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

SAMSUNG ELECTRONICS CO., LTD.; and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,
V.
OURARING, INC.,
Patent Owner

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VOLUME II

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Realtime Reporter, and Notary Public for the
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1 (Pages 257 to 260)

Page 261 1 PROCEEDINGS 2 THE VIDEOGRAPHER: We are back on the 3 record. This is day two, volume number two. 4 Today's date is February 26, 2025, and the 5 time is 9:07 a.m. And it's the continuation 6 of Dr. Brian W. Anthony. 7 You may continue. 8 BRIAN W. ANTHONY, Ph.D. 9 having been previously sworn on oath, 10 continued to testify as follows: 11 EXAMINATION (Continued) 12 BY MR. SCHULTZ: 13 Q. Good morning, Dr. Anthony. 14 A. Good morning. 15 Q. I believe we left off yesterday talking 16 about Niwa, and we were at paragraph 203 in your 17 declaration. We're going to pick up there, if we 18 can. 19 We were talking about your renditions of 20 Figures 27 and 28 and paragraph 203. 21 Do you see those? 22 A. Yes.	Page 262 1 Q. And I'd like to ask you, I believe you -- 2 correct me if I'm wrong or this is an incorrect 3 characterization of your testimony. You testified 4 yesterday that Niwa was silent as to the 5 construction of housing 40 in Figure -- shown at 6 least in Figure 22 of Niwa. 7 Do you recall that testimony? 8 A. Yes, I do. 9 Q. Okay. And I'd like you to take a look at 10 Claim 1 of the '178 patent, and that's Exhibit 5. 11 So as we've talked about quite a bit, 12 Claim 1 requires an external housing component, in 13 part, and an internal housing component coupled 14 with the external housing component. 15 Do you see that? 16 A. Those are the first two components of 17 Claim 1, an external housing component defining an 18 outer circumferential surface, and then an internal 19 housing component defining an inner circumferential 20 surface, and the internal housing component is 21 coupled with the external housing component. 22 Q. And you have an understanding of what that
Page 263 1 phraseology means, correct? 2 A. Yes. 3 Q. First of all, what is your understanding 4 of what the word "component" means in this context? 5 A. I wasn't construing a term "component." 6 But in the context, you know, an external housing 7 component is defining an outer circumferential 8 surface and there's an internal housing component 9 defining an inner circumferential surface, so two 10 components that are brought together coupled to 11 form the ring. 12 Q. Okay. So that's actually what I was 13 getting at. 14 This requires two components that are 15 brought together, correct, to form the ring, in 16 your words? 17 A. That's what's described in the '178, and 18 that's what I described as also known in the art in 19 Schr der and Niwa. 20 Q. So I don't have a Webster's dictionary 21 with me, but components generally describe separate 22 parts of a greater whole; is that a fair statement?	Page 264 1 A. In general. A component would be, you 2 know, a thing that is part of a larger system, 3 yeah. 4 Q. Okay. Could you direct your attention to 5 your paragraph 204, please. And, again, we have -- 6 you're showing Figures 28 and 27 of Niwa here, 7 correct? 8 A. Yes. Annotated with coloring and text. 9 Q. Does Niwa disclose that any of the 10 components shown in these two figures are curved? 11 MR. KAPPOS: Object to form. 12 Q. For the record, Doctor, you're consulting 13 your expert declaration to determine whether Niwa 14 discloses that anything in these two figures are 15 curved? 16 A. I was referencing my declaration and the 17 '178 patent and Niwa to answer the question. 18 Q. Why are you looking at your declaration 19 and the '178 patent? 20 A. You asked me about whether the reference 21 Niwa describes the battery as being curved, and I 22 do discuss curved battery relevant to my arguments

Page 265 1 with respect to Claim 12. And then I was 2 confirming where I discuss Claim 12, which is under 3 ground 7 and 8, which is Niwa and Niwa Schr der in 4 view of Mestas. You were asking -- 5 Q. I wasn't asking you about Schr der and I 6 wasn't asking you about Mestas. I'm asking you 7 about these two figures in Niwa. 8 A. And you asked me about the curved nature 9 of the battery. So I was confirming in my 10 declaration where I was discussing the curved 11 battery. 12 Q. Okay. I wasn't asking about your 13 declaration. I was asking about Niwa. 14 A. And I opine about Niwa in my declaration, 15 and I talk about curved batteries, so I was making 16 sure that I reviewed what I discussed in order to 17 give you a good answer. 18 Q. Okay. So, Doctor, you can't answer this 19 question without this two-minute review that you've 20 been performing, right? 21 A. You asked me about -- 22 Q. I'm not waiting this long for an answer,	Page 266 1 so if you can't answer without a further review, 2 then I'll accept "I don't know" without further 3 reviewing. Is that your answer? 4 MR. KAPPOS: Object to form. 5 A. Can you repeat the question? 6 Q. Now you need me to repeat the question? 7 Do Figures 28 and 27 of Niwa that are 8 shown in your declaration have any curved 9 components? 10 MR. KAPPOS: Object to form. 11 A. In those cross sections, it's -- they are 12 slices through components. So just from those 13 cross sections, looking at those figures, it would 14 be unclear. 15 Q. It's unclear? 16 A. Just from those cross sections. You just 17 asked, you know, looking at those figures, just as 18 those cross sections, a cross section is a slice. 19 But when I talk about curved batteries, I 20 talk about curved batteries with respect to Niwa 21 when I start talking about Claim 12 where I have -- 22 I discuss Niwa and Niwa in view of Schr der.
Page 267 1 Q. So just to be clear, you're saying it's 2 not clear because this only shows a two-dimensional 3 cross section? 4 A. You had asked about that figure and 5 whether from the figure it was clear. 6 Q. Right. 7 A. And just from that figure, it would not be 8 clear. 9 Q. Do any of those components appear to be 10 curved in the figure, are shown to be curved in 11 that dimension that's shown? 12 A. I mean, this is a cross section through a 13 ring. And so in that cross section, you know, it's 14 not along the curved axis. So you would just see a 15 slice as you see here. 16 Q. And they're shown to be rectangles and 17 flat surfaces; is that right, in this cross 18 section? 19 A. Both a planar or a curved surface would 20 look the same with a cross section through the 21 ring. 22 Q. Well, at any rate, they're not curved in	Page 268 1 this dimension that's shown here. 2 A. And that is not the axis along which a 3 ring is curved to go around the finger. 4 Q. Does Niwa -- and I don't -- if you don't 5 know off the top of your head, I don't need a 6 review of your declaration. 7 Does Niwa state that any of these 8 components are curved? 9 A. Again, I don't believe I was opining about 10 Niwa by itself with respect to curved batteries. 11 Q. I didn't ask about batteries. I asked 12 about all the components. 13 If you're not comfortable without 14 reviewing the entire reference, I understand that, 15 and we can move on. 16 A. I'm happy to give you an answer. Just I 17 would like to make sure I'm giving you a correct 18 answer. I did not memorize the documents. 19 Q. Oh, I understand that. But we're not here 20 to read documents front to back. So if you don't 21 know the answer without reviewing the document, 22 that's an answer.

