215:1
define 22:12 61:14
defined 17:8 209:13
defines 216:1
definitely 66:17 67:9 86:6 116:10,12 128:10 129:3
definition 198:5
degradation 99:5 120:19 121:9
degrade 187:9
degree 11:6,21 64:15 95:22 104:6,9,11 182:16 214:19 215:22 232:14
delamination 163:6
demand 82:14
demonstrated 124:5
demonstration 113:7,8 220:12
demonstrations 108:11 113:11

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

density 136:7 136:10 137:12 137:14 139:4 139:10,15,19 139:21 140:8,8 140:11 141:14 141:19,19,20 141:20 142:5,6 231:14
depend 50:11 64:17 67:11,14 67:17 232:13
depended 81:19
dependent 50:10 179:21
depending 15:18 39:3 48:10 66:20 68:1 82:12 94:9,22 170:2 232:4
depends 15:3 23:5 29:3 39:20 45:13 47:8 48:16,20 49:19,20 51:19 54:1 63:22 65:10 68:14 76:16 77:2 78:14 93:21 94:3,15 155:21 175:8 211:2 217:8 219:8 230:1
depicted 58:18 59:19 136:14
depiction 136:16 137:3
deponent 4:5 237:1
deposit 13:8 20:6,14,17 49:14 63:3 105:8,9,14 107:15 110:7 112:10 114:2 115:1,13 131:20 149:22 150:22 151:20 172:3 196:9 201:6 205:5 209:22 228:16
deposited 21:4 35:3 36:16 37:9 38:9,20 61:2 68:8 128:14 141:5 143:14 162:16 163:13 167:11 167:21 168:1 169:7 172:17 175:2 180:1 181:5 194:22 195:5 198:18 200:10 203:16 210:10,10
depositing 10:11 20:2,4 21:7 22:5 84:21 111:22 112:8 122:22 174:13,22 179:14 228:15
deposition 1:11 2:2 15:9,10 21:22 22:13 23:2,4 38:5,22 49:19 61:7,8 62:5,12 73:11 84:2,16 105:6 106:19,21 107:8 109:3,4 109:6,13 111:5 111:13 113:4 115:15 118:7 128:16,17,20 128:22 131:3 135:4,6,19 136:5,7,11,12 137:15,16 146:3 149:7 164:8 166:11 167:4 169:22 170:22 174:21 175:21 176:1 180:7 190:11 190:16 192:3 198:10 210:9 216:3,5 222:4 222:14,22 223:18 225:11 238:6 239:19 239:23,25 240:8,10
deposits 143:19 162:1
depth 216:1
describe 16:6 50:7 51:12 138:1 233:9
described 18:16 90:19 137:21 189:5 191:11
describes 140:10 185:11 216:8
describing 52:11 170:16
description 18:9 34:11 51:18 59:2 60:9 92:1 97:16 104:8 127:16 162:22 163:9 183:12 188:15 204:1,9
design 110:14 173:6 180:14 180:18,20,21 181:7 182:3 219:4 228:10 228:12
designed 23:8
designs 228:19
desirable 174:20
desired 167:11 168:2 172:22

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

detail 119:5 124:20
details 60:1 135:7 210:9
deteriorated 163:6
deteriorates 173:9,17
determine 197:10 211:6 211:16
determined 239:18,23 240:7
determines 182:15
develop 86:20
developed 62:13
developing 80:21 81:6 131:15
deviates 11:7
deviation 12:22 13:3 14:3,21 67:21 68:4,22 69:4,7 181:16 227:5,7,19 233:2,15 234:10,14,22 235:15,18
deviations 11:9
device 10:13 12:2,18 24:14 24:17,19,21 25:10,11 26:3 26:6 39:16 45:11 47:19,21 47:22 72:19 76:18 123:7 140:5,7,18 141:2,3,6 142:19 152:11 158:14 160:21 161:7,10 163:20 194:4 194:13 223:17 223:19
devices 24:16 25:5,8,9,16 26:8,11,15 34:13 36:1,20 38:4 41:1,5,8 42:12 45:21 46:8,19,22 123:15 138:8 138:11 141:22 148:17 152:10 153:2,10,12 154:1 156:8 157:6 162:9 163:11 164:17 164:21 166:17 223:16
dgarr 3:5 239:2
diameter 134:22 226:3 235:12
diameters 226:6
dice 148:22 149:1 157:6
diced 41:9 44:1 151:14,16,19 153:8,9
dicing 42:2,7 42:13,16,22 43:15,20 44:4 148:21
differ 51:1
difference 47:6 60:3 94:5 145:22 199:16 216:16 220:20
different 37:16 63:22 64:7,13 65:6 76:7,7 83:4 93:16,21 94:10,13 98:14 98:14 112:20 113:1 114:21 125:4,4 131:9 133:17,17 137:10 139:7 148:21 149:14 155:6 170:10 171:5,16 176:11 178:2 210:13,14
differently 47:15 209:7
difficult 152:21
difficulty 25:1
digital 82:14 83:16
dimension 175:10
dimensional 16:14
dimensions 146:3 230:16 231:13 232:4,7
dioxide 102:20 186:21 187:17
dipping 131:1
direct 64:5 83:17 112:9,15
directed 112:4 115:18 137:19 169:22
directing 112:22
direction 8:13 238:12
directivity 136:20
directly 186:8 193:22
disadvantage 83:20 148:18 148:20
disadvantage... 74:14
disadvantages 79:9 81:16 148:19 170:9
disagree 120:10 123:2 125:8,13,20 126:2,6 127:3

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

128:10 130:3 130:10 138:20 224:20 225:10
disagreement 37:18 38:1 117:14 119:1 132:6 225:7
disagreements 117:16 120:2 121:15
disavowal 170:14
disavowing 168:10
disclosed 107:10 160:5
discloses 26:14
disclosure 39:6 39:18 91:11,17 92:14,16 99:17 100:8 116:17 117:13 127:10 128:1,7 130:19 142:8 146:1,21 148:15 159:13 161:1,7,9,13 164:21 165:2 167:2,19 168:9 170:13 171:9 176:3 178:16 197:15 224:3
disclosures 122:15 162:4 195:3
discuss 89:14 127:2 225:3
discussed 48:18 65:19,22 67:9 90:3 117:5 139:11 143:10 162:20
discusses 65:16 173:15
discussing 12:10 35:13 38:16 50:14 66:14 161:9 177:12 204:14 234:9
discussion 17:8 36:3 39:10 44:1,2,4 45:1 65:17 67:7 92:5 126:20 135:22 138:21 139:17 142:13 152:5 162:18 177:4 206:17
dispersion 235:13
displacement 228:14
display 1:4 24:21 25:11 36:1 76:17 85:8 93:2 94:7 144:5 147:22 148:17 150:3,9 150:20 152:10 152:13 153:9 156:15 162:8 163:11 164:22 165:7 166:17 178:4 186:14 187:15 214:21 215:6,11,12 217:17,20 223:16 239:4 241:1
displays 1:7 46:6 76:4,5 80:22 87:6 148:5 151:17 151:19 153:8 161:12 166:22 185:21 186:6 215:9 217:19 239:4 241:1
dispute 40:18
dissipate 100:16 103:3
distributed 102:4,9,14
distribution 77:17,20 78:1 105:2 226:11 226:21 227:12 227:14,16 228:11 234:2,3 234:4,7
distributions 227:9
district 2:7 212:11,13 213:18,22 238:5
divorced 99:14
doctor 63:4
document 64:18 118:13 119:8 201:21 222:8,16
documents 6:22 7:11,13 7:15,19
doing 26:18 29:12,15 30:17 34:12 64:8 70:15 87:10 100:22 108:9 108:16 109:1,7 109:11 110:19 115:5 116:6,7 121:6 123:15 133:5,8,9,11 147:9,10,13 149:6,8,13,15 156:16,17,18 166:20 167:3 180:6,21,22 196:16 213:20 218:14
dominant 227:3
double 168:15
downloaded 57:16
downstream 181:16

dr 6:7 25:4 57:7,19,20 61:13 69:14 89:17 143:5 225:14
draw 200:5
drawn 127:5,9 127:22 137:1
driver 46:5,5 164:2
drivers 45:8,10 45:22 46:4,11 46:14,16,21 47:1 176:21,22 177:21
driving 156:22
drop 64:20 75:2,3,4,5 84:13,14 185:3
droplet 64:19 75:4 82:13 84:9,15 182:15
droplets 65:4 66:3 67:4 84:12 183:3,9 183:17 225:16 225:18,22 226:9,19,20
drops 64:5 74:17,20 75:8 78:1 183:18 184:1,10,13,18 228:5,16
drying 183:4
due 16:3 173:9 173:17
duplicating 165:6
duplication 165:8

e

e 3:1,1 4:1,9,9 5:1,1 6:1,1 25:19 49:12 62:19 221:8 239:9,12 240:1 241:3,3,3
earlier 50:14 66:19 93:13 104:18 200:20
early 76:3 85:12 86:3 108:11,14,20 115:12 116:16 150:2
earth 230:18
easy 87:21
edge 53:18 101:15 210:18 210:19 223:3
edges 39:21 144:5,17 178:4 210:11 224:7 232:5
education 214:22
educational 215:3
effect 120:6 174:19 199:20
effective 99:1 124:14
effectively 209:11
effects 126:4
either 26:14,18 85:4 89:12 195:5 197:12 199:20 210:10 218:13
eject 84:8,12
ejected 75:18 227:22
ejection 69:2
el 66:10,11 90:11,16,17 91:1,5,7 92:4,6 92:7,18 98:21 98:22 99:2,4,5 109:7,7 120:19 158:14,16 159:18 187:22
elastic 102:21 103:8
electric 66:7,8 67:3,11,14 68:1,2 69:18 70:7 71:3 72:2 73:1,15 90:12 90:18 91:8,10 92:8,10 125:12 157:13 159:17 160:2 167:21 169:12 170:17 178:9,11 179:8 179:13,21 182:17 218:10 220:3 225:14 226:18 229:8 233:11 234:13
electrical 67:18 73:13 77:9 160:20 163:13 163:22 164:2 170:5 179:3 214:19 215:4 225:19
electrode 12:14 12:18,18 13:1 13:10,14 14:12 49:15 109:4,6 171:12 181:15 181:17,22 194:2
electrodes 108:12 178:11
electron 113:5 136:9 137:6,13
electronics 80:21 87:6
electrons 68:18 69:9
element 25:5 25:16,19 35:22 36:4,11,12 94:16 98:21 99:2 158:15,16

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

elements 36:7 94:12 105:16 164:9 187:15 231:15
eliminate 11:18 11:18 169:6
eliminates 168:20
eliminating 60:5
embodiment 41:19 66:8 67:7 89:21 90:1,4,8,9,11 90:16,19,22 92:22,22 137:8 138:4 170:2 171:1,10 172:6 172:9,13 176:11 177:5 177:12 188:11 230:22 231:9,9
embodiments 144:13 170:10 172:11 230:11
emission 78:18
emissive 85:17 94:16
emitting 158:14 193:10 231:11
employed 238:13
encapsulate 46:13 140:4
encapsulated 46:22
encapsulates 86:14,16,17 145:5
encapsulating 24:16 76:17
encapsulation 35:2,2 36:1,5,8 36:11,13,15,15 36:22 37:9,20 38:9,18 39:10 39:12,13 40:22 41:2,19,20 42:3,11 43:1 46:21 47:2,7 48:2 76:15 86:8,11,21 107:16 109:9 109:13 110:8 111:22 113:5 114:2,10,11 128:18 143:12 143:13,20 144:16,21 145:1,3 146:15 146:18 147:1 147:17 148:11 148:12 149:22 150:22 153:15 157:9 159:19 162:2,6 163:10 163:21 176:19 179:14 187:21 188:13 191:7 194:11 222:3 222:14
ends 44:12 195:22 196:5 210:11 223:4 224:8
energies 50:12 50:12
energy.gov 57:17
engineering 214:19 215:4
enhanced 105:6 111:13
ensure 121:4
ensured 75:19
entire 149:8
entirely 180:18 182:3 207:20
entirety 43:14 44:8 198:2 207:19
environmental 46:14
epitaxy 38:21
epoxys 86:11
epson 154:19 155:5,12,16
epson's 154:10 155:7
equal 68:4
equating 123:8
equipment 154:18
errata 4:7 237:7 239:14 239:16 240:3,5
error 227:2,3
errors 77:4 124:12 214:8
especially 185:13
esquire 3:3,8 239:1
essentially 16:12 52:12 63:8 112:9 130:5 156:3 166:18 167:1 181:13 182:14 182:21 183:17 223:3 229:7 233:5,9
established 161:22
et 11:14 85:18 136:20,21 146:4 149:2 178:2
etch 21:21 22:10,11,14,16 22:17,20
etchable 21:12
etched 63:1,7 210:11
evaluate 160:15 201:6
evaluating 199:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

evaporated 85:11 108:11
evaporates 183:22 184:2 185:4
evaporation 85:15 106:22 107:4,5,15 109:5 113:18 114:1,10,14,18 131:2,8 136:8 136:10,12,20 137:5,12,15,16 171:18 184:12
evaporative 131:1
eventually 175:15
exact 76:1 87:11 115:10
exactly 29:7 75:9 76:10 86:7 166:19 167:16 169:21 211:13 219:2 221:12 222:10 222:17 228:17
examination 2:4 4:2 6:5
examined 237:4
examiner 40:9 40:12
examining 8:14
example 10:10 11:11 19:1 25:10,21 26:3 26:5 34:10 46:2 47:22 48:7 53:2,6 55:6,7,13 56:7 56:17 63:3,11 65:18 67:8 68:9 77:12 81:12 86:10 93:11 100:22 101:3 102:19 110:3 111:16 114:17 130:22 135:7 139:3 144:12,14 145:16 148:5 161:17 162:20 163:6,22 165:4 165:9,10 166:21 167:6 167:18 169:12 172:13 186:5 187:3,5,12 194:7,8 195:19 196:2 199:11 200:9,12 205:6 209:13 211:8 215:10 224:5 230:21 235:9
examples 46:1 53:7 83:9 112:13 229:19 230:9 231:18
exceeds 235:17
excluding 29:21
exemplar 25:22 142:14 235:10
exhibit 4:10,11 4:12,14,16,17 4:18,19 5:2,3,6 5:7,9 6:15,17 8:5 24:6,7 52:1 52:2 56:1,3 57:8,9,10,16 89:18 117:20 117:22 118:10 119:20 143:6,8 173:12,15 189:19,22 190:7 192:12 192:12,14 202:2,3,5,8,10
exist 106:4 114:16 162:7,8
existed 86:9 132:17 133:1
existence 122:15
exists 112:11
expand 70:21
expanded 189:5
expansion 101:1 103:12 104:20 105:1
expect 94:19 132:3
expense 104:20 219:6
experience 94:1 94:3 121:19,21 178:20 214:21 215:1,6,12,22 217:13,16,17 217:19
experiment 219:4,5
experimentat... 218:4,15 219:9
experiments 218:17 219:14 228:10,13
expertise 178:20
expires 238:22
explain 138:13 138:18 200:6
explained 18:1
explicit 126:20 127:10,15 128:1,6 130:19 142:4 161:1,7 161:13 170:13 170:14
explicitly 18:15 103:22 108:19 131:12 137:7 139:18 141:11 141:18 161:9 172:7 189:5,6 205:4,7

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

exploiting 59:6
expose 120:22 121:8
exposed 12:10 41:1 144:2 164:1
exposing 123:6
exposure 120:9 120:11,19
express 164:20 168:9,13 169:11
expressly 26:14 138:18 164:15
extend 44:14 144:17 146:19
extends 145:9 145:14
extent 29:2,20 30:16 40:15 165:2 177:5 203:17 205:2,9 205:16
external 164:2
extra 27:2
extremely 68:19 69:12 183:10 233:18
eyes 29:15 31:11,12,21 168:5

f

f 4:9 5:1 189:2
fabricated 148:5
fabricating 26:14
fabrication 34:13 36:19 123:17 215:13
fact 15:19 32:13 34:9 46:19 60:2 64:22 75:1,16 77:6,17 78:5 84:18 103:7 114:17 121:3 123:14 125:1 131:5 135:13 164:1 198:16 200:18 210:8 211:3 227:17 234:5,6
factor 156:3
factors 173:10 173:17 230:2
factually 61:22
fair 51:17 72:20 209:16 217:7 220:6
fairly 57:1
false 132:15
familiar 71:11 131:19 154:22
fapr 1:21 238:21
far 14:15 19:21 85:12 214:1 219:21 220:1,2 234:14 235:16 235:17
fashion 62:6
fastened 231:15
faster 181:21
features 11:13 63:1,7 200:12
federal 240:1,8 240:9
feel 118:19 121:14,22 126:14 222:18
fellow 238:2
ferrite 231:12
fewer 17:14
fidelity 75:18
field 51:7 66:7 66:8 67:3,11 67:14,17,18 68:1,2,10,16 69:2,10,18 70:7 71:2,4,11 71:12 72:2,12 72:19 73:1,13 73:15 77:9 90:12,18 91:8 91:10 92:8,10 120:7 125:12 134:4 157:13 159:17 160:2 160:20 167:21 169:12 170:5 170:17 178:9 178:11 179:3,9 179:13,22 180:9,11 182:17 191:20 214:20 215:5 218:10 220:3,5 225:14,19 226:18 229:8 229:16 230:12 230:20 231:4 232:1 233:4,11 233:12,17,21 234:13,15 235:20
fields 126:4
figure 26:1,1,5 38:16,17,19 39:7,20,22 41:13,15,17,22 42:6,7 43:3,5 44:2,3,6,12,16 45:2 56:7,11 65:18,22 67:8 68:9 73:16 77:13 78:12 90:3,5,8,10,11 91:16,17,19 92:3,5,9,19,21 93:10,11,15,16 93:17,19 95:2 95:10 96:9,13 96:14,16 97:7 97:8,12,14,18 98:8 112:19 127:9,18,21 137:9,11,20 138:2,6,7,10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

139:17,18 140:1,17 141:9 142:10,12,14 142:15,17 143:18 144:14 144:21 145:12 145:13,15,19 146:6,6,13,21 147:4,8 148:16 162:7 166:10 166:10,18,18 167:6,18,19,19 170:3,3 171:2 171:10,20 172:6 176:1,3 176:5,6,11,15 176:18 177:2,2 177:4,5,6,8,13 188:20 189:13 194:9 195:19 196:14 204:13 208:12,14,17 209:12,21 210:14,15,19 210:20 224:5 228:4 234:8,9 235:9,10

figures 26:9 35:18 58:9 59:22 60:7 90:2,2 95:14 134:21 135:3 135:18,21 136:15 137:4 137:21 138:1,5 139:11 140:12 140:12,15 141:21,21 142:5,9 148:6 162:5 191:10 202:14

file 116:20,22

filed 107:12

fill 41:7 42:11 146:15

filled 123:9

filling 148:16

fills 41:1

film 56:14 91:3 156:21 158:15 158:17,18 185:12,17 186:19

films 192:4

filter 76:19

filters 76:4,5,7 76:12,14 151:5 151:6 152:3,5 153:6

final 68:3 181:14 194:21 195:4,20

finalized 7:8

financial 238:15

find 33:2,15,16 87:21 117:16 197:14 231:4

fine 14:7,7,11 24:11 25:14 89:4,12 129:11

finished 88:17 116:13

finite 134:13

firing 64:20

first 8:11 33:5 35:22 36:5 41:18 52:4 85:6 86:4 87:2 87:18 88:19 103:6 106:5,22 107:5,7 109:14 116:9 119:11 146:18 153:20 166:1,4 186:22 194:10 229:20

firstly 32:21 198:11

five 178:5 201:21 224:10

flash 113:18 114:1 131:2,8 136:12 137:16

flat 11:8 93:5 96:10,12,15 99:22 196:3,9 196:10,18 197:5,9 198:1 198:21 204:1,8 204:10,17 205:18 206:1,2 207:5,20 209:10,19 210:1 211:12 212:2

flatness 93:21

flattening 198:6

flattens 210:17

flatter 200:13

flexible 106:13 108:10,17 133:9 189:2,3 189:16

flight 183:4 184:2,12

flow 50:8 84:16 112:15

flux 231:13 232:9,11,21 235:21

foam 189:12

focus 58:12 80:20,22 119:7

focusing 180:10

foil 186:5,6,7,9 186:16

foils 108:10,17 114:19,20

folder 8:5

follow 23:12,14 92:2 127:7,19 132:2 226:20 227:12,15

followed 60:18

following 15:4 42:2 138:21 165:19 166:6 166:19 190:12

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

190:20
follows 6:4 53:15 92:16 127:21 160:13 227:13 239:8
food 105:19
force 230:1,6
foregoing 237:5 238:6,8
form 20:15 35:5 60:6 65:4 92:1 144:3 156:3 164:10 164:22 165:7 186:17 206:9 213:19
formation 138:2,11 139:9 165:14,19 166:5,6 171:12 183:18
formed 38:19 39:14 90:12,18 90:22 91:4,7 91:20 92:3,6 92:10,17 98:21 138:14,19 161:8,11 171:3 171:7,14,17,22 171:22 188:12
forming 87:8 91:1,5,20 92:18 94:11,14 95:20 127:12 128:3 138:8 142:11 171:22 177:9
forms 97:21 127:1,11 128:2
formulate 7:3 82:10
formulated 119:15
formulation 165:19
forth 131:3,14
found 8:12,13 19:22 69:22 70:14,17 189:15
founded 58:4
four 58:9 165:14,18
fourier 16:19 16:22 17:2
fpc 188:11,16 188:19,19,21 188:22 189:15
fraction 55:4 227:7
frame 76:2 160:18
frcp 240:1
free 102:6 110:12 118:19 121:14 126:14
freely 172:10
frequency 15:18,22 16:1 16:7,8,10,11 17:5,5,6,8,11 17:13 54:19 55:4 60:5
frequent 16:3
frequently 15:7 175:7
friday 1:12 2:10
front 143:7 222:9 231:11
fujimori 55:15 55:16,21 56:11 173:8,15,21 174:1,10 229:17,20 235:19
full 76:17
function 10:19 15:20 17:9 50:22 98:9
functional 186:14
functionality 20:1
functions 104:4
fundamental 155:22
further 28:11 33:6,8,20 34:15,19 36:12 68:3 89:3 99:3 167:10 170:12 198:3 205:15 236:2 238:16

g

g 6:1 27:1,3 62:19 77:18
gap 41:6,7 146:16 148:16
gaps 42:8
garr 3:3 21:8 23:19,22 24:2 28:8,18 29:10 30:7 31:5,17 32:7 34:7 35:5 37:10 43:11,21 44:9 45:12 48:5,15 49:4 51:14 53:20 55:11 58:20 59:21 89:9 97:2 107:17 119:3,12 129:7 132:7 135:10 158:20 159:6 160:12 164:19 166:12 168:22 173:11 185:7,9 199:21 200:16 203:11 207:13 213:19 222:13 224:11,16,19 224:22 225:6 236:4,7 239:1
gas 64:4 112:16 123:6
gaussian 77:17 77:17,22 226:11,12,20

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

227:1,4,5,12,14
227:15,18,19
228:11
general 10:6
18:13 20:3
74:6 80:11
84:13,18 86:15
88:3 97:4,10
97:17 131:17
132:2 139:14
153:11 157:21
198:14 217:4
217:18 230:4
generally 10:17
10:18 11:4
18:18 19:4,11
20:21 44:14
64:2 65:7 81:4
90:8 92:2 93:5
94:19 106:2
125:20 149:1
174:19 177:22
184:11 212:18
227:13 232:7
generate 64:3
83:16 112:8
226:9
generated
182:20
geographical
129:21,22
geometric
200:4
geometry 179:8
179:21 180:11
234:20
ghosh 27:1,3,4
27:5,16 28:11
28:13,15,15
29:3,9,21 31:4
31:9 32:14
33:2,8,10,15,21
34:6,15,19,21
35:1,14,18
36:2,3,10,19
37:4,8 38:4,12
38:15,18 39:5
40:22 143:6,12
143:13,19,22
144:1 146:6,13
146:22 147:2,4
147:9,10 148:3
148:4 149:10
161:19 162:1,1
162:5,6,11
163:9 164:11
165:5,12,16,16
166:21 194:9
194:10 223:14
ghosh's 36:14
37:19 38:8
144:21 147:12
148:10,15
give 17:3,3 55:7
180:4 230:12
230:13,19
231:1 235:1
given 30:16
53:12 54:2
60:7 64:14
65:5 70:4 92:2
92:14 103:15
114:12 119:17
120:4 200:18
204:2,8 205:10
206:15 216:4
218:2 229:19
230:5 234:1
237:6 238:10
gives 67:1
78:20 97:19
98:13 230:8,16
231:3,12
giving 144:18
glass 150:15
151:13,18
152:14,15
153:7,9 161:11
161:11 164:10
165:1 187:3,5
187:16 193:13
193:18 223:15
glasses 150:3
151:13 152:13
166:22 187:5
glove 121:4
123:14
glue 163:5
go 15:15 19:21
33:15 35:10
38:2 40:6 43:3
51:22 57:3
58:6 60:10
74:21 75:9
89:3,20 117:20
118:10,21
121:11,16
126:12,14
135:10,11
140:1 150:10
183:7 190:10
194:4 201:13
224:9,14
228:16
goal 11:15,20
goes 99:7
124:20 127:1
139:8 171:4,15
172:8 177:2
going 20:16
21:22 25:12
49:5 68:8 79:7
89:5 105:15
121:8 122:8
126:1 129:8
132:7 200:5
201:10 203:13
221:9 222:5
223:10 224:12
227:20 228:16
232:7 234:22
235:16
good 6:7,10
55:6 105:2
231:22
gosh 4:19 143:8
graduate 106:8
217:1
graph 17:1

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

gravure 62:8 62:13,14,20 63:13 81:14
grid 209:13,17 209:20 210:1,2 210:7
grill 62:18
ground 26:22 29:7,8,21 30:14,14 31:2 32:19,19 33:3 33:18,22 34:1 34:4 50:20,22
grounds 27:6
group 71:14 86:2 88:11 111:1
groups 85:20 88:1 110:19
guaranteed 82:17
guess 48:16 56:10 64:17 88:4 107:12 124:18 133:4 193:15 194:10 234:9

h

h 4:9 5:1 27:1,1 27:3,3 241:3
h10-41069 5:5 173:13
half 88:19,20 235:13
hand 8:21 23:12 69:1 79:11 81:8,11 86:8 94:13 147:19 181:19 229:21 230:12 231:8 233:8,8 238:19
handle 155:19
handled 239:8
happen 37:5 175:7 201:10
happened 8:18 37:15 87:19 179:10
happens 77:20 100:9 183:20 210:2 211:11
happy 222:10
hard 62:22
harder 83:19
hardness 95:22 104:6,9,12,19 104:22 206:20
head 13:12 70:11 82:3,5 110:3,21 113:13 155:5 155:15,20 179:9,22 220:12
heading 190:16 190:20
heads 82:19,21 83:1,3,8 152:19 155:16 156:1 218:7
hear 107:2 138:17
heard 47:3 51:2 221:4,14,20 222:4,18
heavy 181:9,10
height 16:16,22 50:19,21 51:17 60:3
heights 51:6
held 232:11 233:22
help 28:2 104:16 105:3
helpful 129:10
helps 197:22 198:6 199:3
hereunto 238:18
hermetic 105:20
hides 95:11
high 17:5,11 60:5 63:9,10 68:19,20 69:11 82:2 95:22 100:17 104:6,9 104:11 105:21 120:15 136:7 136:10 137:12 137:14 139:4 139:10,15,19 139:20 140:8 140:11 141:14 141:19,20 142:5 179:19 181:18 187:4 233:16
higher 76:14 78:17 79:11 84:19 181:12 182:1
highest 229:5
highlight 97:6 97:15
highly 156:17
history 116:20 116:22
hit 74:17 229:10
hitachi 230:18
hits 185:4
hmm 84:10 136:2 193:8 205:19
holes 230:16
honestly 43:22 109:10 119:4
hong 3:8
honors 116:14
horizon 70:22
hour 89:10
hours 218:21
huge 64:14 80:20
humphrey 4:18 69:14 117:5,17 117:22 120:2