Page 269 1 In paragraph 214 of your declaration -- 2 A. I'm sorry, what paragraph again? 3 Q. 214. 4 A. 214. 5 Q. You talk about and quote Niwa about Niwa's 6 disclosure of a stack layer construction. 7 Do you recall that? 8 A. In 214, it would have been obvious to have 9 cavity portions at least partially overlap. Niwa 10 describes stacking substrates according to adoption 11 of a stack layer construction of several substrates 12 compared to mounting all circuit elements on one 13 substrate. 14 Q. Is the term "stack layer construction," is 15 that a term of art that a POSITA is familiar with? 16 A. So it's, you know, a -- circuit boards 17 are -- can be stacked, they have layers, so 18 stacking in the context of a POSITA reading this 19 would certainly understand what stacking meant. 20 Q. Okay. What's your understanding of why 21 Niwa, quote-unquote, adopts a stack layer 22 construction here? And feel free to -- you cite to	Page 270 1 paragraph 219 of Niwa. 2 A. So Niwa describes stacking substrates. 3 According to adoption of stack layer compared to 4 mounting all circuit elements on one substrate, 5 each area of the first substrate 21 and 22 is 6 decreased. 7 So Niwa also states that, then, the 8 largeness of the second unit can be restrained to 9 not protrude from the third joint of a finger, and 10 consciousness of the examinee for wearing the 11 plethysmograph sensor can be reduced. 12 Q. Is it fair to say what he's saying there 13 is instead of spreading the substrates along the 14 circumference of the ring housing, he's stacking 15 them in one location so as to avoid spreading them 16 out? 17 A. What was described here is distributing 18 functionality on a circuit board in different areas 19 so as to not have everything be in one region of 20 the circuit board. 21 Q. That would result in a bigger circuit 22 board, correct?
Page 271 1 A. Well, Niwa is describing being conscious 2 of the size and sort of discussing techniques to 3 stack in different substrates so as to balance the 4 size of the two different substrates being used. 5 Q. So why does he -- if you know, do you know 6 why he would consider that to be advantageous? 7 A. Well, as described here, so beneficial, 8 the largeness of the second unit can be restrained 9 so as to not protrude from the finger. 10 Q. And by "largeness," does he mean that the 11 housing on the sides of the figure wouldn't include 12 these substrates that are concentrated at the top? 13 A. I'm sorry. Can you reask that? 14 Q. Yeah. And I'll ask you in the context of 15 Figure 22 of Niwa. 16 The stacked layer construction is with 17 respect to unit 20, correct? 18 A. So I was just, for a moment, noticing a 19 mistake. So on the top of page 151, the first 20 substrate is indeed 21. Second substrate I called 21 out as 22, but that should be 27 is decreased. 22 Q. Okay. And those are part of unit 20 shown	Page 272 1 in Figure 22, correct? 2 A. Yes, that is correct. 3 Q. So when he's talking about restraining the 4 largeness of the second unit in the context of 5 Figure 22, he's talking about mounting these 6 elements on top of the knuckle of the ring rather 7 than on the sides, thereby being able to keep the 8 sides of the ring having a thinner profile; is that 9 fair? 10 A. So as I describe here, so Niwa is trying 11 to decrease the size of unit 20, and in doing so, 12 in view of those teachings, a POSITA would 13 similarly have been motivated to partially overlap 14 the first portion of the cavity that has the 15 battery and the second portion of the cavity that 16 has the PCB as is discussed -- as disclosed by 17 Niwa, so fit components inside the limited volume. 18 Q. So in this context of Figure 22, this 19 means he's not putting components on the sides of 20 the ring; is that fair? Figure 22's Niwa. 21 A. Niwa in isolation is describing putting 22 those components on those modules 20 and 10 and is

Page 273 1 concerned with fitting components inside of a small 2 volume, and so is motivated to have things 3 overlapping. 4 Q. Okay. "Small volume" meaning a small part 5 of the -- a small section of the circumference of 6 the ring? 7 A. So Niwa teaches the benefit of having 8 things stacked, whether you're putting things in -- 9 a POSITA reading that would understand that that's 10 beneficial in putting it as described there in 20, 11 but it's also beneficial in general if you had a 12 larger region of circuit board or a larger region 13 where you're putting the electronics functionality. 14 Q. And a POSITA would know, would they not, 15 that in the context of wearing a finger ring, 16 there's an advantage to, as shown in Niwa, 17 concentrating these components in a stack at the 18 top of the ring versus putting it on the sides? 19 MR. KAPPOS: Object to form. 20 A. Well, the part that we're discussing here 21 is on page 151, right? It's all under the section 22 where I'm discussing Schr der in view of Niwa. So	Page 274 1 I'm not analyzing Niwa in isolation. I'm viewing 2 Schr der in view of Niwa. And the teachings of 3 Schr der in having a cavity in which to put 4 components is flexible circuit board coupled with 5 Niwa's teaching of the benefit of stacking and 6 having things overlapping is the analysis that I'm 7 describing here. 8 Q. I understand. 9 But I'm trying to -- the teachings of Niwa 10 by itself are certainly relevant to what we're 11 talking about here, right? 12 A. In the section that we're talking about, 13 though, my analysis is -- 14 Q. I didn't ask you about any section. 15 I'm saying in the context of determining 16 the validity of these claims, the disclosures in 17 each reference by themselves is relevant, isn't it? 18 A. My analysis is not them by themselves. My 19 analysis is the POSITA using them together. 20 Q. Okay. So the -- so in your mind, it's 21 irrelevant what Niwa discloses by itself, and it's 22 irrelevant what Schr der discloses by itself, and
Page 275 1 it's relevant what Mestas and any other reference 2 discloses by itself. Your analysis is the only 3 thing that's relevant is what's disclosed 4 collectively by these references; is that fair? 5 MR. KAPPOS: Object to form. 6 A. My analysis is on obviousness, and I 7 describe the reasons the POSITA would be motivated 8 to combine these references and what they teach. 9 (Interruption by the reporter.) 10 A. And so I'm not analyzing here Niwa by 11 itself. I'm analyzing Schr der and Niwa together. 12 Q. Okay. 13 A. -- as of -- 14 Q. Okay. Did you -- and in your work, did 15 you analyze Niwa by itself as part of this 16 exercise? 17 A. So in grounds 5 and 6, I discuss Niwa 18 alone or Niwa in view of Schr der. 19 Q. Doctor, let me cut to the chase. I'm 20 asking you questions about Niwa by itself. If your 21 answer is I haven't done that analysis and I can't 22 answer questions about Niwa in a vacuum, then I'll	Page 276 1 move on. 2 A. That was not my answer. I told you 3 grounds 5 and 6 are in my declaration where I 4 describe Niwa alone. 5 Q. Okay. 6 A. So that's -- 7 Q. So you can answer questions about Niwa by 8 itself, right? 9 A. I'm going to my declaration to refresh my 10 memory of where I discuss Niwa by itself. 11 Q. Okay. 12 A. So as I describe on page 216 with respect 13 to Niwa by itself, which is ground 5 under claim 3, 14 which is where we were discussing the prior 15 paragraph on page 151, it's my opinion that Niwa 16 teaches claim 3 and describes -- 17 Q. I didn't ask you that question, sir. I 18 didn't ask you that question. 19 I asked you if the stacking arrangement 20 disclosed in Niwa allows Niwa to restrain the 21 thickness on the sides of the ring. 22 A. To restrain the thickness on the side of