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

humphrey's 117:7 119:21 232:19
hundreds 180:22
hydrocarbon 182:12
hydrocarbons 182:10,11
hypothetical 17:21 22:7,8 23:13 34:16 69:6 200:1,17 200:19,22 201:2,8,11,17 203:12,15 204:2,9 205:14 206:18 209:9 219:17
hzhong 3:10

i

idea 34:12 36:19 178:10 199:22
idealities 75:8
ideally 82:16
identification 6:18 24:8 52:3 56:4 57:11 118:1 143:9 173:14 189:20 192:15 202:9
identified 188:2
identifies 125:6
identify 131:11
ignore 131:6 235:8
ignored 234:11
ignoring 126:19 127:15 127:22 128:7 166:14
imagine 150:21
immediately 190:20
impact 68:17
impermeance 147:18
impinge 233:1
implement 216:18
implementati... 191:12
implementati... 66:2
implemented 172:10
importance 17:4
important 206:4 233:14
importantly 20:21 204:12
importing 147:2 148:2
impose 19:15
imposed 206:10
imposes 19:4
imposing 206:6
imposition 12:11 18:7 206:2
impressed 150:12
incidentally 201:9
include 29:9 31:12 32:3 50:9 175:17
included 156:12 239:14 240:3
includes 30:1 113:9 185:13
including 9:20 42:12 80:22 86:1 87:6 98:7 143:15 160:2 162:3 167:9
incompatibili... 192:19 193:19
incompatibility 193:3
incomplete 201:11 219:17
inconsistent 201:16
incorrect 16:5 34:17 69:16 120:21 125:1,8 125:13 127:16 129:2,3 153:14
incorrectly 123:16
increase 10:19 11:1,3 15:1,21 16:2 181:14 201:17 207:22 234:3
increased 67:22
increases 11:1 18:5 67:22 199:19 207:18 234:5
increasing 207:10
independent 28:16 31:3 33:11,14 197:11
indicate 42:1 91:12 204:9 208:6
indicated 77:15
indication 230:4
individual 24:21 41:5,8 42:8 46:6 142:7 157:2,6 162:8 164:22 165:7 166:16 167:3
individually 186:12

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

induced 68:21
industrial 72:2
industry 150:9
inform 37:5
information 40:2 42:5 49:5 51:20 58:22 121:18 150:17 203:14,21 205:10,15 206:16 208:5 216:4,10 218:7 219:20,22 225:17 229:18 230:13
informed 122:4 136:17
inherently 26:14
initial 7:4,5,13 7:19 40:19 206:17 207:3 207:20
injection 74:19
ink 20:11 49:21 50:2,3,5,13 63:3,6,6 82:15 85:16,22 86:3 86:5 115:1 116:1,2,5 123:11 125:12 128:17 194:21
inkjet 49:1,7,12 49:14,20 57:17 64:10,13,15,19 65:1,8,10,11,13 65:16,17,21 66:3,9,14,16,19 66:21 74:3,7 74:11,14,17,19 74:20 75:14,15 75:21 76:5 77:1 80:6,12 80:21 81:2,3 81:10,21 82:2 82:3,5,7,8,12 82:13,18 83:3 83:10,21 84:5 84:7,15,18,20 85:9,13 86:9 86:10,13,20 87:18 88:2,5 116:4 123:12 123:13 124:4,5 130:7,15,19 131:13 134:15 149:22 150:2,8 150:14 151:5 153:1,12,22 154:6,10,19 155:1,3,7,20,22 157:12 160:20 170:5 184:8,10 184:12,14,18 184:20 195:5 195:10 220:9 225:15,20 226:12,14 227:1,8,8
inks 81:6 82:8 82:10 184:14 184:18
inordinately 152:12
inorganic 60:17 61:1,7 62:5,16 112:6 116:5 158:17 171:13 193:12
inorganics 115:11
inside 121:4 137:19
instance 25:10 203:21 205:11
instances 47:18 156:19 157:1
institution 122:7
insufficient 33:19
insulating 185:12,16 186:17,19
integrated 156:18
integrity 163:5
intended 11:12 75:3
intentional 11:10 202:20
intentionally 128:16 162:1 206:11
interact 233:4
interchangea... 47:11 51:4,8
interconnecti... 87:5
interest 74:15 238:14
interestingly 131:5
interface 47:22 48:9 102:4,9 194:1
interfacing 194:1
interlayer 187:14
intermediate 47:20
internal 50:12
international 1:7 239:4 241:1
internet 57:4
interpret 29:4
interrupt 14:4
intimately 131:15
intrinsic 74:19
introduced 77:4 205:8,21 207:6,21 234:10,14 235:15,18
invalid 34:20

invalidity 28:6
invention 75:20 110:20 116:17 117:13 138:5 149:18,20 191:14,15 220:16
inventive 157:21 158:10
inventor's 129:15
inventors 30:20 32:3 122:14
involved 131:15
involves 32:14
ion 185:14,17 185:22 187:2 187:11 188:2
ionize 179:4
ions 69:9
ipr 1:5 6:13 9:2 9:11 236:2
irell 3:9
irell.com 3:10
irregular 52:6 127:13 128:4
irrelevant 159:3
islands 143:17 143:21 146:16
issue 7:1,17 8:21 9:10 10:10 24:20 25:7 30:2 32:2 47:17 69:8 79:18,22 121:5 123:15 144:15 161:18 174:10 175:5,20
issues 57:4 188:1
item 42:8
items 7:17 105:21

j

j 49:12
japan 5:4 173:12
jersey 129:16
jet 49:12 81:12 86:5 115:11 128:17
jetted 85:16,22 86:3
jetting 20:11 116:1,2,5 123:11 125:12 194:21
jim 8:18 86:2
job 1:22 83:16
jp 5:5 173:13
jumping 128:22
june 238:19 239:3

k

k 49:12 190:2
kateeva 57:19 58:4 59:13
keep 74:20 79:13,14 82:3 89:5 225:9
keeps 211:12
key 140:7 207:5 229:4
kind 16:4 89:6 194:17 208:21 217:3
knew 8:16,18 8:19 58:1 122:18
know 8:10,12 8:18 28:3,21 29:1,22 30:1,4 30:18 43:22 44:5 54:2,9 57:20 58:4,7 58:22 69:14 71:9 72:15,20 77:3 79:18 80:10,16 85:12 85:17 86:6 87:17 89:5 104:13 105:16 106:15 107:20 108:15,19 109:10,21 110:1 111:3 112:11 113:20 114:11 115:10 120:16 121:14 121:22 122:18 122:20 129:5,7 129:13 135:19 143:19 150:1,2 150:4,7 151:2 151:3,4,7,12,15 152:1,1,6,7 153:5,6,17,18 153:19 154:3,5 154:9,20 156:6 160:1,5 161:3 168:3 200:1,7 208:15 214:2 215:7,8,10,11 215:18,19 216:2,14,19 217:3,6 218:9 218:19 219:17 220:1,2,11 221:12 222:9 222:17 223:6 223:14 225:22 226:3 228:20 229:11,15,16
knowing 122:19 210:9 234:19
knowledge 26:19 27:13,19 31:13 32:16 161:17 165:4 214:14 215:2 215:17 216:6 216:17
knowledgeable 132:3

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

known 29:19 30:22 34:14 39:1 79:14 130:22 159:3 159:14 160:6,9 165:22 174:2 174:15 175:5 175:13 183:5 184:3
kodak 85:6,8

l

lab 57:22 61:16 61:18 80:20 86:5,10 88:16 108:3,6,9,15,19 109:22 111:15 114:9 116:7 124:5
labs 107:22 113:9,12
lag 83:18
laid 39:13 41:20 144:2
landing 78:7
language 171:11
large 64:21 65:12 82:19,22 83:5 87:5 134:12,13 156:13 179:7 182:16 184:2
largely 53:15 56:21 90:5 98:15 232:16
larger 44:7 47:19 75:3 132:19,21 133:13 152:19 165:1 184:10 227:7
largest 149:19 149:21
laser 21:15 22:21 23:15 166:6,11
late 83:2
lateral 144:15 233:15
laterally 144:19 166:16
law 238:8
lay 32:21
layer 9:14 10:1 10:4,7,12,13,14 10:22,22 11:16 11:20 12:10,11 12:17 13:9 14:1,14,16,17 14:20 15:10,14 17:18,20 18:2 18:5,5,8,16,19 18:20,20 19:10 19:14,18 21:5 21:16 35:2,3 36:1,5,12,13,15 36:15 37:9,20 38:9,19,21,21 39:10,13,13 40:1,1,22 41:2 41:19,20 42:11 47:3,4,7,7,20 48:1,2,3,4,12 48:14,19 49:2 49:3,8,9,16,17 53:22 56:5,11 56:20,21,22 58:14 59:12,13 59:20 60:6,17 62:5 66:11 80:7 87:4,7,8 91:1,3,5,7,9,19 91:20 92:1,3,9 93:22 95:3,3,9 95:10,11,14,20 96:19 97:21 98:6,6,9,15,19 98:20,22 99:1 99:4,5,8,12,17 99:18,19 100:7 100:9 101:4,5 101:9,14,14 102:7,15,19,20 103:17,21 104:6 107:16 110:8 111:22 113:5 114:2 115:2 122:22 124:19 125:7 126:18,21 127:1,8,20 132:22 140:18 140:18,19 141:5,9,10,11 141:14 142:1 143:12,14,20 144:1,21 145:1 145:3 146:8,18 148:11,12,22 149:3 151:21 153:16,22 159:18,19 162:6,15,16 163:7 164:16 164:16 165:14 165:18,19 166:2,5,6 170:21 171:2,3 171:17,21 172:1,3,6 174:13 175:22 175:22 176:1,2 176:8,8 177:9 179:14 186:17 187:21,22 188:13 191:7 192:4 194:11 196:10,10,11 196:15,15,19 196:21 197:3,6 197:12,15,16 197:17,20 198:2,3,6,8,13 198:15,18 199:1,5,11,17 200:10,15 201:6,7,7,19 203:3,10 205:3 205:11 207:11 208:13 209:2

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

209:15 210:5 210:12,16,17 210:21 211:1,7 211:10,17,18 211:19 222:22 223:2,4,19 224:5,7
layers 36:8,22 38:20 39:14 47:18 55:17 58:16,18,19 85:17,18 86:18 88:2 90:17,21 92:18 95:1 101:11 105:14 105:19 109:7,8 116:5 124:2,6 124:9,14 125:8 127:6,19 128:18 130:20 132:20 133:16 136:5,7,10,13 137:10,12,14 137:14 138:22 139:2,3,4,7,10 139:14,15,19 139:21 140:8,8 140:11 141:15 141:19,20 142:6,7,14,14 144:16 148:3 162:2 163:4 167:4 190:12 190:17 191:2,3 193:22 194:6
231:11
lcd 76:21
lead 74:15
leads 124:12
learning 38:5 217:3
left 93:19 210:18 231:8 233:8
legal 239:7
legally 6:3
letter 156:5
level 82:2 120:16 132:2 214:13 217:11 217:21
levels 58:2 93:21
light 30:18 33:16 158:14 192:20 193:4 193:10 223:13 231:11
lighter 181:20
likelihood 104:3
likely 152:3
limit 155:22
limitation 10:14 28:10
limited 151:6
limiting 131:5 131:14 139:12 139:13 220:15
limits 81:3
line 42:19,20 42:21 163:2,18 163:18 170:13 232:9 239:15 240:4 241:4,7 241:10,13,16 241:19
linear 152:17
lines 41:22 42:13,13 43:2 143:15 162:3,7 163:4,5,7 164:12 170:3 190:21 232:12 232:13,15,21 235:22
liquid 20:15 52:16,20,21,22 53:1,3,5 76:4,5 182:20 183:13
list 8:9 117:2 131:13
listed 129:16
lists 165:21
literature 86:13 109:19
little 12:4 23:20 83:19 89:3 110:13 139:22 145:9 178:1 234:5
llp 1:15 2:9 3:3 3:9
locate 7:11
located 8:6 177:14,20
location 45:8 68:3 74:21 129:21,22
locations 76:8 172:22
locked 239:12 240:1
long 86:11 198:6 218:18 219:13 224:12
longer 206:2
look 8:4 10:10 15:9 24:3 25:15,22,22 26:4 28:13 33:7,21 34:10 37:11 38:12,14 38:15 39:9,20 41:4,13,15 43:7 44:1 54:19 55:7 56:7 60:4,11 62:2 65:7 71:7 77:12 93:15 95:16 98:11 117:2 136:17 138:3 140:1,15 140:22 141:7 142:20 144:13 149:4 154:17 158:11 165:16 170:15 176:6

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

183:11 185:5 188:6,20 189:21 192:11 192:16 194:9 196:21 197:13 202:13 210:8 210:15 224:3 228:4 229:20 230:10 231:22 235:9,9
looked 71:17 72:10,15,21 87:21 117:10 142:17 154:4
looking 8:11 41:16 117:11 117:18 176:13 197:9 204:3
looks 136:15 208:1 209:11
los 3:10
lot 17:11 58:22 61:19,20 63:12 77:21 117:3,16 120:3,9 187:4 187:6 221:12
lots 88:5 121:11
low 17:6,13 82:7 139:19,21 140:8 141:19 141:20 142:6
lower 15:22 139:14 179:20
lunch 89:2,8,10 129:9 135:14 143:2

m

made 63:2,2 85:7,13 90:17 91:3,9 94:8 95:20 98:20 105:17 133:15 158:15,17,18 171:13 175:9 175:11 214:8 230:18
madigan 57:19 57:20 61:13
magnet 230:3 230:17,18 231:1,4,12,20 232:3,4,5,7,8,9 232:11,12,17 232:21
magnetic 68:10 68:16 69:2,10 69:17 70:8 71:2,5 72:3 73:2,9,10,22 120:6 126:4 220:4,10 229:16 230:1,6 231:13 232:1 232:14,20 233:4,12,17,21 234:15,19 235:20
magnetically 68:21
magnets 230:14
magnitude 15:5,9,20 102:13 229:22
main 75:4 94:5 104:12
maintain 182:2 229:9
major 79:18 120:1 152:20
make 13:11 28:2 45:21 49:2,16 70:5 76:3 81:9,9 82:10 114:18 131:13 144:12 148:21 192:4 194:5 200:13 231:19 239:14 240:3
makes 122:10 137:9 146:11 149:12 189:17 194:12,15 199:16
making 79:21 80:21 151:17 153:5,6 186:14
manage 149:2 152:14,15
managed 111:1 175:14
manella 3:9
manners 187:21
manufacturing 71:22
map 25:19
mapping 24:17 24:19,20 25:6 25:9,15 36:20 45:17
marjorie 1:21 2:5 238:2,21
marked 6:17 8:4 24:8 52:3 56:3 57:10 117:22 143:9 173:13 189:19 192:15 202:8
mask 23:3,9 69:18 70:8 71:5 72:3 73:2 75:12,15,19 76:9 77:1,8 78:6,9,17 79:2 105:11 110:10 110:13 112:1 125:12,18 171:8 172:3,7 172:13,14,18 173:6,7,9,16 174:7,7,11,12 174:16,20 220:4,10,21,21 221:1,1,5,8,11 221:11,13,14

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

221:21 222:4 222:12,21 223:2,7,11 224:1,4 230:5 230:7,14,15,17 231:10 232:10 232:11,15 233:21 234:20 235:22
masked 128:17
masking 76:6 106:1,3 111:17 135:1 165:13 165:18 166:2,4 174:19 175:3
maskless 74:4
masks 73:6,10 73:19 74:7,9 74:12,15 75:20 78:10 79:14 105:13 106:13 115:21 134:21 172:21 234:19
mass 57:18 181:20 182:12 182:12,13,15 218:12 226:6 226:15 227:11 227:13,21 228:9
massive 83:21
master 181:4
match 103:9,12
matches 105:2
matching 101:1
material 20:4,7 20:14,16 21:3 21:5,10,11,12 21:20 22:4,10 22:20 23:3 30:3,21 32:16 43:2 44:13 48:14 49:15 60:18 66:11 75:17 85:16 90:17 92:15 95:19,21 97:19 97:20 98:20 103:9 104:5,9 104:11 127:11 128:2,14 137:10 139:4,5 139:10 147:17 147:20,20 148:21 158:16 158:17,19 167:7,20 168:1 169:13 171:14 172:17,21 175:3 183:2,15 186:17 187:16 192:20,21 193:3,4,5 195:1,22 196:1 196:21 197:4,6 199:9,10 200:10 205:6 206:21
materials 61:2 62:17 86:1 90:12 102:21 112:6,15 120:19 124:17 130:21 131:20 136:5,7 146:3 149:22 150:8 151:1 167:10 168:21 169:7 171:5,16 180:16 192:19 193:10,11,12 193:12,16,17 193:19,21 194:2 197:18 214:20 215:4 217:18
mating 164:2
matrix 43:9 46:1 92:19 93:1,5,6 94:6,6 94:7,20 177:10 177:11,15,15 177:20
matter 6:22 7:1 7:4 32:2 35:16 47:17 48:8 122:11 159:11 165:6 178:18 180:2 181:1
matters 37:7 159:12 227:16
maximum 232:22 233:20
mean 9:16 10:17 12:9 13:3 16:10 18:9 20:2,3 30:10,12 32:10 33:14 42:15,20 43:12 47:16 49:19 52:10,18 59:4,5 60:22 61:21,21 63:21 68:15 69:15 73:3 74:6 77:2 78:12,14 79:20 80:14,15 83:15 85:1,2,10 86:11 87:21 88:3 92:12 93:20 94:5 96:5 97:21 98:1 104:7 107:19 109:18 110:2,12,16 112:20,21 119:4 120:5 125:2 128:20 129:2,15 132:1 132:20 136:18 140:6 144:8 146:10 147:22 148:18 150:18 151:6 152:20 154:14,15 155:2,20 156:15 157:6 157:20 158:2,7

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

167:15 168:1 177:17 178:13 196:17 200:6 204:19 205:12 207:16 210:8 210:20 211:22 212:18 213:21 214:5 215:19 215:20,22 216:13,19,21 223:6 225:18 225:22 226:5 226:22 235:5

meaning 214:4

means 60:13 64:4 82:9 83:4 96:6 134:11 165:22 226:14 235:6

meant 55:22 92:8

mechanical 39:15 100:16 104:14 230:5

medium 17:5

meet 212:20 213:6,8

memorized 121:12

mention 130:15

mentioned 50:15 81:13 84:8 154:10

mentions 52:16 154:18 172:2 173:8

merit 2:6 238:3

met 57:21 58:5

metal 63:2,2 87:7,8,18

metallization 87:4

metals 115:14 230:18

meter 150:3,14 151:13,17,18

method 63:18 66:7,9,10,10 67:4 69:19 70:7 71:4 73:1 73:14,16 77:10 90:13,19,22 91:4,8,10 92:4 92:6,7,8,11,17 123:12 125:13 135:19 157:13 159:18 160:11 160:20,21 168:20 169:6 169:12 170:5,6 170:17 177:9 178:10,12 179:14 182:17 182:18,21 218:11 220:4 225:15,15,20 225:20 226:19 234:13

methods 66:9 73:16,20 74:3 80:8,13 170:9

micrometer 13:22 14:14

micrometers 81:5 124:10

micron 13:9

microns 13:15 124:6

microphone 107:2

migrating 187:12

million 74:16

millipascal 82:9 184:21

mimic 96:18

mind 12:3 14:5 219:2

minimal 79:16 184:11 233:2

minimum 81:4 164:3

minuscule 68:22 69:8 234:6,10 235:4 235:5,6

minute 39:8 178:5 201:21

minutes 129:9 132:8 135:12 224:10

mischaracteri... 32:8 169:1 207:14

mismatch 104:20

missed 145:2

mit 57:22

ml 66:1 155:6 155:10

mlp 66:1 155:5 155:10

mm 84:10 136:2 193:8 205:19

model 155:15

moderate 182:10

modified 205:14

moisture 19:13 19:19 96:1 99:3 104:3 121:1 123:9 144:4

momentum 68:20 69:12 181:11,18 182:2

money 63:12 63:12

morning 6:7,10

mother 54:10 151:13 161:11 161:11 166:22 223:15

motion 69:1 75:5 233:13 234:1

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

motors 152:18
move 152:19 187:7 233:12
moveable 185:13,17,22 187:2 188:2
movement 50:11
moves 233:9
moving 69:11 75:6 126:9 183:22 232:22 233:10,16
multi 87:4 132:22 148:22 149:3 160:21 161:7,10 192:4
multicompon... 157:3
multilayer 87:5 87:18 162:21
multiple 24:21 76:18 84:12 103:21 104:4 139:2 148:4 151:10 152:10 152:10 153:1 153:10,12 154:1 156:8,11 156:15,19 157:20 161:12 164:9,17,21 166:22 192:3 223:15,16 227:2

n

n 3:1 4:1,9 5:1 6:1 49:12 77:18 221:8
name 6:8,10 9:8 88:15
nanometers 12:19 13:16,18 13:20 14:12,13 15:13,16 175:10
narrow 234:4
natural 234:7 234:12
naturally 77:20
nature 29:22 54:10 226:14
nda 150:19
near 228:21 229:21 235:12
necessarily 29:9 31:9 48:3 48:14 49:2,16 49:18 83:13 93:7,13 103:7 125:7 160:13 216:4
necessary 185:16 198:4 239:14 240:3
necessitates 184:22
need 12:4 20:8 21:17 37:3 38:2 40:2,6 45:19 46:10,13 46:18,21 49:5 51:20 74:15 80:9 85:2 135:10,13 146:15 159:9 160:1 180:9 203:13 217:4 219:21 221:9 221:13,17 222:5,8,16,19 225:17 234:17 234:21
needed 70:1 87:6 144:18
negative 126:3 168:15
neither 238:13
net 75:7
never 11:19 70:6 72:22 73:22 83:21 167:13 193:21 218:1
new 108:8 129:16 150:15 157:14,15 160:8 200:21 202:3 217:1,2
nice 194:8
nitride 193:13 193:17
nitrogen 121:4 123:13
non 11:6,6,12 11:14,21 15:6 15:7,10,12 38:10 39:3 52:16,22 53:5 53:8 54:5 55:5 55:19 56:19 75:8 137:14 162:16 168:14 197:1,1,13 198:18 199:4 199:12,14,16 199:19 205:8 205:13,22 207:6,11,18,22 211:8,14,19 212:3 214:11 214:11,12 232:6
nonselectively 61:2
noon 89:1
notary 2:7 238:5
notating 239:15 240:4
note 18:14 122:2,6 170:11 171:7 176:10 176:18
noted 14:5 98:19 172:8
notice 39:21
noticed 41:6 174:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

novel 157:18 157:20 158:3,5 158:13 159:2,4 159:12,19 160:3
novelty 157:18 158:22
november 122:13
nozzle 64:20 65:3 84:8,11 112:10 115:18 134:22 136:17 227:22 235:12
nozzles 64:22 83:4 84:2,6 112:4 136:15 136:19 155:10
number 1:22 41:6 64:21 65:13 83:1 90:9 94:10 134:12,13 178:13 192:12 202:11 218:21 228:22 229:1 239:15 240:4
numbers 13:12 15:9 42:9 82:19 83:6 156:13 231:2
numerical 178:18 229:11
nw 1:17 2:9 3:4

o

o 4:9 5:1 6:1 27:1,3 190:2 221:8
oath 6:4 238:8
object 213:19
objection 21:8 28:8,18 29:10 30:7 31:5,17 32:7 34:7 35:5 37:10 43:11,21 44:9 45:12 48:5,15 49:4 51:14 53:20 58:20 59:21 97:2 107:17 119:3,12 158:20 159:6 160:12 164:19 166:12 168:22 199:21 200:16 203:11 207:13 222:13
observed 175:2
obtain 230:7
obvious 27:14 33:5,16 70:5 132:21 134:15 167:16 169:17 169:20 176:17
obviously 19:3 29:15 59:1 118:7 147:16
obviousness 28:22 29:14,22 30:12,15,17 31:10,10,20,21 32:13,15 33:9 40:7 69:21 70:15 168:5 223:13
occur 42:7,17 43:1
occurrence 16:3,8 17:4
occurring 17:12 77:20
occurs 233:2
october 238:22
offer 142:5
offered 30:13 119:13 161:12 212:14,17,21
offering 37:14
office 1:1 239:11
oh 43:16 53:12 67:19 105:9 106:7 131:8 150:1
okay 8:22 11:4 11:22 12:8,15 12:16,20 13:7 14:15,22 16:17 17:16 18:3 20:10,20 21:2 23:1,18 24:10 24:12 25:13 26:12,21 27:4 28:4,14 29:5 31:14 32:20 34:2,22 35:12 35:17,21 36:6 37:13 38:11,13 39:1 40:21 42:10,18 43:4 43:16 44:10,17 45:9 46:9 48:22 50:3 51:9 52:5,14 54:13 56:9 57:15 58:8,13 59:18 60:12 62:1 68:6 70:20 71:10,18 72:11,16 73:18 74:2 78:14 80:19 87:14 88:21 89:19,22 90:10,20 91:6 91:14 93:3 95:8 98:13 99:10 101:8 102:16,22 103:6,14 105:4 106:17 111:11 111:18 113:17 113:21 117:1,7 118:3,3,10,13 118:17,20,22 119:9,19 121:10,16 123:4,19 125:10,21 126:8,9,15

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

127:4,17 128:8 129:4 130:13 132:4 134:10 135:15 139:22 140:3,14 141:1 143:1,7,22 145:17 148:7 148:14 149:17 151:9 159:16 167:5 168:12 168:18 181:3 185:10 187:18 188:5,9 189:7 189:18 190:9 190:10 191:1,9 192:10,13,17 194:19 202:3,7 202:15 203:19 206:3 207:8 208:8,19 209:3 210:22 212:4 212:15 214:12 216:22 220:14 221:19 226:17 227:10 228:15 230:8 231:6 236:1

oled 12:2,5,7,17 36:1 41:1,5 42:12 45:11 46:6 48:13 49:15 57:18 71:12 84:21 85:6,8 86:5 93:1,5,6 94:12 94:16 113:4 114:4,13 115:14 121:21 123:7,17 133:12,18 138:7,11 140:4 140:18 141:2,3 141:6,17 142:2 142:8,19 144:17 156:8 156:15 163:21 178:22 179:5,9 179:10 180:12 181:2 186:13 191:3 193:20 194:4,14,16 208:11,18,22

oleds 19:11 61:19,20 72:6 72:13,18 85:13 86:1,3,15 92:20 106:14 106:18,20 107:4,21 108:9 109:12 111:3 111:17 112:3,5 112:12 114:20 115:7,13 131:16,18 133:3,6,16 146:14 156:12 156:20 157:1 175:17,19 177:15,16,20 186:8,10 191:17,21 192:9 220:5,8

once 182:20

ones 8:1,6,6 58:12 97:14 152:7

ongoing 129:8

onus 88:4

open 25:12 57:13,14 87:8 118:13 190:4 202:4 220:21 221:1,5,8,11,13 221:14,21 222:4,12

opening 190:5 222:21 223:5 223:11,18 224:1,6 230:3 235:12

openings 223:7

operation 42:2

opinion 33:9 37:14 38:8 119:10,14,16 134:14 135:2,5 137:3 159:20 161:13 212:14 212:21

opinions 7:4,5 7:8 120:16 212:17

opportunity 150:10

optical 149:4

optimizing 175:12

option 60:17 79:4

optionally 39:12

optoelectronic 72:19

order 13:19 99:12 146:14 171:21 217:5 219:14

ordinary 27:17 27:20 61:12,14 130:6 144:9 160:10 174:2 214:4,14

organic 48:13 49:2,8,9,14,16 58:14,16,18 59:12,13 80:7 85:22 91:3 95:20 98:20 102:18 109:7 115:2 123:15 124:19 136:11 137:15 158:16 158:18 183:13 190:12,16 191:2,3 192:19 192:20 193:2,4 193:10,19,22 194:6

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

orientation 93:16
oriented 69:13
origin 227:1
original 239:10 239:20,22
origins 11:9
outcome 238:15
outliers 75:10 75:12 77:5 78:2,5,7
outside 72:12 114:13 134:18 191:20 196:1
overcame 40:16
own 19:15 62:2 80:16,18 82:3 88:11 100:8 116:6 135:6 175:3 176:5
owner 1:8 2:3 3:7
owner's 118:5
oxidative 123:8
oxide 38:19 144:1
oxides 114:15 114:15
oxygen 19:7,13 19:19 21:11 22:16,16,19,19 96:1 99:4 104:3 121:1

p

p 3:1,1 6:1 221:8
p.m. 89:15,15 135:16,16 143:3,3 178:7 178:7 201:22 201:22 224:13 224:13 236:9
package 163:5
pad 14:10 164:1 176:2,4 176:16,19 189:12
pads 163:13,22 164:7,13 176:4 176:7,15,21 177:14,19 178:1,3 188:12 188:17,18
page 4:2,10 5:2 25:20 26:2,5 26:10 27:11 56:8 58:6,10 60:10 93:18,20 95:17 97:8 165:11,11 195:12,14 229:21 230:11 231:7 239:15 240:4 241:4,7 241:10,13,16 241:19
pages 118:21 119:2 239:14 239:17,17 240:3,6,6
pair 181:15,17 181:22
palanisamy 5:7 192:12,14 193:6,15 194:18,20 195:3,8,19
panels 151:11 156:15,18
paper 14:8 24:9 25:13 87:18 116:9 118:14 118:18 156:5 216:17
papers 61:6
paragraph 34:10,12 35:10 35:13,16 36:4 36:10 37:12 38:14 39:11 41:13,17 43:8 45:3,5 52:1,16 65:20 66:5,6 66:21 89:20 90:13,15 91:2 91:13,18 95:16 95:19 97:16 98:12,12,13,16 98:19 104:8 121:12,12,16 121:16 122:2 122:11 123:1 123:21,22 125:14 126:1,1 128:12 130:1,4 130:20 131:7 131:10,10 132:6 134:10 135:7,22 137:9 138:22 139:9 141:7 143:22 154:17,20 163:16,16 165:17 170:15 170:18 171:6 171:11,20 172:8 173:1,21 174:1 177:8 183:13 188:7 188:10 190:12 190:19 191:3 193:7 195:12 196:4 214:16 229:22
paragraphs 120:13 124:13 124:20 126:18 138:3 142:10 142:16 185:6
parallel 64:22 82:20 83:1,4,8 84:3,4 219:10
parallelism 83:21 84:5
parameter 16:13 181:7 182:3