Page 277 1 the ring? 2 Q. Yes. 3 A. So the -- there's a benefit in stacking to 4 reduce the size of the ring and whether that be in 5 an isolated section or in the remainder of the 6 circumference of the ring. So the POSITA reading 7 this would understand the benefit of stacking to 8 reduce the used volume. 9 Q. Okay. And so, in effect, if you're 10 stacking in one location, that allows you to reduce 11 the volume in another location; is that fair? 12 A. Depending on design decisions. But in 13 general, yeah, being able to reduce the volume and 14 using stacking is beneficial in order to reduce the 15 volume of the ring. 16 Q. And, again, back to my line of 17 questioning. What I was getting at was if you 18 looked at Figure 2 of Niwa -- Figure 22 of Niwa, 19 the stacking of elements in unit 20 obviously makes 20 that section of the ring thicker, but it also 21 allows the sides of the ring to be thinner; is that 22 fair?	Page 278 1 A. Well, I think a POSITA would also not want 2 to have -- would be cognizant of not having 3 significant radial changes. So, you know, 4 there's -- you wouldn't want to make it wider to go 5 to extremely thin. You would want to have it be a 6 thickness that both aesthetically and from a 7 manufacturing perspective it was thick enough to 8 sort of conform with those -- sort of mate in a 9 holistic design sense with 20 and 10. 10 So, in general, if 20 is thinner, then 30 11 would also be able to be thinner, and if 20 were 12 thicker, then 30 would also likely be thicker -- or 13 sorry -- 40 would be thicker. 14 Q. And a POSITA would -- or anyone who wears 15 a ring would understand that having the sides of 16 the ring being too thick would interfere with your 17 other fingers, correct? 18 A. Well, if they were too thick at some 19 point, you know, it could certainly impede. 20 Q. Right. 21 Impede -- 22 A. Some -- some --
Page 279 1 Q. -- making a fist, for example -- impede 2 making a fist, for example, or putting your fingers 3 together? 4 A. Well, any ring does some level of -- it's 5 a -- it's a structure on your body. And so at some 6 level it's going to constrain some of the motion of 7 your body, any ring would, no matter the size ; 8 smaller rings, less constriction, bigger rings, 9 bigger constriction. 10 Q. Does Schr der in isolation teach stacked 11 layer construction anywhere in his disclosure? 12 A. Sorry. You said Schr der? 13 Q. Schr der, yes. Exhibit 2. 14 A. A POSITA reading Schr der would 15 understand, for example, when we talk about the 16 carrier material having the chip module connected 17 to the antenna coil, and other electronic 18 components could also be stacked as described with 19 the carrier foil as described in 13 for an 20 alternative manufacturing flexibility. 21 So I think the POSITA reading this would 22 understand that there is stacking potential,	Page 280 1 stacking that could be used and would also be 2 motivated to look to other teachings of stacking, 3 which is, as motivated, to combine Niwa with 4 Schr der. 5 Q. So Figure 3 of Schr der, again -- I 6 appreciate that you state you haven't relied on 7 Figure 3. But Figure 3 in isolation is an example 8 of where Schr der could be stacking elements? 9 A. Well, again, I was not using Figure 3. I 10 was discussing the -- the variant, for example, of 11 Figure 7, which would have an inlay which would 12 have stacked -- potential for stacked construction, 13 as they described. Could there be stacking used in 14 Figure 3? Potentially. But that's not what I was 15 opining about. 16 Q. Okay. Could you turn to paragraph 217 of 17 Niwa, please. 18 A. Of the patent, Niwa patent? 19 Q. The Niwa patent, correct -- publication. 20 So in this section of Niwa he characterizes the 21 battery as, quote, highly flat. It's about halfway 22 down paragraph 217.

Page 281 1 Do you see that? 2 A. According to construction, battery 24 3 formed is highly flat and is located right above 4 the finger 2. 5 Q. Do you have any opinion as to why Niwa 6 chooses to use, or at least says he chooses to use 7 a highly flat battery here? 8 A. Again, in general, a POSITA -- a person 9 designing a ring wants to minimize size, minimize 10 volume, so using a relatively flat, highly flat 11 battery could be beneficial there. 12 Q. And that would facilitate also the stacked 13 layer construction that he utilizes? 14 A. Could facilitate the saving of space, 15 facilitate as described, and with the battery 16 number -- battery 24. 17 Q. And that's shown in your Figure 28? 18 A. So the battery is colored blue there. So 19 as to reduce the thickness of the ring at that 20 area, as is described in the benefit for stacking. 21 Q. Just to be clear, highly flat doesn't mean 22 curved, right?	Page 282 1 A. It doesn't mean not curved. It means 2 highly flat. So highly curved things can be flat, 3 non-curved things can be flat. 4 Q. Your testimony is that highly flat can be 5 curved? 6 A. This piece of paper is highly flat. It's 7 still highly flat. 8 Q. So that's a yes? 9 A. Yes. Highly flat things can be curved or 10 flat or planar. 11 Q. And could you jump to paragraph 217 of 12 your declaration, please. 13 In the first sentence you say, a POSITA 14 would have understood that using multiple LEDs 15 emitting light at different wavelengths provide 16 accurate real-time information to the user about 17 the user's health. 18 Do you see that? 19 A. Yes. 20 Q. Schr der in isolation doesn't state any 21 concern about providing accurate information about 22 a user's health, does he? In fact, he doesn't talk
Page 283 1 about a user's health at all, does he? 2 A. You said Schr der? 3 Q. Schr der, correct. 4 A. So, again, this section is in my 5 discussion around the combination of Schr der and 6 Niwa for -- and describe all the motivations to 7 combine previously and having multiple wavelengths 8 they further describe as beneficial, not just for a 9 user's health, but also for beneficial in 10 redundancy of the device if one LED fails, loses 11 contact with the skin. So those benefits would 12 apply to both making measurements of user's health 13 and, for example, getting a vein image. 14 Q. Again, in isolation, though, does Schr der 15 talk about making measurements of user's health, in 16 your words? 17 A. Well, you're -- well, so, I mean, you're 18 taking that single sentence, such as the whole 19 paragraph there, that discusses the benefit for 20 using multiple wavelengths. 21 Q. You're quoting Schr der there? 22 A. I'm quoting as discussed in section VA6,	Page 284 1 POSITA would have understood that using multiple 2 LEDs and getting light at different wavelengths 3 provides accurate and real-time information to the 4 user about health. Furthermore, incorporating 5 additional LEDs provides for beneficial redundancy 6 in a device. If one LED fails, loses contact with 7 the skin, is occluded by a mole or scar, other skin 8 irregularities, or is above a region of tissue with 9 low level of vascularization, the remaining LEDs 10 can continue to function. 11 So for example, if you were to consider 12 Niwa in isolation, which is not what I'm describing 13 here, though -- 14 Q. Schr der in isolation is the question. 15 A. Sorry. Right. 16 So Schr der in isolation, which is getting 17 a vein image, you know, having good imagery of the 18 vein if it were occluded by a mole or a scar, you 19 know, there's -- in isolation there's still that 20 benefit, but, again, discussing your combination -- 21 Q. But Schr der -- my question is with 22 respect to Schr der in isolation. You reviewed

Page 285 1 Schr der by itself, right? 2 A. I've reviewed all of them, yes. 3 Q. Okay. Schr der by itself doesn't talk 4 about using his vein pattern imaging for evaluating 5 a user's health, does he? 6 A. So that first sentence says "user's 7 health," but it's not -- the rest of my 8 descriptions here are not only talking about -- 9 Q. I'm asking about a paragraph in your 10 declaration. The question has nothing to do with 11 that. 12 A. Well, you pointed to that sentence which 13 is in my declaration. 14 Q. Pointed to what sentence? 15 A. The sentence -- the first sentence of -- 16 Q. I just asked you about Schr der and 17 whether he discloses anything about a user's 18 health. 19 A. Right. 20 And you had referred to that from the 21 sentence that is my first sentence of paragraph 217 22 I thought.	Page 286 1 Q. Not really. I may have drawn your 2 attention to it, but now I'm asking a question 3 about Schr der. There's no context to these 4 questions. The context is what the question is. 5 Does Schr der refer to a user's health in 6 isolation? 7 A. Schr der does -- can you reask the 8 question? 9 Q. Does Schr der refer to -- and this is the 10 third time I've asked it -- does Schr der refer to 11 using vein pattern imaging to evaluate a user's 12 health? 13 A. I was not opining about Schr der by 14 itself. In isolation, does it talk about vein 15 imagery to -- for biometric identification? Yes. 16 Q. I didn't ask about biometric. I asked 17 about a user's health. 18 A. So it talks in isolation, which is not 19 what I was opining about. In isolation it talks 20 about vein imagery. What I'm opining about is the 21 combination of Niwa and Schr der where there's a 22 benefit to combine.
Page 287 1 But even in isolation, if Schr der were -- 2 just if we were to consider hypothetically Schr der 3 by itself, there's also a benefit, as I describe 4 what I understood you to be asking about that 5 paragraph 217, but having multiple LEDs to improve 6 that, to improve the ability to give even that -- 7 Q. Schr der doesn't disclose multiple LEDs. 8 He discloses using infrared to take vein patterns, 9 right? 10 A. Again, I was not opining about Schr der by 11 itself. I was opining about Schr der and the 12 benefit of having multiple LEDs in the combination 13 of Schr der. 14 Q. So you didn't evaluate Schr der by itself? 15 A. So we discussed yesterday under ground one 16 Schr der in view of the knowledge of a POSITA. And 17 as I was discussing here, this is the 18 section 217 -- 19 Q. You just said you weren't opining about 20 Schr der by itself. So which is it? Did you 21 review Schr der or not? 22 A. I did, yes.	Page 288 1 Q. Okay. I'm asking about your opinions. 2 I'm asking about what Schr der discloses by itself 3 in isolation. Do you understand that context of 4 that question? 5 A. Yes, I do. 6 Q. Okay. So does Schr der refer to using his 7 device to evaluate a user's health? And if your 8 answer is yes, you can point me to the line and 9 paragraph of Schr der that does that. 10 A. When I was opining about Schr der by 11 itself, I am talking about -- 12 Q. I'm not asking about what you're opining 13 on. I asked you a very simple question about the 14 reference. You've reviewed the reference, so you 15 should be able to answer questions about the 16 reference in isolation. 17 This entire line of questioning has been a 18 waste of time because you don't think you need to 19 answer questions that you haven't already opined 20 on. 21 This exercise is not to have you read your 22 declaration. This exercise is to explore your