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

parameters 180:19 217:4
part 30:5 31:15 33:22 42:1 45:11 50:1 74:19 81:1 116:19,22 139:13 163:20 200:3 225:21
partial 59:6,16
partially 59:5
particle 67:2 181:20 182:13 182:13 200:9 200:11 201:5 201:10,13,15 233:3,6,9,10,12 233:16,19
particles 65:8 65:12 66:12,15 66:18 67:4,11 67:17,22 68:7 68:13 69:10 77:14 179:4,10 181:5,9,10,10 228:21 232:22 234:2
particular 16:12 19:6 29:13 35:7 45:15 48:9 56:6 87:1 120:13 138:4 153:16,19,21 155:5 187:8,9 190:11 202:14
particularly 50:7 233:16
parties 1:14 2:8 238:14
pass 236:3
passivate 47:21 48:9
passivation 47:4,7,18 48:1 48:3,12 192:21 193:2,4,11,12
passive 46:1 93:6 94:6 177:15,19
passivity 192:19
passivization 196:5
past 44:14 89:1 144:17 145:14
patent 1:1,2,6,8 2:3 3:7 4:12,14 4:16,17,19 5:4 5:6,7,9 7:16 9:10,13,17 10:5,8 18:12 19:16 24:7,20 25:7 30:2,19 45:16,17 47:17 52:2 56:3 57:10 109:18 112:14 118:4 143:8 161:18 162:19 173:12 189:19 192:14 202:8,10
patenting 165:13
path 110:12
pattern 49:21 75:18 128:20 133:18 209:14
patterned 128:16
patterning 165:17
patterns 83:5 132:21
pdf 239:12 240:1
peak 16:3
pecvd 105:14 105:19,22 106:3,12 111:12,15,16 112:1,4 136:9 137:5,13
pen 14:5,8
penalty 239:16 240:5
pending 40:18
penetration 144:15
people 51:11 74:11 80:12 115:13
peppered 120:14
percent 12:21 13:19 14:21 15:15 24:1
percentage 235:2
perfectly 11:7 198:21 204:8 204:10 205:18 209:9 210:1 212:2 226:10
perform 62:4 169:13 212:22
performance 85:15 99:9 187:10
performed 158:21 159:22 164:4
period 8:19 155:17 239:18 240:7
perjury 239:17 240:6
permanency 206:21 207:7
permeate 96:1
permeating 144:5
permeation 19:19 99:3 104:3
perpendicular 233:11
person 27:17 27:20 61:14

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

130:6 144:9 160:10 161:20 174:2 214:13 217:21
personal 62:2 73:3 212:17
personally 61:6 64:14 65:5 72:22 89:4 124:4 186:6 234:18
persons 61:11
perspective 215:3
peters 1:21 2:5 238:2,21
petitioner 1:5 3:2
ph 88:16
ph.d. 239:5 241:2,24
phase 136:11 137:15
phased 64:4
phd 1:11 2:2 4:3 6:2 57:22 61:16,17 87:2 88:19,20 237:3
phosphosilic... 193:13,17
phrase 52:6
physical 44:13 51:17 52:11 113:11 125:4 190:3 206:7
physically 19:3 189:12 200:7
physiochemi... 19:2 50:6
pick 218:8
picked 81:16
pictiva 1:7 239:4 241:1
piece 14:8 55:13 70:11,18 70:18 165:1
pieces 42:5 55:10 150:15 151:13,18
piezoelectric 66:2 155:3,7 155:12
pillars 11:11
pixel 94:7,8,10 94:16 143:14 177:9 208:18
pixelation 49:21
pixels 24:22 76:18 93:18 144:17 145:14 145:15 157:3
place 48:12 78:16,16,19,21 78:22 79:5 121:3 231:3
placed 6:3 53:3 94:18,21 223:2 231:14 238:7
placement 77:14 78:1 234:20
places 98:7 143:17
plain 214:3
planar 96:7 127:1,11 128:2 196:3,16 197:13
planarity 10:20 11:2,3,6,6,14 11:21 15:2,4,6 15:7,10,12 16:2 18:6 50:15 94:2 96:2,4,5 97:19 97:20 98:4,4 101:4 103:22 196:16 197:1,1 198:18,22 199:4,12,14,16 199:19 204:20 204:22 205:8 205:13,22 207:6,10,11,18 207:22 211:8 211:14,19 212:3
planarization 9:14 10:4,7,12 10:15,16,22 11:16,20 12:11 13:8 14:1,14 14:16 15:12,14 15:20 17:18,20 18:2,5,8,16 48:4,14,18,19 49:3,17 53:21 54:6 55:20 58:18 59:9,17 59:20 60:6 86:17,22 88:2 88:7,9 95:3,10 95:14 97:21 98:6 99:11,15 99:18,19 100:5 100:8,19 101:2 101:9 136:13 139:3 140:10 140:19 141:5 141:11,14 142:1 151:20 153:16,22 162:15 167:3 176:8 182:6 196:11,15,19 197:2,6,12,22 198:4,5,8 199:5,10 200:14 203:2 203:10 204:4 204:11 205:11 207:11 208:13 209:1 211:1
planarize 87:7 94:11,14
planarized 96:21

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

planarizing 126:18,21 130:21 136:5 139:9,14 197:6 197:11,14,15 197:16,17,18 198:2,13,15 199:1,17 201:7 201:19 206:8 208:4,6,7 210:5,6,12,15 210:17,21 211:7,9,17,18 211:19
plasma 22:16 22:19 105:6 111:12 112:8 112:21 171:17
plate 230:17 231:12 232:3,4 232:5,7,8,9,12 232:16,21 233:22
player 85:8
please 6:8 14:9 24:5 35:8 43:18 46:12 55:10 57:7,13 58:6 60:10 89:20 95:7 118:10,21 128:8 143:5 168:17 169:4 172:16 173:20 185:5 188:6 189:21 190:4 190:10,14 192:11 202:2 202:13 203:4 231:5
plenty 175:4
plot 16:13
plurality 25:5,8 25:16 26:7,11 26:15 34:13 36:20 38:4 45:21 46:7
plus 33:17 111:16
pml 162:21 163:3,3,7,12,19 164:4
point 12:9 26:2 31:8 33:5,6 34:9 40:19 60:11,16 68:19 69:3 92:17 95:17 103:21 112:17 137:18 157:16,19 158:5 159:7 172:12 173:19 207:5 211:15 221:2 229:4,5 233:14
pointed 27:10 41:5 90:5 214:9
pointing 28:1 29:2 194:18
points 41:14 146:2 157:20 158:3,10 183:1
polarity 24:16
polymer 14:17 14:20 39:14 86:14 162:21
polymers 86:20 88:6
poorer 83:15
popr 118:11 120:17
portion 177:9 195:21 198:7
portions 144:2
posita 214:18
position 16:15 17:1,9 22:3 33:17 45:7 50:22 68:2 122:18 162:12 176:20 193:16 212:5,6,9
positioned 78:10
positioning 67:12,14,18 80:5 94:15
positions 168:21 213:10 213:17
positive 116:11
possibilities 166:7
possibility 74:22 144:4 174:5
possible 7:17 11:19 59:6,17 78:22 100:5 110:17 121:2 146:20 172:15 172:18 173:6 174:20,22 175:13
post 166:10
potato 105:17 105:20
potential 79:8 163:2
potentially 149:3
practice 72:2 107:14,18 109:20 114:1 153:20,21 185:21 220:7
pre 15:9,10,12 18:7
precisely 75:17
preclude 167:9
predictable 20:22
preferably 39:14 139:1
preferred 136:8
preliminary 122:11

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

preparation 111:5 118:6
prepare 6:19 7:6
preparing 7:7
present 18:21 233:18
presentation 57:16 61:1
pressure 120:9
pretty 8:8 79:18 101:15 103:2 112:2 118:17 155:2 182:4 217:3 229:9 235:6
prevent 46:20 78:7 187:11
prevented 40:19 99:4,6
previous 49:9 101:19 125:17 170:12 192:2 195:16,17 201:1,16
previously 8:17 18:2 48:18 52:13 65:19 70:4 98:17 154:21
primary 9:1,5 118:5
princeton 129:16
print 63:6,12 88:2 124:9 152:18,19 153:1,12 156:1
printable 81:7
printed 63:12 86:4,5,20 108:9 133:10 156:13 189:16 196:4
printer 74:17 121:8 154:6,10 154:19 155:4
printers 65:12 65:13 121:3
printing 49:1,7 62:13,14,16,18 62:20,21 63:8 64:10,13,15 65:8 66:3 74:3 74:11,14 75:21 77:1 80:6,13 80:21 81:14,22 82:14 84:7,20 86:9,10,14,15 87:4,18 88:6 109:7 120:18 120:22 124:8 128:17 132:11 132:13,15,18 133:6 134:8 150:14 152:16 155:1,7,18 156:4,11,18,19 157:9,13 160:21 184:9 195:6,19,22
prior 12:11 27:21 30:21 34:14,18 87:20 88:10 138:11 159:2 161:18 162:13,15,19 162:22 163:11 216:10,12,14
priority 70:9
probably 8:3 47:12 59:16 61:19,20 87:12 116:10 117:10 117:15 119:4 147:7
problem 116:6 120:17,20 125:6 163:2,19 185:2 193:9 194:17 225:4,6
problems 75:13 123:7 152:20
procedure 239:19,21
proceeded 7:5
process 22:11 22:11,13 23:15 23:16 49:20 59:15 60:19 74:4 77:1 79:14 105:5 106:20 107:3 107:16 109:15 114:3 132:14 152:16 168:14 175:8,12 191:11,12 195:22 215:14 216:5
processes 77:21 105:18 131:20
processing 132:16 164:3
produce 55:3 75:2 76:7 153:9
produced 75:19
produces 183:16
product 85:6
production 57:18 132:1 170:1
products 85:1,5 85:21 107:19
professor 86:13 108:9 134:5 150:16
progressively 132:19 133:13
prohibiting 19:18
project 87:1 217:2
proper 34:3
properties 49:22 50:2,3,5

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

50:7 88:6 125:3,5 188:4 204:3,4 205:3 234:3
property 50:4 51:19 99:13 100:11 226:19
proposals 212:11
proposed 122:3
prosecution 37:16 40:20
protection 39:15 46:14 104:14 124:15 124:22 144:18 146:5,7,11,12 146:14 147:7 149:11,13
protective 141:16 171:12
provide 20:1 27:15 34:11 39:15 91:22 92:13 97:7 99:15 100:9,15 102:3 120:16 124:21 135:3,6 146:4,10,14 147:7 152:17 165:2 194:20 198:12
provided 7:14 8:7,9,10,12 38:6 45:2 130:21 135:1 135:22 146:7 206:16 239:19 240:8
provides 41:15 99:19 100:11 103:21,22 104:1,2,4,13 115:20 146:12 149:11
providing 48:17,20 96:4 96:7 100:4 101:4,9 105:1 105:2
provision 99:1
public 2:7 150:17,21 238:5
publication 113:6 122:12
publications 62:3 85:20 88:18
publish 87:15 134:1,7
published 61:6 86:3 116:8,15 124:5 134:2,3 134:4
pull 24:5 89:17
purely 33:16
purpose 211:18
purposes 26:17 36:17 54:18 76:15 98:14 157:7
pursuant 2:4
pushing 65:3
put 24:14,14 27:2 42:4 46:3 46:20 63:6 79:1 82:15,16 82:22 84:2 99:8 102:7,19 105:19,19 130:9,11 141:9 147:17,20 178:3 186:8,16 186:20 187:14 189:14 199:9 204:7 205:20 205:21 218:20 219:9 222:9
putting 10:17 20:4 33:2 79:20 82:19 149:10 164:21 205:6

q

qualifications 121:19
quality 149:4,5
quantized 227:15
question 27:8 31:7 32:5,9,11 32:12 35:8 37:7,16 41:3 43:13,16,18 44:5 49:10 54:12 67:15 72:5 78:11 80:10,11,15 95:6 101:19 103:5,16,17 113:6,20 116:3 129:8 138:16 140:21 153:13 153:13 154:15 160:22 161:1,6 168:16,17 169:3 170:12 191:16 192:2 195:2 196:8 198:10 199:7 200:2 209:4,6 211:4,5 217:22 218:20 219:21 222:11 227:4 229:13
questions 49:9 125:17 126:13 170:13 236:2,4
quick 23:19
quickly 83:5 185:4
quite 20:22 75:1 114:20 160:4 174:18 232:8
quote 131:10
quoting 131:8 131:9