Page 289 1 knowledge of these references. I'm not asking you 2 about combinations. I'm asking you about a single 3 reference that's the basis for your invalidity 4 position, and you haven't answered those questions 5 for two days. 6 So, again, can you point me to line and 7 paragraph of Schr der, not your declaration, that 8 talks about using Schr der's device to evaluate a 9 user's health? 10 MR. KAPPOS: Object to form. 11 A. In forming my opinions in my declaration, 12 which is what I understood I was being deposed 13 about, my declaration, I do not opine -- 14 Q. You're not being deposed -- who told you 15 you're being deposed about your declaration? 16 You're being deposed about these IPRs. You don't 17 think I can ask you questions outside your 18 declaration? Is that your -- is that your -- 19 MR. KAPPOS: Object to form. 20 Q. Is that your testimony? Because this 21 entire deposition is going to have to occur again 22 if that's your understanding.	Page 290 1 MR. KAPPOS: Object to form. 2 Q. Is that your understanding, that you're 3 just here to sit and answer questions about your 4 declaration? 5 A. I'm answering questions about the case. 6 Q. There's a lot more in this case other than 7 your declaration. You understand that, right? 8 A. Yes. 9 Q. Okay. So point me to line and paragraph 10 of Schr der that talks about using his device to 11 evaluate a user's health. If you don't think that 12 exists, I'll accept that. If you're not sure, I'll 13 accept that. 14 A. Schr der discusses biometric monitoring -- 15 biometric identification using data imagery. A 16 POSITA reading Schr der would understand that is -- 17 can be related to health. It is Schr der -- 18 Q. You didn't explicitly say related to 19 health. I said, where does he use his device to 20 evaluate a user's health? Where does he say that? 21 Can you point me to that in Schr der? Are you 22 saying it's the section where he talks about
Page 291 1 biometrics? 2 A. So a POSITA reading Schr der would 3 understand that vein imagery can indeed be related 4 to health. If Schr der -- 5 Q. Point me -- as I stated in my question, 6 point me to the line and paragraph, please. 7 A. Schr der is not by itself discussing 8 things other than the vein imagery. 9 Q. Are you refusing to point to a line and 10 paragraph to support what you just said? 11 A. I just -- 12 MR. KAPPOS: Object to form. 13 Q. That's the question. 14 MR. KAPPOS: Object to form. 15 A. I thought I just answered the question. I 16 said -- 17 Q. I asked you to point to a column and line. 18 You understand patents have columns and lines, 19 right? Okay. So point me to the column and line 20 where you contend Schr der talks about using his 21 device for user's health. 22 A. So in giving my answer, I'll point you in	Page 292 1 general to the bottom of column 9 and top of column 2 10 where Schr der talks about using a biometric 3 sensor with at least one infrared diode. 4 Q. Okay. And can you give me a line number 5 there? 6 A. For example, line 66, column 9. A 7 biometric sensor can be employed at least one 8 infrared diode, at least one infrared sensor. In 9 column 10, it continues, line 6, on a first capture 10 of a vein image of the fingering, a vein image must 11 be captured along the whole finger. 12 So Schr der in isolation is talking about 13 biometric sensing of a vein image. 14 Q. That's all I asked for, Doctor. I didn't 15 ask for an explanation. I asked for you to point 16 to column and line. So that's the answer to the 17 question. I didn't ask for any more than that. 18 Can you turn to -- 19 MR. KAPPOS: And I'll let the record 20 reflect again that counsel cut off the witness 21 and didn't let him complete his answer. 22 MR. SCHULTZ: I didn't ask for an

Page 293 1 explanation. I asked for column and line, and 2 he gave that answer. 3 Q. Do you have something to add to that? 4 A. So as I was trying to describe, this is 5 where Schr der talks about vein imagery for 6 biometric sensing. But as I opine, a POSITA 7 reading Schr der would understand and be motivated 8 to combine other teachings relative to health, 9 which leads to then the -- 10 Q. I understand that's in your declaration, 11 Doctor. 12 Could you go to paragraph 229 of your 13 declaration. 14 And I have a question about your 15 annotation of this figure which appears to be 16 Figure 22 of Niwa. Why do you draw the housing as 17 cutting through the middle of the unit 20? 18 A. The housing should incorporate the around 19 20, as I also show in the Figure 27, which it goes 20 up and over in item 40 or in item 20. 21 Q. So just to be clear, your green line that 22 passes through unit 20 in your annotation, that	Page 294 1 should travel up and around -- 2 A. That's part of the housing. 3 Q. -- unit 20? 4 A. Yes. 5 Q. Okay. Can you go to paragraph 231, 6 please. 7 A. 231 of my declaration? 8 Q. Yes. 9 So is it your opinion that in light of 10 this paragraph the LEDs in Niwa are not oriented in 11 a plane? 12 A. Actually, first, let me correct my prior 13 answer about you were talking about the housing. 14 The reason I drew the green like that is I was 15 mentally thinking of the mapping of the Figure 7 16 which has the housing like this, where the module 17 20, the chip module, would be on the... 18 So even though in this I used the -- this 19 figure to denote the light sensor and the housing, 20 the housing in the embodiment that I discuss, the 21 Figure 7 housing which would have 20 on the inlay, 22 that would be inside the -- on the carrier inside.
Page 295 1 And then your question was about the -- 2 Q. About paragraph 231, whether the LEDs of 3 Niwa are in a planar orientation. 4 A. So what I'm describing here is the 5 situation where if they were planar in the 6 embodiment I had proposed, that the LEDs would 7 still be at different radial positions around the 8 circumference of the ring, and in the prior 9 paragraph arguing that -- explaining how if they 10 were curved around the ring, they would also be at 11 different radial positions. 12 So in either case, what I'm describing is 13 the light sensors 12 being at different radial 14 positions, whether they be planar in 231 or curved 15 around as described in 230. 16 Q. So does Figure 22 of Niwa -- in Figure 22 17 the LEDs are located in unit 10 at the bottom of 18 the ring, correct? 19 A. Correct. 20 Q. Similar to Asada's arrangement and 21 location? 22 A. Well, at least the Asada figure that I	Page 296 1 have earlier in the introduction has the light 2 sensors at the bottom. 3 Q. And Figures -- Figure 27 provides -- of 4 Niwa provides additional detail of the sensor unit 5 10; is that fair? 6 A. I'm sorry. Say that again. 7 Q. I'm asking about Niwa, Doctor, Figure 27 8 of Niwa. That shows the detail of the sensor unit 9 10, doesn't it? 10 A. 12 is the light sensor. Yes. 11 Q. Is it your understanding Figure 22 and 12 Figure 27 are a different cross section or the same 13 cross section? 14 A. Well, 27 is showing far more detail, and 15 it's showing a compressed finger. It's describing 16 similar elements, 20, 10, but the cross section 17 is -- aspect ratio is very different and so they're 18 not drawn to scale. 19 Q. Is this a -- is Figure 27 a side view of 20 the finger, while Figure 22 is a cross section 21 along the length of the finger, or is it not clear? 22 MR. KAPPOS: Object to form.

Page 297 1 A. I believe 27 is sort of a -- also a slice, 2 effectively a compressed slice through the -- the 3 radial piece of the finger. 4 Q. That would make sense because that wire 30 5 is in the same location, correct? 6 A. I think that's fair. 7 Q. So in Figure 27, the item 13 is the sensor 8 unit containing the LEDs? 9 A. You said item 13? 10 Q. Yes. 11 A. I believe item 13 is the measurement 12 window translucency portion and 12 -- 13 Q. I'm sorry. Item 12, yes. 14 A. -- is the light sensor. 15 Q. So 12 includes the LEDs and photodiodes? 16 A. Item 12 is the light sensor, yes. 17 Q. Is item 12 shown to be planar in this 18 figure? 19 A. In this figure it's drawn as a 20 cross-sectional rectangle. 21 Q. That means planar? 22 A. Again, it's in that -- the slice through	Page 298 1 it, and it's rectangularly drawn here, yes. One of 2 my arguments here is about the radial -- what I'm 3 trying to describe in that paragraph you were 4 highlighting, 231, was the orientation of the 5 radial positions of the light sensor being around 6 the circumference of the ring. 7 Q. I understand that, Doctor. 8 MR. SCHULTZ: All right. Let's take a 9 five-minute break. 10 THE VIDEOGRAPHER: The time is 10:24. 11 We're off record. 12 (Proceedings interrupted at 10:24 a.m. and 13 reconvened at 10:41 a.m.) 14 THE VIDEOGRAPHER: We're back on the 15 record. The time is 10:41. 16 MR. SCHULTZ: Let's have marked as 17 Deposition Exhibit Number 9, Petitioner's 18 Exhibit 1010, U.S. Patent Application 19 publication to Mestas, M-e-s-t-a-s. 20 (Anthony Exhibit 9, U.S. Patent Application 21 2014/0244009, marked for identification.) 22 MR. SCHULTZ: For the record, Nardeen
Page 299 1 Billan entered the room, who is an associate 2 at our firm. 3 MS. BILLAN: First name is Nardeen, 4 N-a-r-d-e-e-n, last name is B-i-l-l-a-n. 5 BY MR. SCHULTZ: 6 Q. Dr. Anthony, I'd like to ask you some 7 questions about paragraph 241 of your declaration. 8 First off, do you recognize Exhibit 9? 9 A. Yes. It's the Mestas. 10 Q. It's the Mestas reference. And you've 11 reviewed that reference -- 12 A. Yes. 13 Q. -- a number of times? 14 A. Yes. 15 Q. Now, you have a statement that -- at the 16 end of paragraph 241, that a POSITA would have been 17 motivated to implement Mestas's curved battery in 18 Schr der's finger ring because having a curved 19 battery would provide a larger battery that 20 conforms to the circular shape of the ring without 21 stressing the battery or ring housing. 22 First of all, can you point to the	Page 300 1 batteries in Mestas that you propose putting in 2 Schr der by figure of Mestas? 3 A. So in page 167 where I have the Figure 15 4 from Mestas, just want to correct -- this is one of 5 the corrections that was on the -- from Exhibit 1. 6 I've labeled incorrectly the thing called "cavity" 7 that should be pointing to 22, I believe is the 8 number. So the cavity is the larger area where the 9 things I've labeled blue are recessed into. Right. 10 So they are 50 and 52, not labeled on that figure, 11 but they are that portion. I can refer to a better 12 figure. 13 Q. So the labeling in blue in this paragraph 14 245 of your declaration is not accurate? 15 A. Correct, that is correct. Those are 16 pointing to the -- I think the -- hold on, let me 17 just check the figures. 18 Right. So I refer to figure for 19 numbering, for example 8A, so the battery cavity is 20 50, and the 59 is the -- is that recess for 21 connection to the battery. So what should have 22 been labeled as -- it should be in blue is the --

Page 301 1 is 50. 2 Q. Okay. So -- 3 A. That is where the battery, it would go 4 into that area. 5 Q. So the batteries or battery in Mestas 6 you're relying on, is that shown in Figure 21A and 7 21B of Mestas as item 142? 8 A. So I label -- the figure I used was 9 Figure 6, which is on page 169 in my declaration, 10 coloring blue the battery 142, yes. 11 Q. Okay. So that's shown in Figure 6 as 12 well? 13 A. Yes. 14 Q. Figures 21A and 21B show the same battery, 15 correct, 142? Or I should say pair of batteries. 16 A. Show a pair of batteries. 17 Q. Those figures show the same battery? 18 A. I'm going to confirm that they show the 19 same embodiment or different embodiments, but they 20 are showing batteries, and they believe are 21 different. They are here, be different variants in 22 Figure 6.	Page 302 1 Q. That's all right, Doctor. We don't need 2 to answer that. We can use Figure 6. 3 A. Okay. 4 Q. So Figure 6 shows a cross section of a 5 bracelet; is that correct? 6 A. It's a -- of a wearable band, yeah, 7 Figure 6. 8 Q. Wearable band that Mestas in this 9 embodiment states is -- goes around your wrist, 10 right? 11 A. It's showing item 10, which stems from 12 Figure 1, which is, in this case, depicted around 13 the wrist in the figure. 14 Q. That's, item 10 is shown in Figure 1 on a 15 person, correct? 16 A. Correct. 17 Q. So let me first ask you: Mestas discloses 18 using a pair of batteries, 142? 19 A. What's depicted there is battery 142 in 20 two regions, yes. 21 Q. Okay. So is your proposed combination 22 that both batteries 142, that the pair of batteries
Page 303 1 142 be incorporated into Schr der's ring? Or do 2 you not opine on that? 3 A. Well, I opine, you know, starting on 4 page 163, for why a POSITA would have been 5 motivated to combine Schr der's teachings with the 6 teachings of Mestas. So a POSITA would have been 7 motivated to combine Schr der with Mestas because 8 they are analogous art teaching improvements to the 9 same type of devices. Schr der and Mestas are 10 directed to wearable biometric sensing devices -- 11 Q. What are you reading from, sir? 12 A. I'm sorry. Paragraph 240 of my 13 declaration. 14 From paragraph 240, A POSITA would have 15 been motivated to combine Schr der with Mestas. 16 They are analogous art teaching improvements, the 17 same type of devices. Schr der Mestas are directed 18 to wearable biometric sensing having structural 19 components including inner and outer surfaces 20 cavity, battery, and a PCB within the cavity. 21 Q. So Mestas is -- teaches using two 22 batteries, correct? I think we've already	Page 304 1 established that. 2 A. Well, a POSITA would understand that 3 depending on the battery requirements, two 4 batteries is shown here, but it could be one 5 battery depending on... 6 Q. Your testimony is that Mestas, which shows 7 two batteries, it could be one battery. So you're 8 changing the design of Mestas to have one battery? 9 A. You asked whether Mestas teaches two 10 batteries. It's showing two batteries. I'm 11 confirming and reskimming Mestas to see whether it 12 says it has to be two batteries, so it's shown in 13 that figure as two batteries, but it's not clear. 14 I don't have Mestas memorized. 15 Q. You're looking to see whether Mestas says 16 it could be one battery? 17 A. I don't have Mestas memorized, so it's 18 shown in the figure as two, but I -- 19 Q. Well, you say you rely on Figure 6, right? 20 A. And shown in that figure is two batteries, 21 but you asked whether Mestas teaches only using two 22 batteries, and that figure shows two. I was going