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

r

r 3:1 6:1 62:19 62:19 241:3,3
r&s 240:1,9
r2r 60:13,17 61:1,7
radius 54:21 55:1 226:15 227:8 228:18
raise 225:4
ramps 11:11
range 81:5,7 82:8,8 125:4 178:14,18,21 180:3,4,8 184:20 229:1 229:12
ranges 179:15
rare 230:18
rates 84:17
rather 127:12 128:3
ratio 181:4 184:1 218:12 227:11
reaches 183:3
reaching 179:11
read 37:13 52:4 64:16 97:17 117:7,8,9,12 122:16 154:21 163:7,16 164:5 169:21,21 174:1 190:19 190:22 230:3 231:16 237:4
reading 160:7 161:3 167:14 167:15 168:6 169:16 216:13 218:14 239:24 240:9
real 54:3 154:2 220:12
reality 11:19
really 60:1 69:8 75:5 124:18 150:12 170:16 182:15 183:18 193:21 200:11 211:2 217:6 235:21
realm 30:4
realtime 2:6 9:9 14:18 16:20 30:8 41:10 63:15 109:16 150:5 154:7,12 182:7 207:1 212:7 236:5 238:4,4
reason 15:4 76:9 95:13 104:11,15 210:6 228:7 232:18 241:6,9 241:12,15,18 241:21
reasonable 18:8,10 94:19 212:19 213:5
reasonably 132:3 218:4
reasoning 120:8
reasons 98:14 130:8,11 184:4 207:16
recall 7:21 58:3 70:11 71:6,16 75:22 86:1 87:17 88:8 105:18,22 108:2 111:1,15 113:13,16 114:8,12 116:19 120:1 129:17 155:9,9 156:4 178:19 189:2 213:13 213:20
received 7:16 7:17,22
recently 117:10
recess 25:2 57:5 89:15 135:16 143:3 178:7 201:22 224:13
recite 24:15
recollection 8:5 88:12
recommend 8:14
recommended 8:11
record 6:9 25:1 49:13 57:4,15 89:14 135:11 202:10 224:9 224:15,17,18 225:1,3,8 236:6 238:9
recorded 2:2
rectangular 56:13
reddinger 88:16
reduce 11:17 11:21 102:10 103:19 193:3 197:1 201:8,14 211:8,9,14,18 211:19
reduced 102:14 102:17 192:21 238:11
reduces 198:16 198:17 199:12 199:14,20
reducing 199:3 210:7
reduction 104:2
refer 11:4,7 20:4 31:13 42:22 47:13

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

50:6 51:16,19
reference 24:6 69:22 137:11 140:11 141:15 141:21 142:10 143:10
referenced 239:6
references 7:21 9:2,5,8 26:20 165:5
referencing 137:4
referred 8:17 30:21 32:17 41:13 55:14 88:10 98:16 107:10
referring 10:13 10:18 27:21 32:12 50:20 56:5 87:2 88:15 92:15 96:13,22 97:4 112:18 120:12 120:13 139:17 143:16 154:16 155:4 157:17 162:4 173:20 189:16 191:6 221:3,18 226:2 226:3,4
refers 36:4,11 36:12 43:8 191:3 194:10
reflects 127:13 128:4
refresh 57:7 202:2 221:17
refreshing 190:6
regard 161:1
regarding 7:4 37:20 124:13 212:6,10 236:2
region 138:14 138:19 139:1,1 163:10 171:7 171:13 196:2,3 196:5,6,22 197:10 198:7 232:20 233:17 233:20
regions 20:9 21:20 22:1,4 23:14 39:22 42:16,22 78:7 100:17 157:10 196:1 197:19 197:19,21,22 198:3,20 199:4 199:11,15,18 199:20 201:5 210:1,3 211:10 211:11 212:1,3
registered 2:5 238:3
rejected 122:8
rejection 40:16
relate 201:1
related 17:20 17:21 36:3 38:4 65:18 76:10 90:8 113:7 120:8 124:17 132:10 144:13 170:13 188:3 198:16 208:5 212:14 214:20 215:5,9 217:19,22 238:13
relation 10:9 36:19 65:22 80:10,16 90:4 90:16 136:3 137:8 148:4 170:12 171:19 188:2 231:9
relationship 121:19 179:17
relative 17:3,4 18:7 50:21 55:2 56:12 94:15 170:8 234:7
relatively 96:10 96:11,15 160:8 175:6 182:9
relaxation 99:2 99:12,16,20,21 100:4,10,12,15 100:22 101:7 102:3 104:2,16
released 239:22
relevant 6:21 8:20 37:1 122:19 216:9 227:17
remember 8:3 61:15,17 62:9 86:7 87:11,19 87:22 103:20 106:9 108:13 109:10 110:2,4 110:6,22 111:7 111:10 116:9 116:14,21 117:4,11 133:8 133:22 134:2 146:22 150:12 155:11,15 188:22 189:4,5 216:7 217:15 222:1,7 223:12 235:19
remembered 221:22
remote 1:10 2:1 112:7,21
remotely 1:14 2:8
removable 22:18
removal 20:9 23:10,15,16 164:4 168:8,10 168:14,20 169:13

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

remove 20:9 21:5,12,17,21 22:2,10 60:18 79:8 167:10 169:7,13
removing 167:20
repeat 35:8 93:12 95:6 125:19 138:16 148:15 168:17 190:13
rephrase 15:11
replicate 53:4 167:1
replicated 26:8 98:16
replicates 52:21 53:13 56:22
replication 56:10
report 25:12 95:18 132:10
reported 1:21
reporter 2:6,6 4:6 9:7 49:11 89:5,13 238:1 238:3,4
reporting 238:3
represent 28:20
representation 40:10
representing 77:16
represents 138:10 159:13 195:21
request 123:9
requested 14:18 16:20 30:8 41:10 63:15 109:16 150:5 154:7,12 182:7 207:1 212:7 240:1,9 240:10
require 19:17 101:2 219:5
required 66:22 180:5 230:1,7 239:20
requirement 19:9,15
requirements 10:18 184:20
requires 163:21
research 71:15 72:18 73:3 80:22 85:2,20 107:22 109:22 110:18 111:15 113:9,12 155:16
residual 183:22 231:13
resin 91:3 95:21 125:2 183:13
resins 124:21 125:4
resolution 63:10 76:20 81:3,5 178:2
resolutions 76:11,14
resonance 233:6
respect 25:5 26:7,20 28:10 30:13 33:3 35:15 37:22 39:6,17 44:3 44:15 45:1,18 60:2,7 66:16 78:12 79:17 82:6 91:11 101:18 104:7 120:6 125:11 126:7 127:9 135:21 142:3 142:13 147:1 147:18 162:18 163:8 171:1,9 172:4 188:1 195:3,11,11,13 195:18 197:20 198:12 214:8 223:1
respective 142:7
respectively 36:8 38:21
response 118:5 192:1
result 11:14 15:1 75:7 165:8 170:1
resulting 199:14 204:20 204:21
results 10:19 11:1
return 239:17 240:6
reverses 171:21
review 9:10 111:5 116:17 121:14 239:8 239:10,13 240:2
reviewed 116:20 117:3 118:4,7,9 119:5,7
reviewing 6:21 6:22 130:16
rheological 49:21 50:2,3,4 50:5
ribbon 189:17
ribs 93:17
right 9:19 10:2 13:2 20:15 33:12 53:3,4 60:15 68:8,16

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

69:3 72:19 76:2 81:6 82:20 88:14,22 93:19 96:12 102:12,21 103:4,14 111:8 112:14 126:12 126:14 130:16 145:6,19 146:16 158:8 167:8 174:3 193:22 198:10 217:2 218:10 218:11 219:15 223:3 225:11 227:22 229:21 230:12 232:5 232:16 233:8 235:6
rigid 205:6,20 206:5,19
risk 79:11,16 80:1,3
risks 149:2
rmr 1:21 238:21
roll 60:13,13 62:5,5,7,7,15 62:15,21 63:9 63:9 105:5,5 105:13,13,17 105:17 106:3,3 106:12,12,20 106:20 107:3,3 107:9,9,16,16 108:16,16,19 108:19,20,20 109:14,14 114:3,3,14,14 114:15,15,17 114:17 133:3,3 133:8,8,10,10 133:20,20 216:3,3,5,5 217:22,22 218:1,1,3,3
rolls 63:5
roughly 39:11 155:16 156:5 163:2,18
roughness 11:13 13:4,5 13:19,20 14:13 14:21 15:13,15 17:5,5,6,7,11 17:13 60:5 200:13 201:4,9
round 53:6,16
rounded 53:18 55:17
rounding 54:3 54:8,15,22 55:2,3 56:12 60:4
routinely 121:2 121:6
row 45:8,10,22 46:3,4,5,11,14 46:16 165:7 176:21,22 177:21 178:3
rows 164:9,22
rsa 1:21 238:21
rule 231:21
rules 233:7,8 240:8
running 93:19

s

s 3:1 4:9 5:1 6:1 27:1,3 77:18 77:18 241:3
samsung 1:4 213:14 239:4 241:1
samsung's 122:3 212:6,10 213:16,22
santa 108:5
sanyo 85:7,7
satellite 75:2
saw 171:20 231:5
saying 34:18 59:2 97:18 101:19 104:18 121:7 127:10 128:10 206:7 217:9 218:6 221:7
says 38:18 39:11 41:17 66:6,21 90:16 91:2,18 95:15 95:19 98:18 100:7 122:3 124:1,21 126:20,22 128:1,12 132:13,18 134:12 136:3 137:7,8 138:22 144:1 146:7 149:10 163:1 163:19 164:14 165:21,22 166:7 167:13 167:17,20 168:19 169:5 169:11 171:2,6 171:11,16 174:1 177:8 183:13 188:16 193:9 196:3,4 210:16 229:22 230:14,16
scale 57:1 76:22 235:11
scenario 12:1 15:2
schedule 239:10
schematically 137:1,20
scheme 167:21 169:22 170:1
schemes 167:4
science 214:20 215:4 217:18
scope 119:3 131:22

screen 108:9 109:6 124:8 132:11,13,15 132:18,21,22 133:6,17,17 134:8 195:6,10 195:19,21 196:4
screens 133:14
scribe 42:19,20 42:21 43:2 162:3,7 163:4 164:12
scribing 143:15
seal 144:3
sealed 163:5 239:20
sealing 105:20
second 33:6 35:1 36:8,11 36:14 37:8,20 38:9,18 41:20 60:11,16 66:17 88:19 138:14 143:13,20 148:10,12 162:2,6 166:5 173:22 187:1 190:8
secondary 26:20
secondly 74:22
seconds 82:9 184:21
section 27:10 27:11 44:7 45:3,4 53:7 65:18 90:4,6 96:16 97:13,18 104:10 117:12 117:18 120:12 122:21,21 123:20 124:18 124:19 125:9 125:14,20,22 126:2,16 130:2 130:3,11 131:9 132:5,9 162:20 176:14 190:11 190:16
see 25:21 44:18 52:6,15 55:16 56:11,14 57:8 57:12 58:9 60:20 62:3 69:9,10 77:13 93:17 96:8,9 96:17 118:11 118:12 122:18 130:18 145:13 145:22 150:10 185:11 190:15 192:18,22 193:1 194:7,12 195:20 202:3 202:16 203:5,9 206:8 208:17 211:7 222:16 228:2,5
seems 91:12 129:2 134:16
seen 70:6 71:1 112:2 145:11 179:5,22 180:12 181:1
seiko 154:10,19 155:5,7,12,16
seiko's 154:6
selected 115:15 167:4
selection 64:5
selective 21:22 22:13 23:4,11 23:17 37:1 38:5 39:3,3,7 39:18 40:6 62:4,11 106:19 106:21 107:5,8 109:13 110:16 113:4 135:3,6 164:8
selectively 10:11 20:2,3 21:6 22:5 35:3 36:16 37:9 38:10,10 40:3 61:8 105:8,9 107:15 110:7 111:22 114:1 162:16 171:8 210:10
self 158:14
sell 150:8
semiconductor 85:22 112:6
seniority 58:2
sense 79:6 138:21 145:18
sensitive 75:12 78:4
sentence 52:4 128:22 131:6 173:22 192:18 192:22
separate 63:19 157:1
sequence 139:19
sequential 192:3
serially 219:11
set 7:13 46:6 50:6 216:2 233:7 238:18
sets 182:12,13 182:14
shadow 23:3,4 69:18 70:8 71:5 72:3 76:6 78:9,10,17 105:11,13 106:1,3,12,13 110:9,13 111:17 112:1 125:12,18 165:13,18 166:2,4 171:8 172:7,13,14,18

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

172:21 173:6,6 174:7,11,12,16 175:3 220:20 221:1,11 222:21 223:2,7 224:4 232:14 233:21
shape 194:22 195:4,8,20 203:16 205:7,7 206:9,12,22 207:7,19 208:4 208:11,11,18 209:20 222:21 230:1 231:1 232:14
share 57:8 118:11 190:7 202:2
sharp 53:2,4,17 56:13 101:15 102:12,18 103:2,18
sharpness 55:18 101:10
sheer 50:9
sheet 4:7 237:8
sheets 133:9
shoot 74:16
shooting 74:20
short 68:15 89:10
shorted 186:9 186:10
show 26:2,5,8 26:10,10 60:1 95:14 97:8 146:10 165:9 176:4,5,15 195:4,20
showed 62:14 62:16
showing 61:6 85:22 90:6 108:8 196:2
shown 41:19 44:6,12 66:8 67:8 73:16 78:3 91:18 96:14,16 97:14 98:7 137:20 138:2 141:8,11 142:14 145:15 147:3,8 148:5 166:9 169:21 176:14 177:8 204:13 208:1,5 208:7 209:12 234:8
shows 25:19 148:16 169:22 176:7,12,15
side 18:21 41:14 42:6 94:21,21 150:4 188:21 230:12
sides 102:4,9 194:4,5,6,15
sign 150:18 239:16 240:5
signature 237:13 238:16 238:21 239:22 239:24,24 240:9
signed 237:8
significant 54:4 54:8,16 55:2,4 56:12,14 60:2 234:22
significantly 55:17 71:7
silent 39:5 45:5 66:22
silicon 46:17,22 102:19,20 186:20 187:17 193:13,14,18
silicone 102:20 193:17
similar 58:2 73:17 84:17 90:5,6 94:1,22 112:13 145:18 163:9 165:9 171:11 177:14 208:10
similarities 146:10
similarity 112:22
similarly 39:9
simple 82:10
simply 15:5 160:4 165:6 203:22
single 12:5,7 69:22 84:9 152:11 153:2 223:5,11 224:1 227:3,21
singular 26:3,6 65:2 70:11,17 224:6
sitting 111:9 119:10,18 190:6
situ 76:6
situation 16:18 17:10 21:19 77:5,6 78:6 201:3,19
situations 75:11 93:8
size 75:4 84:14 149:21 151:17 153:7 154:16 156:5 230:2 234:13
sized 150:14 151:13,18
sizes 133:17,18
sizing 172:20
sketched 59:22
sketches 59:1 59:11 60:8

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

skill 18:17 26:19 27:13,18 27:20 28:2,21 29:1,4,16,17,22 30:1,4,18 31:1 31:12,22 32:1 32:15 33:1,7 33:15 61:12,14 77:7 104:13 122:19 130:6 134:15,18 144:9 159:14 160:6,10,16 161:2,16,17,20 165:3 167:15 168:4,6,7 169:16,18 174:3,5 176:13 214:13,14 216:7 223:14
skilled 121:20
skills 218:2,7 218:16
slightly 53:18 167:11
slope 202:18,20
sloped 53:6 206:12
slot 149:8
slower 181:11
small 17:12 41:6 75:3,5 156:3,19 179:8 181:17 183:4 183:10,17,18 185:3 233:15 233:18
smaller 65:4 84:14 151:19 181:20
smooth 99:22 127:1,11 128:2
smoother 15:21
sodium 187:4,6 187:7,11
sole 103:20
solution 80:13 124:2 134:15
solutions 239:7
solve 75:12
solvent 182:16 182:18,19,22 183:2,14,22 184:12 185:3
solvents 183:7 184:15,19,22
somewhat 73:17
soon 135:10
sorry 14:9 15:11 35:6 46:12 55:21 66:10 67:13 69:9 71:22 80:9 92:7 95:6 95:19 107:1,3 113:19 138:16 140:20 144:7 145:1 153:21 165:15 166:3 168:15 172:16 173:11 189:15 190:13 203:4 203:13 208:14 220:22
sort 11:15 19:4 41:14 42:4 59:1,11 74:10 77:16,19,22 83:17 93:18 104:12 129:8 147:21 181:9 182:10,11 186:18 190:5 192:2 201:12 207:4 208:1 215:22 216:8 227:1 231:21 233:12
sorts 215:14
source 64:18 137:19 227:3
sources 129:1 131:8 136:4,4 136:6,8,9,12 137:13,17 227:2
spacing 181:14
spatial 16:1,8 16:10,11 22:12 54:19 55:4 62:11 78:1,20 79:12,15 80:4 94:15
spatially 20:5 42:16 61:7 112:10 177:22 178:3 192:3
spaying 137:16
speak 75:10
speaking 20:22 64:2 90:5 100:14
species 19:12 22:18 112:8
specific 10:17 17:21 20:5 22:7,8 26:20 26:22 35:15 47:14,22 48:6 50:10 59:15 61:7,15 64:9 64:18 65:16,17 66:2 72:5 80:14,17 81:17 82:1 94:22 96:15 97:13 100:13 101:3 106:16 112:10 132:1,6 133:12 139:13 148:2 152:4 160:11 170:7 178:1,13 178:17 179:21 180:16 187:21 192:3 198:19 205:11 207:16 214:7 215:12 215:21 217:16

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

222:6 229:3,19 230:8 231:17
specifically 6:22 8:2 10:9 19:9,18 22:16 27:12 28:9 33:3,8 34:9 38:14,17 40:7 43:7 50:6 59:10 65:22 70:14 71:16 74:16 85:16 86:15,21 87:10 88:9 90:3,15 92:12,22 95:15 98:5,8,18 99:16 104:10 107:20 110:1,6 111:3,10,15,17 113:16 114:5,7 116:3,21 117:4 117:11,18 126:22 129:17 131:14 132:10 134:7 136:3 138:13 139:17 146:2 150:1 154:3,18 158:3 171:6 172:12 177:7 191:16 191:19 193:16 195:10,18 198:16 215:5 230:15
specificity 221:10 222:8 222:19
specifics 36:21 39:4,21 48:11 48:16,21 49:19 51:20 54:1 64:1 76:16 77:2 93:22 94:4,9 99:14 231:20
specified 158:1 229:2,3
specifying 66:14
speeds 63:10
spin 131:1
spinning 190:6
spiral 233:7
split 157:4,5
spoken 147:18 195:9
spot 74:18 228:6,17,18 234:12
spray 63:20,21 63:22 64:2,3,4 64:6,12,16 65:2,4 81:13 83:11,15,20 84:1,11,14,19 115:11 116:3 123:13 136:19 182:21 183:1 184:5 195:5 226:7,8
spraying 115:1 131:2 136:12 194:22
spread 20:16 21:1,6,17 167:8
spreading 22:4 22:9 235:17
spreads 21:3
sputtering 109:14 110:5,8 110:11,12,16 114:15,18 131:1 136:9 137:5,13 171:3 171:17
squiggles 17:12 17:14
ssl 57:18
stack 85:16 140:2 191:4 193:20
stacks 84:21 85:14
stages 155:21 156:4
stand 188:19 189:2
standard 22:19 123:14 185:20 227:5,7,18
standing 102:6
stands 189:1
stanford 106:10
stars 3:9
start 12:7 78:13 80:18 183:4 186:2 198:10
started 7:19 62:7 86:12 88:16 108:8 134:4 207:5
starting 25:19 45:3 123:21 125:14,22 132:5 135:22 163:17 190:11 195:14 204:22
state 6:8 164:15 239:9 239:12
statement 18:13 61:22 97:3,10,17 98:2 122:10 139:12 153:11 168:13 169:11
statements 128:21
states 1:1 60:16
statistically 228:17
steel 186:5,6,7 186:9,16
steep 217:3

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

stenographer 9:9 14:19 16:21 30:9 41:11 63:16 109:17 150:6 154:8,13 182:8 207:2 212:8 236:5
stenographic... 238:11
step 20:9 60:3 95:4,11 101:15 167:10 169:13 170:14,20,22 210:19
stepped 107:1 204:16
steps 11:11 96:12,17,18,22 97:9,15 157:21 169:7
sticking 79:21 188:21 214:11 214:12
stipulation 239:21
straightforward 132:22 149:7 167:14 169:20 175:6 186:3
street 1:17 2:9 3:4
strength 67:11 67:14,17,22 229:17 230:2 230:13,20
stress 99:2,12 99:15,20,21 100:4,9,12,15 100:17,19,21 101:6 102:3,3 102:6,8,10,11 102:13,17 103:3,19 104:1 104:16 105:2
stresses 103:9
strike 20:12 27:18 40:11 58:16 61:12 64:10 71:2,20 73:9 76:12 90:10 106:19 111:19 137:22 143:12 149:19 165:15 213:15
strong 79:20 235:21
structural 92:15 215:13
structurally 146:9
structure 52:22 56:13,16 77:15 78:3 91:19 95:5,12 102:5 127:20 133:18 138:2,6,11 141:6,8,16,17 142:1,18 146:12 148:3 149:1,12 159:5 163:12,21 164:5 165:9 166:9 167:18 174:13 180:1 194:21 201:4 202:16,22 203:2,5,17 204:16,21,22 205:5,16,21 206:5,7,19 207:5,20,20 208:1,3,10,20 209:10,10,20 210:7
structures 81:9 149:3 162:14 165:7 175:9,11 179:5 195:5,8 208:18,22 213:6
struggling 76:1 221:7
student 57:22 88:15 106:8 116:13 217:1,8 217:9
students 87:3
studied 184:5
study 218:5
sturm 8:10,11 8:15,18 121:5
sturm's 86:2
sub 157:3 175:10
subject 6:22 7:4 32:2 35:15 48:8 111:4
submitted 6:12 7:9 55:15 117:9 118:8 214:1
subpixel 76:20 76:20
subramanian 1:11 2:2 4:3,11 6:2,7,11,17 25:4 57:7 89:17 143:5 225:14 237:3 239:5 241:2,24
subsequent 20:8 21:5 23:10 42:22 124:13 168:14 168:20 169:13 170:19
subsequently 22:10 41:9 42:17 46:17 90:16 91:4 151:14,16 210:11
substances 96:1
substrate 26:15 41:18 42:1 43:6,9,10,14,19 44:7,8 63:5 64:6 68:8,11

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

68:20 69:4,7 75:6 78:22 79:2,3,5 82:4,5 138:9 139:10 141:16 142:11 142:18 144:3 149:21 151:11 152:11,11 153:2 154:1 164:18 167:8 173:9,16 174:17,22 175:1 177:10 180:6,12 181:2 183:3 185:12 185:13,14,18 186:1,2,5,7,11 186:16,18,19 188:3,4 196:22 202:22 203:1,8 228:21 231:12 231:15 232:2

substrates 160:21 161:7 161:10

subtractive 170:14,19

sucking 214:11

sue 108:3 110:4 114:9 134:3

sufficient 28:13 70:16 122:1 160:4 235:20

suggestion 124:16

suitable 132:14 179:15

support 152:16

supposed 233:3

sure 8:8 13:11 28:19 30:10 31:6 35:9 43:12,17 49:10 54:17 59:14 60:9 72:7 74:8 78:11,13 105:15 111:6 112:2 115:10 117:16 118:16 118:17 121:11 128:9 132:2 133:19,21 134:11 150:4 150:18 154:14 157:15 169:2 185:19 209:3 216:20 221:10 221:16

surface 11:5,5 11:8,13 13:3,5 13:19,20 14:13 14:21 15:13 16:13 18:6 20:15 50:11,12 50:19 51:6,11 52:7,10 53:14 53:16 68:17 93:5 96:7,19 96:22 97:4,6 97:11 100:1 101:21 127:1 127:12,13,14 128:2,3,5 184:1 185:4 194:3 196:9,10 196:18 197:5 198:7,21 200:12,13 201:4,9 204:8 204:17 209:11 209:12 233:13

surfaces 96:21

surprise 129:18 129:20

suzuki 4:16 55:22 56:1,3 125:6

system 41:14 65:21 67:8 180:15 186:18 233:19

systems 54:3 66:3 84:2,4 184:4 238:4

t

t 4:9 5:1 49:12 241:3,3

tad 23:22

take 8:4 16:12 24:3 34:16 37:11 60:11 75:16 89:2,7,9 89:10 98:11 138:3 139:22 140:15,22 141:6 143:1 154:17 158:11 178:5 185:5 188:6 189:21 192:11,16 201:20 202:13 205:15

taken 2:4 238:6 238:10

takes 148:20

talk 141:13 150:19 170:8 194:9

talked 49:8 126:11 172:5

talking 12:5 21:11 29:13 47:2 51:6 54:3 54:18,20,22 65:15 126:3 154:2 157:16 200:8 206:20 206:21 207:4 208:15 221:12 221:13 222:10 222:17 223:20

talks 126:16 218:3 224:4

tape 46:17

tapers 210:2

target 68:3 78:21 82:4,5 109:1 151:4 152:6 174:21 180:19 183:21

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

229:10 233:1
taught 28:11 33:8 34:15,19 168:8
teach 34:18 135:6 160:19
teaches 96:20 164:8 165:12 165:17
teaching 37:20 38:3 147:1 161:4 162:11 167:12 168:11
teachings 34:20 35:14 36:18 37:1,4 130:7 132:11 144:12 148:4 161:19 164:11 166:13 166:15,19,21 168:6 169:17 218:2
teachment 195:9
team 85:10
technical 25:1
technique 39:4 62:14,21 63:9 64:3,19 81:13 82:15 162:19 162:21 163:3 163:20 167:17 183:12 226:7 227:6
techniques 39:2,2 81:12 81:14,19 113:2 120:18 123:13 124:3 130:22 131:11 136:22 146:4 161:8 183:1,6 184:5 192:4 195:10 226:8
technological 215:8
technologies 214:21 215:6 215:13,14,14 217:17,20
technology 57:18 82:19 85:9 105:12 106:5 112:11 113:5 154:15 155:8,12 222:15
tell 61:22 222:1 230:20
telling 37:15 96:3
tells 98:3,4 164:12 197:15 230:15,17,19 230:22 231:8 231:10,21 235:19
tend 184:10 227:15 233:6
tends 226:11 227:8
tens 84:4 124:9 180:21
tension 20:15
tenth 1:17 2:9 3:4
term 16:11 19:14 25:8 42:21 47:3 50:16,18 51:1 51:12 52:13,13 214:4 221:14 221:21 222:4 222:12,18 235:6
terminate 232:12,15
terminated 12:2,8
termination 232:13
terminologies 9:14
terminology 51:16
terms 11:5 15:13 16:1 17:8 47:11 107:18 113:11 136:16 232:8
tesla 231:14
test 211:6,16,21
testified 6:4
testimony 237:5,6 238:10 238:10
testing 157:7
textual 59:1 60:9 127:16 128:6 204:1
tft 99:2
tfts 187:8
thank 9:9 55:12 185:9
thanks 189:18
theory 28:6 30:6 31:16
thermal 101:1 103:11,12 106:21 107:4,5 107:15 136:8 136:10 137:12 137:15
thesis 116:14
thick 12:19 13:9 124:2,7 124:10
thicker 147:16 147:19
thickness 13:13 56:15
thicknesses 59:8 93:22 95:1
thin 21:16 124:14,19,21 125:6,8 156:21 186:17 192:4