Page 305 1 to relook at Mestas to confirm whether it said it 2 had to be two, which I suspect is the not the case. 3 Q. Well, regardless of whether it says that, 4 are you proposing that in your combination that 5 both of Mestas's batteries be incorporated into 6 Schr der? 7 A. Well, what I'm proposing in the 8 combination is that the teachings of Mestas with a 9 curved battery would provide a larger battery that 10 conforms to the circular shape of the ring. It's 11 not -- a POSITA -- in my proposed combination, it 12 would not have to be two batteries. 13 Q. Okay. So you could take one of Mestas's 14 batteries? 15 A. Schr der teaches using a curved battery to 16 provide a conformable circular shape without 17 stressing the battery or ring housing. 18 Q. Schr der teaches using a curved battery? 19 A. Mestas. 20 Q. Okay. But for Figure 6, Mestas found it 21 necessary to use two batteries for the application 22 he's using the device for, correct?	Page 306 1 MR. KAPPOS: Object to form. 2 A. The teachings of Mestas are the benefit of 3 having a curved battery. It is two batteries in 4 the figure, but in the proposed combination, it 5 could be as well one battery. 6 Q. Okay. So if Mestas used one battery, it 7 would have to be bigger than either of the two 8 batteries to provide the same capacity; is that 9 right? 10 A. Well, that does depend on the properties 11 of the battery, the chemistry of the battery. So 12 there are battery variants that are a function of 13 cost, that you can have higher density energy 14 storage in one battery that's more expensive than 15 using two, so... And you could also deliver the 16 same amount of power, energy in a single battery if 17 it had higher energy density. 18 Q. Okay. So you think Mestas is using two 19 batteries; whereas, he could be using one battery 20 if he wanted to use a more expensive battery; is 21 that your testimony? 22 A. Well, in constructing a device showing
Page 307 1 within the skill of a POSITA to explore the cost 2 and complexity of single batteries, multiple 3 batteries, the teachings that I'm relying on of 4 Mestas is that of a curved battery and would 5 provide sort of better use of the housing in 6 combination with Schr der. 7 Q. Okay. Whether we're talking about using 8 one or both of Mestas's batteries, the battery 9 disclosed in Mestas's bracelet is too big to put in 10 a ring like Schr der, correct? 11 A. Well, there's a -- what's taught is the 12 benefit of a curved battery. And I'm not proposing 13 wholesale, just copying and paste that battery into 14 a device of the size of a ring, but a POSITA would 15 curve the battery to beneficially use the space and 16 size the -- use an appropriate energy density as 17 well as for the power requirements for. 18 Q. Right. Because you can't wholesale, just 19 copy and paste the battery of Mestas into a ring 20 because it's far too big, correct? 21 A. Nor did I propose just copying and pasting 22 it wholesale.	Page 308 1 Q. How many times -- how many times too big 2 is the battery of Mestas, approximately, to be put 3 in a ring such as Schr der? 4 MR. KAPPOS: Object to form. 5 Q. My guess is about four times too big. Is 6 that fair, or would you say it's more or less? 7 MR. KAPPOS: Object to form. 8 A. Well, I didn't find it necessary to do 9 that analysis in forming my opinions. The wrist is 10 some size, the battery -- a ring is a smaller size. 11 It has -- the finger ring is more tightly coupled 12 to the finger, so it would beneficially -- it could 13 use less power. So you could reduce the size, the 14 energy required for the battery. It's not 15 necessary to calculate the size differential to 16 beneficially understand the use of curved batteries 17 as I propose. 18 Q. Well, you'd need to know the size of the 19 battery you wanted when you're designing a ring, 20 right? 21 A. Well, you'd need to know the energy 22 density and the space that you need for the device

Page 309 1 that you're trying to design. 2 Q. So in the context of Mestas's form 3 factor -- and you say in paragraph 242 that it 4 would be trivial, quote-unquote, to miniaturize the 5 battery of Mestas; is that right? 6 A. So in 242 as I describe, paragraph 242 of 7 my declaration, POSITA would have had a reasonable 8 expectation of success in combining Schr der and 9 Mestas. 10 Q. Doctor, I don't need you to read your 11 declaration. 12 A. Well, you asked me to confirm -- 13 Q. I'm asking you about a sentence in your 14 declaration. 15 A. And can you point out that sentence, 16 please. 17 Q. Yes. You said it's trivial to miniaturize 18 the battery of Mestas and put it in a ring; isn't 19 that right? 20 MR. KAPPOS: Object to form. 21 A. So in my paragraph 242, starting after the 22 reference to Mestas 143, as miniaturization of	Page 310 1 electronic components improved, a POSITA would have 2 found it trivial to implement Mestas's teaching 3 into a ring form like that of Schr der's finger 4 ring. As I've described in the technical 5 background, a POSITA would have been motivated to 6 implement a ring-shaped device due to the ring's 7 compactness, stability of motion, signal, motion, 8 other disturbance, rejection, et cetera. 9 Q. So my interpretation of what you're saying 10 here, and correct me if I'm wrong, is that you're 11 saying it would be trivial to miniaturize the 12 battery of Mestas to fit into the ring of Schr der; 13 is that a fair characterization? 14 A. To miniaturize -- to make a -- use a 15 battery that's not proposing to copy and paste the 16 exact battery, but batteries come in curved shapes 17 and sizes, are flexible, and would be appropriately 18 sized and placed into the -- using the teachings of 19 curved battery of Mestas into the Schr der -- 20 Q. That's not what you said, Doctor. You 21 used the word "miniaturize." Aren't you proposing 22 to miniaturize the battery of Mestas?
Page 311 1 A. No. I say as miniaturization of 2 electronic components improved, a POSITA would have 3 found it trivial to implement the teachings, 4 Mestas's teachings, into a ring form like that of 5 Schr der's finger ring. 6 Q. Okay. And you're relying on Mestas's 7 teaching of a battery 142, right? You said that 8 yourself. 9 MR. KAPPOS: Object to form. 10 A. Mestas teaches a curved battery and the 11 benefit of using a curved battery, and a POSITA 12 would have found it trivial to implement those 13 teachings. The teachings are more broad than just 14 that exact battery, the benefit of using a curved 15 battery, and a POSITA would have found that 16 straightforward. 17 Q. Well, you already said his teachings are 18 of a battery that's too big for a ring, right? 19 MR. KAPPOS: Object to form. 20 A. I did not say that. I said that a battery 21 in that form factor is bigger than a ring, but it's 22 teaching curved batteries, as I propose here, and	Page 312 1 the benefit of using curved batteries in the 2 combination, a POSITA would find that 3 straightforward to do. 4 Q. So let's go back to my other question. 5 You didn't give me a number as to how many times 6 you'd have to scale that Mestas battery down or a 7 battery of similar size to fit in a ring. Would it 8 be five times smaller, ten times smaller, someplace 9 in between? 10 MR. KAPPOS: Object to form. 11 Q. Do you not have an opinion on that? 12 A. It depends on the size of the ring. 13 Again, the size of the battery you need is going to 14 be a function of the energy density of the battery 15 and the size of the ring. 16 Q. Doctor, I'm talking about the battery of 17 Figure 6. How much smaller would you have to make 18 it to have it fit in the ring? 19 A. You can estimate a -- from the figure you 20 could estimate the average dimension of a wrist, 21 estimate how much of the arc length around the 22 wrist that battery is and get an estimate of