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

thing 47:13 149:9 187:13
things 109:2 117:3 126:3 149:15 183:9 215:11,15,17 216:14 217:5
think 7:18,18 12:1 19:8 27:8 29:11 33:13 34:17 37:6 41:3 44:10 49:12,18 52:12 55:21 58:21 61:11 65:6 67:6 76:2 84:3 86:1,4 88:3,14 88:18,22 101:17 103:19 108:1 110:5 111:19,21 112:15 118:14 120:5,14 122:17 142:21 143:11 148:14 151:22 153:4 153:12 156:21 160:13,14 168:16 169:9 170:7 178:16 178:21 192:1 196:13 203:13 212:18,19 213:4,5,5,12 214:5,5 216:16 220:1,12 221:9 221:16 224:11 224:16 229:2 229:13 231:17 236:7
third 35:2 36:8 36:13,15 39:10 39:13 235:13
thirds 39:11
thousand 84:2
thousands 83:7
tighter 226:16 227:9
time 7:2,9,12 8:20 29:12 32:2 61:4 64:20 70:21 75:20 76:2 82:12 83:18 84:10 85:15,19 86:4,14 88:4,8 108:4 110:19 113:13 114:16 119:17 121:6 123:13,15 132:17 133:1 134:4,6 149:18 149:20 150:7 150:13 151:5 151:12,17 155:17 159:15 160:9,18 183:2 190:9 191:13 191:14 214:1 219:6 220:16 232:20 233:20 239:10,18,25 240:7
tiny 64:5
title 57:17 58:14
today 50:14 83:7,22 119:11 119:18
together 42:5 58:4 70:8 71:4 72:3 73:2 186:10,11 220:9
told 22:9 70:4 76:10 120:4 123:2 125:17 126:4 133:7 152:2 192:1 198:11,14 201:8 205:1,2 205:4 222:1
took 129:10
tool 115:19 150:8,9 153:5 154:22 156:2,3
tools 150:13
top 12:10,17 13:9 26:10 28:15 39:12 41:15,16,18 42:6 49:15 56:22 58:12 70:10 94:18 96:10,14 99:8 101:20 102:7 103:18 110:21 113:13 140:18 141:9 144:16 165:11 186:19 194:3,13,14 202:22 203:7 204:3,7,16 209:22 220:11 229:21,22 231:7
topic 61:17 116:14
topography 51:2,5,13 204:13
topological 11:10,12 201:18
topology 16:13 50:16,17,18,22 51:5,12,18 52:13,21 53:14 53:16 54:20 55:2,18 56:12 56:15,22 94:20 101:20,21 102:8 127:22 197:21 199:13 199:14 201:15 209:17 210:6,7 210:17 211:2,9 211:12,20
totally 193:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

touch 193:22
tour 150:11,19
towards 68:20 75:6 183:21
trademark 1:1
tradeoff 80:3
tradeoffs 147:14 148:1 148:10,19 149:16
trading 80:3
trajectory 67:10,13,16 68:13,18
transcript 238:9 239:6,8 239:10,13,13 239:22 240:2,2
transcription 237:6
transfers 63:6
transform 16:22 17:2
transistor 94:17 186:13 187:10
transistors 94:8,10,12,14 156:12,21,22 186:8,9 187:9 187:12,15
transitions 16:4
translation 5:3 152:18 155:21 156:4 173:12
transport 85:17 229:6,7
transverse 68:1 68:2
trapezium 208:2 210:12
traveling 182:21
treat 65:6
treating 131:4
trial 1:2
true 9:6 19:8 19:10 34:8 35:16 47:10,10 73:5 79:10 84:10 91:15 93:4 97:5 102:1 121:1 127:10 139:16 143:18 144:6 147:2,2,6 163:9 164:6 176:11 194:3 194:12 207:4 211:6,20 212:13 226:22 229:6,7 237:5 238:9
try 182:1 190:6 190:7
trying 29:7 63:5 108:1 112:14 150:8 188:22 201:6
tune 184:22
tuneable 182:4
turn 23:20,21 83:18,18 143:5 185:22
turns 19:22 20:18 39:2 177:22
two 9:1 16:14 39:11 42:4 44:18 58:12 75:7 81:1 90:1 96:12,17,18 135:12 137:10 148:17 149:14 166:1,7 170:9 179:18 183:8
type 65:10 109:2 174:7
types 63:22 139:20
typewriting 238:12
typical 58:14 58:15,17 131:20
typically 46:15 46:17 63:1 164:1 182:1
typing 9:7 89:6
typographical 214:8

u

u 62:19 77:18
udc 129:19,21 131:15,17,19 132:1
ultimately 224:7
ultrasonically 183:19
uncertainty 74:18 77:14 228:6,8,14
under 6:4 23:3 50:8 59:15 90:1 110:13 122:22 172:14 172:17 173:5 175:3 185:12 185:17 238:7 238:12
undergo 75:5
undergraduate 116:13,13
underlying 52:7,9,22 53:14 95:4,11 101:11,14,20 102:8 127:8,14 127:20 128:4 198:21 199:12 199:13,15 200:10 201:4 211:2,8,12,20
underneath 208:9 232:12

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

understand
9:16 12:15
13:6 18:17
21:9,13,18
22:15 27:8
28:19 29:7
30:10 31:6
32:10,18 33:13
37:6 38:7 41:3
43:12,16,18
44:10 49:10
54:11 67:19
78:11 93:12
101:17 103:5
103:11,16
113:10,19
122:7 128:9,21
140:20 144:7
148:8,9 160:22
161:5 162:12
165:5 169:3,9
177:17 180:13
198:15 200:1,3
200:4 206:13
209:3 216:6,15
216:17,20
217:9,14
220:18 221:6
221:10 224:2
225:21
understanding
10:3 17:17,20
18:1,4,11 29:6
32:1 54:7,15
209:5,8
understood
37:17 168:16
196:7 227:20
undesirable
79:6
undesired
168:21
unequivocally
210:16
uneven 96:21
96:21 97:4,6
97:11
uniform 225:16
225:18,22
226:6,10 232:1
232:8
uniformity
226:13 232:6
unintentional
11:13
unit 227:5
united 1:1
universe
216:10
university
108:4
unpatentability
28:6 30:6
31:16
unreasonable
218:22 219:1,6
219:12
unrelated
47:16,17 48:8
112:12 192:8
unwanted 20:9
21:20 22:4
23:13 169:7
upload 201:21
upper 138:22
139:13
upstream
179:12 180:5
181:14
use 21:15,21
22:11 42:20,21
49:1,7,14 59:7
59:17 65:12
66:1,21 69:17
69:21 71:4
73:19 74:6,7,9
74:11 75:14
77:7 78:9 80:6
82:13,15 85:13
95:21 97:19
103:8 104:5
105:6 107:8
110:9 112:7
115:1 118:15
118:19 122:5
123:11,13
125:18 130:5
132:10,21
133:13 136:19
137:4 139:6
144:15 149:21
155:14 159:1
159:17 160:2
167:17 169:11
169:17,22
170:14 172:12
178:1 179:7,19
179:20 180:16
184:22 185:12
185:16 186:5,7
187:3,3,17
193:2 196:20
209:16 220:4
231:21 233:7
235:10,20
useable 7:18
used 7:3 8:16
18:21 27:7
42:21 47:11,12
47:15,19,21
48:9 50:15
51:4,7,12,16,18
54:5,6 55:20
59:8 60:6
62:13,15,16
63:11 69:22
72:4 73:6,9,10
73:13,22 75:12
75:15,21 76:6
76:9 77:1 81:2
81:8,11,12,13
81:18 84:20
85:8 86:20
88:6 91:1,4
92:18 95:1
101:5 105:13
105:18 112:3
114:18 115:13
115:21 123:12
124:6,8 130:6

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

131:20 132:16 133:2 134:21 136:4,6 138:1 140:4 146:4 150:3,19,22 151:2,10,15,20 152:1 153:14 153:20 155:15 155:15 170:17 178:15 179:4 182:5 184:7 192:4 222:21 226:9 230:14 234:19
useful 186:13
uses 66:15 71:15 171:10
using 20:12 22:10 27:5 36:18 37:2,5 50:18 52:12,13 63:12 66:13,18 67:1 70:6 81:10 88:2,9 90:12,18,22 91:8,9 92:4,6 92:10,17 104:9 104:11 105:11 105:17 106:21 107:15 108:11 109:5,6,13 110:5,8 111:22 112:1,3,15,21 113:5 114:1 115:17 120:18 120:22 121:7 122:3 124:2 125:2,11 130:22 133:6 134:7 135:19 136:15 147:21 148:3,4 151:8 153:1,12,22 156:2 157:8 161:8 166:22 167:21 170:4 171:8 172:3,7 173:2 179:3 180:16 181:8 181:10,19 186:4 192:18 195:7,9 224:4 232:3
usually 46:10 46:13 65:3 174:16 217:2

v

v 62:19 239:4 241:1
vacuum 122:22
vague 235:6
validity 40:19
valley 16:4
value 105:21 178:17 227:21
values 178:18 229:12
vapor 111:13 113:1 131:3 136:11,11 137:15
variants 155:6 155:11
variation 16:9 50:19,21 56:14 60:3 226:14 228:8 234:7,12
variations 11:10,12 54:20 201:18
varies 217:8
various 26:18 78:15 85:20 98:7
vector 69:12
velocity 68:18 69:11 181:12 182:1 228:20 229:3,4,9 232:22 233:17 233:20
vent 112:9
veritext 239:7,9 239:11,20
versa 170:6 215:1
version 93:1
versions 26:9 46:1
versus 17:1 54:9,16 80:7 148:11 152:11 214:11 216:17
vice 170:6 215:1
video 2:2
videoconfere... 1:10 2:1
view 27:1,12 28:7,11 29:1 33:1,11 41:14 41:15,18 42:6 42:6 122:12 169:19
viewing 33:1
vis 94:16,16
viscosity 50:10 81:7 82:7,8 184:19 185:1
vision 108:3,22 114:9 133:5,6 133:8 134:2
visited 106:10
visual 147:21 149:5
vivek 1:11 2:2 4:3 6:2,10 237:3 239:5 241:2,24
vladimir 57:22 58:1,3
vladimir's 61:16,18
voice 37:18 38:1
voltage 178:10 178:17 179:2,5 179:15,19,20 179:22 180:15 218:10

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

voltages 178:14 178:21 179:7,8 179:9 180:3,4 180:8 181:1
volts 180:21,22
volume 23:20 24:3 75:17 84:19 182:14 184:1 185:3 226:2,15
volumes 226:6
volumetric 84:16 226:13
volunteer 111:6
vs 1:6
vt 58:14,15,17 59:12

w

wait 126:13
waived 238:17 239:24,24
waiving 239:21
want 22:1 32:18 75:9 78:8 82:16 89:2,3 103:8,9 179:20,20 180:10 222:9 225:3,10,11
wanted 20:7 81:9
wants 89:13
warping 173:10,17
washington 1:18 2:10 3:5
water 19:7 144:3
way 16:5 20:5 23:7 24:14,18 24:19 33:22 39:12 69:20 72:9 77:7 82:14 89:12 98:15 100:20 107:20 110:22 111:21 112:11 114:11 127:16 129:5 133:15 137:1,19 146:19 147:3 147:12 148:5 148:10,12 149:14 153:17 153:18 160:15 169:21 170:11 176:12 211:20 213:20
ways 26:18 64:8 133:12 147:15 149:14 175:13
we've 161:8
weaver 4:14 9:3 51:22 52:2 107:10 126:10 126:13,20,22 128:13,15 129:6,13 130:7 130:14,16,20 132:12 135:2,5 136:1 138:13 138:18,22 191:10
weaver's 126:18 134:20 135:18
web 132:14,16
weight 152:14 182:10 230:2
went 21:20 224:16
wetting 20:16
whereof 238:18
willing 219:9
wipe 63:4
wire 188:21
witness 2:3 6:3 55:9,12 89:4 236:3 238:7,17 238:18 239:13 239:16 240:2,5
word 9:22 47:3 49:12 221:6
words 9:17 15:22 19:3 34:17 37:3 38:5 41:16 42:5 55:3 75:14 96:8 100:3 128:15 131:6 136:19 159:8 169:15 179:2 181:8 196:13,20 231:22 235:17
work 8:14,16 8:18,20 61:19 61:20 80:16,18 86:19 88:1,10 88:13,15 110:4 112:3 116:16 131:22 134:1 156:14 175:3,4 175:16 186:20 217:5 219:3,4
worked 81:3 85:10 123:17 186:6 187:2 234:18,18
working 8:19 62:7 81:4,17 86:12 88:5
works 63:9 82:7 226:14
world 54:3
worse 85:18 147:21
writing 14:9
wrong 61:3,10 61:21,22 62:3 69:15 117:17 120:5,9 121:9 123:3,18,22 124:3,11 126:5 126:19 128:19 132:17,20 232:19

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

x

x 4:1,9,9 5:1,1 16:14 17:12,15 240:1

y

y 16:15
yamazaki 4:12 9:3 24:5,7,13 24:18 25:6,9 25:11 26:1,13 26:22 27:6 28:6,10,16 29:8 31:3,8 32:14 33:1,10 33:11,17 34:5 38:6 43:3,5,8 45:2,17 46:2 65:14,15 76:22 89:18 95:17,18 96:20 98:2,10 98:12 99:17 100:6,7 101:4 104:1 122:13 144:6,10,12 146:1,5,11,12 146:17 147:5 149:12,13,14 154:11,18 157:12,19,22 157:22 158:4,5 158:8,9,12,22 159:1,12,13,13 159:15,19 160:2,5,7,9,17 160:18,19 161:2,3,4,10,14 164:7,10,12,14 164:15,20 165:8 166:13 166:15,17,19 167:2,3,7,9,12 167:13,17,20 167:22 168:19 169:5,16,18 170:7,16 175:21 178:17 180:15 185:6 185:11 188:7 189:6 208:17 209:12,21 210:15,16 219:19 222:20 223:1,10,12,13 223:20 224:4 228:2 229:3 234:8
yamazaki's 122:15 169:6 178:9 225:19
yeah 13:2,21 14:2,11,11 21:14 23:22 54:11 77:11 88:14 93:12 102:1 103:5 109:5,21 110:1 110:21 113:19 153:17 169:2 178:14 202:5 212:18 225:21
year 87:11 108:13 115:11 214:21 215:6 215:22 217:11 217:12,16,19 219:7
years 219:4
yep 231:6
yield 132:19

z

zero 50:21,22
zhong 3:8 4:4 6:6 24:4 25:3 49:11 57:3,6 88:22 89:7,12 89:16 129:11 129:12 135:15 135:17 143:1,4 178:5,8 185:8 201:20 202:1 224:9,14,18,20 225:2,9,13 236:1,8
zone 78:18 105:3 174:21 229:8
zoom 24:2

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

DISCLAIMER: THE FOREGOING FEDERAL PROCEDURE RULES ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY. THE ABOVE RULES ARE CURRENT AS OF APRIL 1, 2019. PLEASE REFER TO THE APPLICABLE FEDERAL RULES OF CIVIL PROCEDURE FOR UP-TO-DATE INFORMATION.

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

VERITEXT LEGAL SOLUTIONS

COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

Veritext Legal Solutions is committed to maintaining the confidentiality of client and witness information, in accordance with the regulations promulgated under the Health Insurance Portability and Accountability Act (HIPAA), as amended with respect to protected health information and the Gramm-Leach-Bliley Act, as amended, with respect to Personally Identifiable Information (PII). Physical transcripts and exhibits are managed under strict facility and personnel access controls. Electronic files of documents are stored in encrypted form and are transmitted in an encrypted

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222

fashion to authenticated parties who are permitted to access the material. Our data is hosted in a Tier 4 SSAE 16 certified facility.

Veritext Legal Solutions complies with all federal and State regulations with respect to the provision of court reporting services, and maintains its neutrality and independence regardless of relationship or the financial outcome of any litigation. Veritext requires adherence to the foregoing professional and ethical standards from all of its subcontractors in their independent contractor agreements.

Inquiries about Veritext Legal Solutions' confidentiality and security policies and practices should be directed to Veritext's Client Services Associates indicated on the cover of this document or at www.veritext.com.

Pictiva EX2020
Samsung v Pictiva
IPR2024-01222