Page 313 1 approximately what that size is. 2 And you could do a similar exercise with 3 the approximate size of the average ring and come 4 up with a scaling factor. I didn't find it 5 necessary, though, to do that calculation in order 6 to form my opinion that it would be straightforward 7 to do. 8 Q. How big a scaling factor would you be 9 comfortable that would require to -- that would be 10 required to fit that in a ring? Five times? 11 MR. KAPPOS: Object to form. 12 A. Some place between 5 and 10 -- 13 Q. Okay. 14 A. -- with that not having calculated it. 15 Q. Now, if a POSITA -- and a POSITA is a 16 person two years out of college with a couple of 17 years of experience; is that how you defined him or 18 them? 19 A. So back on page 27, paragraph 18 where I 20 start to describe level of ordinary skill in the 21 art, a POSITA is a hypothetical person presumed to 22 know the relevant prior art. The art further	Page 314 1 understand the factors that may be considered in 2 determining level of skill. Include the types of 3 problems, the prior art to those problems, rate 4 with which innovations are made, sophistication of 5 technology, educational level of active workers in 6 the field. 7 I understand a POSITA is one who is 8 presumed to be aware of all pertinent art, thinks 9 along conventional wisdom in the art, a person of 10 ordinary creativity. A person of ordinary skill at 11 the relevant time would have had at least a 12 four-year degree in electrical engineering, 13 mechanical engineering, biomedical engineering, 14 optical engineering, related field of study or 15 equivalent experience, and at least two years' 16 experience in academia or industry studying or 17 developing physiological monitoring devices such as 18 noninvasive biosensors. 19 A POSITA would have been familiar with, 20 for example, sensor system design and signal 21 processing. Higher level of education or skill 22 might make up for less experience. So that's what
Page 315 1 I used as the definition of a POSITA. 2 Q. So a person with a four-year degree -- I'm 3 going to paraphrase a bit since it's long -- 4 four-year degree and two years of relevant 5 experience, I'm not going to quote you on that, but 6 about that. 7 A. That's approximately. You know, 8 some education and some experience. 9 Q. You don't mention anything about battery 10 design or experience with batteries, per se. Would 11 that person be skilled in battery design? 12 A. Well, as I describe, that person is going 13 to be skilled at electrical engineering, mechanical 14 engineering, optical engineering. And designing a 15 device, they're going to identify available LEDs, 16 available light detectors, available vendors for 17 those components. 18 They're not going to design an LED or a 19 battery from scratch. They're going to secure 20 those components from providers that sell those 21 items when they're designing their device. So 22 they're not going to design an LED from scratch,	Page 316 1 nor would they design the battery from scratch. 2 Q. So that person is not capable of taking a 3 battery of Mestas, for example, and redesigning it 4 so it's scaled down five to ten times? 5 MR. KAPPOS: Object to form. 6 A. No. I disagree. That person's, again, 7 not going to design -- neither case is a POSITA 8 going to be designing the battery. 9 Q. That's right. I understand that. I said 10 design. He's not capable of designing a battery to 11 fit these needs. 12 You said he's capable of calling vendors 13 and getting off-the-shelf components to fit a 14 design, but he's not capable of redesigning -- 15 taking a battery, saying, oh, I like the 16 characteristics of this battery, I'm going to 17 redesign it to be five times smaller. He's not 18 capable of that, is he? 19 A. He's capable of figuring out what size it 20 needs to be and specifying it appropriately. It's 21 not necessary to design the battery from scratch. 22 It's not necessary -- I'll paraphrase.

15 (Pages 313 to 316)

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1 It's not necessary for the person to design the
2 battery. That person would know the size of the
3 battery they needed and be able to identify a
4 source for it.

5 **Q. And to put a -- to finish that thought,**
6 **it's not necessary for him to design a new battery,**
7 **nor is he -- does he have that capability at that**
8 **stage in their career.**

9 MR. KAPPOS: Object to form.

10 A. It's unlikely that they would need -- it
11 would have the -- would be designing a new battery
12 from scratch.

13 **Q. Okay.**

14 A. That's a very narrow, generally extreme
15 expert. What's needed here is the ability to
16 identify the energy density needed and construct a
17 device accordingly.

18 **Q. So you're not proposing, correct me if I'm**
19 **wrong, that the POSITA miniaturizes by --**
20 **miniaturizes the battery of Mestas by designing a**
21 **new battery? That's not your --**

22 A. That would not be necessary.

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1 **Q. Okay.**

2 A. They would identify the battery they
3 needed, a curved battery with the appropriate
4 energy density, and secure it appropriately.

5 **Q. So in 2013 the POSITA would -- if you**
6 **wanted to put a curved battery in Schr der, he**
7 **would figure out the specs of that battery, and he**
8 **would look for that battery where?**

9 A. From suppliers that make batteries.

10 **Q. Okay. And what if that battery wasn't**
11 **available in 2013, what would he do?**

12 A. Well, there were certainly curved
13 batteries, flexible batteries available. And if
14 they needed something that wasn't commercially
15 available, they would likely establish a design
16 relationship with the battery provider to create a
17 form factor that was more targeted for what they
18 were wanting.

19 But a POSITA would understand the benefit
20 of using something commercially available, so they
21 do not have to go through a battery or any
22 component redesign. Or maybe they'd do the same

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1 thing if they needed to do a very unique, for some
2 bizarre reason, LED for a particular form factor.
3 A POSITA at the time would certainly know the
4 benefit of using commercial available technology as
5 a benefit over having a -- sinking engineering
6 costs into a redesign of any component.

7 **Q. Putting yourself back in the 2013 time**
8 **period, if you were confronted with this -- and I**
9 **appreciate you're more of an expert probably back**
10 **then than a POSITA -- would you be a POSITA or**
11 **would you --**

12 A. Yes. I would be beyond --

13 **Q. -- you would be well beyond a POSITA?**

14 **What -- with your knowledge of POSITAs of**
15 **that time period, what would -- where would they**
16 **look for a battery, an appropriate battery?**

17 A. Where would they -- vendors of batteries
18 that sell battery solutions and make flexible
19 batteries.

20 **Q. Okay. Who were they in 2013? Do you have**
21 **any experience with --**

22 A. I do not recall.

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1 **Q. -- battery vendors?**

2 A. We would first, for example, go to
3 companies that are electronics providers, things
4 like DigiKey and Newark. If they didn't have
5 something on their standard catalog, you would go
6 to other companies that provide components. Very
7 rarely would they go -- you don't go right to the
8 company that makes LEDs.

9 You go to a provider, a component
10 provider. So companies like DigiKey, as an
11 example, or Newark, Edmund Scientific, companies
12 that represent many component providers so that you
13 have a central place in order to either identify
14 components or to establish relationships with
15 providers if they need something custom.

16 **Q. Okay. Can you just -- for the court**
17 **reporter's benefit, could you spell out those I**
18 **think three providers you mentioned.**

19 A. Let's see, what did I say? DigiKey,
20 D-i-g-i-K-e-y. Newark, I think it is N-e-w-a-r-k,
21 Newark Electronics. Edmund Scientific, Edmund
22 Optics. And there are others, but those are -- oh,

16 (Pages 317 to 320)

Page 321 1 sorry, Edmund, E-d-m-u-n-d. 2 Q. Were those vendors around in 2013? 3 A. Absolutely. And there are others, but 4 those are the common ones. 5 Q. Have you in your work on this case 6 attempted to find whether there was a battery 7 available in 2013 that was appropriate to fit in 8 Schr der as you've proposed? 9 A. I did not find it necessary to do that, 10 no. 11 Q. Okay. So just to circle back to the 12 language you've used in paragraph 242, I mentioned 13 before you said it was trivial to implement 14 Mestas's teachings into a ring, a ring form like 15 that of Schr der's finger ring. 16 When you say -- when you're -- the 17 functions -- based on your testimony, my 18 understanding is that the functions you regard as 19 trivial are the characterization of the ring -- I'm 20 sorry -- characterization of the battery and 21 searching for the correct battery via vendors; is 22 that the trivial part of the -- the proposal?	Page 322 1 A. Well, Mestas also teaches using cavities 2 for the battery and curved battery, and those are 3 the types of features that the teachings of Mestas 4 that a POSITA would have found trivial to implement 5 into the Schr der finger ring. 6 Q. Okay. Why is it trivial? 7 A. It's straightforward. It's 8 straightforward application of known technology. 9 Q. Using that word "trivial," is it trivial 10 to miniaturize the battery of Mestas by a scale of 11 5 to 10? 12 A. Again, the POSITA is going to identify the 13 size, the energy density they need, and work with a 14 vendor to use and find an appropriate curved 15 battery. 16 Q. I'm actually referring to -- not referring 17 to that. I'm referring to actual miniaturization 18 of the battery shown in Mestas. Is that a trivial 19 engineering problem? 20 A. Yes. As I've described it, it's 21 straightforward to identify the teachings -- to 22 take the teachings of a curved battery and identify
Page 323 1 the size that is needed in your device and secure 2 it appropriately. 3 Q. I think -- I don't think you're 4 understanding the question I'm asking. Maybe I 5 didn't ask it correctly. 6 Is it trivial to design and manufacture a 7 miniaturized version of Mestas's battery? 8 A. So if you're just asking narrowly about a 9 particular battery shown in that Figure A, I don't 10 believe that Mestas talks about a specific battery 11 vendor, a specific battery, actual dimensions, its 12 very specific energy density. 13 So if you were to take the hypothetical of 14 wanting to take whatever that actual battery is and 15 miniaturize it, you'd have to know more details 16 other than, well, there's a curved battery. 17 But a POSITA -- the way a POSITA would 18 identify the battery they needed was to understand 19 the energy density they needed for the desired 20 lifetime of the device that they wanted to achieve 21 and the available space and would design and select 22 in the trade-offs between all the components and	Page 324 1 all the functions, all the manufacturing that was 2 required to put it together, identify appropriate 3 components and vendors for those components. 4 Q. Do you have any experience with designing 5 a miniaturized version of a battery? In other 6 words, someone gives you a battery and says, I need 7 you to design the same battery but half the size? 8 A. Um, I actually have been heavily involved 9 in the manufacturing process of flexible batteries 10 and the inspection techniques that go into making 11 batteries. So I do have a lot of familiarity with 12 batteries. 13 Q. Okay. Given my hypothetical, shrinking a 14 battery down in size and designing it 15 appropriately, what happens to a battery's capacity 16 and characteristics when you reduce, scale down the 17 battery to a smaller size? 18 A. Well, again, depends on the details of the 19 battery and how much -- how fast you're pulling 20 power from it. You'd have variable thermal 21 properties. You'd have variable energy densities, 22 different materials to give you more energy density

Page 325 1 in a small volume. So those are trade-offs that 2 would impact the cost of the battery. 3 Q. Does the capacity -- if you're just 4 shrinking everything down, all the parts of the 5 battery, does the capacity reduce in a linear 6 fashion; or is it more complicated than that? 7 MR. KAPPOS: Object to form. 8 A. So you're saying -- I'm sorry. I don't 9 understand the question. 10 Q. I'm saying, when you shrink a battery 11 down, and in all other respects the battery is, I 12 guess, physically the same, what happens to its 13 characteristics and capacity? Do they reduce 14 linearly, or is it a -- 15 A. So you're talking about decreasing the -- 16 Q. Physical size. 17 A. -- the physical size and using the same 18 materials? 19 Q. Correct. 20 A. So you're going to decrease the -- less 21 material provides less energy density, and you're 22 decreasing -- so the volume of the material is	Page 326 1 there to store your power, store your energy, and 2 so it decreases as you decrease the size. 3 Q. Is that a linear system, or is it more 4 complicated -- 5 A. It's a function of the volume. 6 Q. Is that true with respect to -- does 7 that -- does that vary depending on the type of the 8 battery in terms of whether you're talking about a 9 lithium battery or a lead acid battery? 10 A. Different materials have different energy 11 densities, different thermal properties. And, 12 again, a POSITA would select the battery, the 13 capacity they needed for the design trade-offs that 14 they were trying to achieve such as size, the duty 15 cycle, their measurements, the thermal management 16 that they would need to address. These are all 17 considerations in picking appropriate components, 18 not just the battery, but the entire system. 19 Q. Could you turn to paragraph 154 of Mestas. 20 And actually, the part of paragraph 154 -- of 21 course you can read it in context, but I'm curious 22 about the part of paragraph 154 right above where
Page 327 1 155 begins, where it's talking about the recessed 2 compartments 50 and 52. 3 Do you see that? 4 A. I see that. Let me just read the 5 paragraph. 6 Q. And my question is, first of all, Mestas 7 has, and you mentioned these in your report, 8 compartments 50 and 52 to accommodate the 9 batteries; is that right? 10 A. Yes. 11 Q. And here he says, the recess compartments 12 may have an increased size to accommodate larger 13 power supplies having increased capacity. 14 Do you see that? 15 A. Yes. 16 Q. So Mestas here is contemplating using 17 larger batteries; is that fair? 18 A. Well, what's described there is if you 19 want to make the battery bigger, you can. You 20 don't have to. But if you want to make the battery 21 bigger and you want it to be in the recess, you'd 22 have to make the recess bigger.	Page 328 1 Q. Okay. 2 A. Similarly, if you wanted to make it 3 smaller, you make the recess smaller. 4 Q. And are you familiar with the FuelBand 5 product? 6 A. The FuelBand product? 7 Q. Nike FuelBand, no? 8 A. (Shaking head from side to side). 9 Q. You're not familiar with the product 10 that's embodied by this publication? 11 A. I've not -- I mean, I don't have it. I 12 have not -- 13 Q. Have you heard of it? 14 A. Yes. 15 Q. Oh, okay. What is the Nike FuelBand, as 16 far as you know? 17 A. I think it's described here. If you want 18 to point out specifically where the FuelBand is 19 described in the -- 20 Q. No. I really wasn't asking you that. I 21 was just wondering if you had any familiarity with 22 the commercial product.

Page 329 1 A. I've not followed it on online or similar 2 level of familiarity with the Oura Ring. 3 Q. Okay. But you're familiar with the 4 functionalities of the bracelet discussed in this 5 Mestas publication? 6 A. So I'm familiar with the Mestas 7 publication and what it describes, yeah. 8 Q. And he's performing similar functions as 9 the Niwa ring; is that fair? 10 A. I'm sorry. You asked -- I'm sorry. 11 Q. What types of functions does Mestas 12 perform? 13 A. Well, there's a whole lot of them here. 14 In general, I discuss in the -- what motivation it 15 combines, discussing generally sort of wearable 16 biometric sensing. There's activity. 17 Q. He has an accelerometer? 18 A. So, for example, in paragraph 141, the 19 control of -- 20 Q. Of Mestas? 21 A. Of Mestas. -- various sensors may be 22 operably associated with the controller including a	Page 330 1 3-axis accelerometer. 2 Q. Does it have a photoplethysmogram as well? 3 A. Well, P -- 4 Q. PPG sensor. 5 A. PPG sensors, photoplethysmograms sensors 6 are also various sensors. 7 Q. Dr. Anthony, you're searching Mestas for? 8 A. Well, you asked about the various sensors, 9 so certainly it talks about various sensors and 10 accelerometers. It also talks about GPS. Those 11 are described. It's, you know, all towards 12 determining wearable biometric properties, and I 13 was making sure I didn't miss any of the various 14 embodiments in sensors that are explicitly stated. 15 But certainly a POSITA reading various 16 sensors understands various sensors in addition to 17 the ones that are explicitly listed. 18 Q. Does Mestas have an LED that projects 19 light into the tissue of the user? 20 A. It certainly has LEDs for display, and, 21 again, I was not analyzing Mestas here by itself to 22 motivate.
Page 331 1 Q. So it doesn't have -- it doesn't 2 specifically recite a PPG sensor, does it? 3 That's all right, Doctor. We can move on. 4 A. Well, certainly, as I described, it has 5 various sensors for wearable biometric sensing. 6 It's in the same field of art and explicitly states 7 accelerometers and GPS, and a POSITA would 8 understand that they're in the same field and would 9 beneficially combine Mestas and Schr der. 10 Q. Do you have a sense as to the power 11 requirements of an accelerometer in this context? 12 A. Again, you know, the power requirements 13 would depend on the intended sort of rate of being 14 used, the accelerometer, and how long they wanted 15 the device to last. 16 Q. How about an accelerometer compared to a 17 PPG sensor? 18 A. Again, it depends on the details of both 19 to know whether one's more than the other and how 20 they wanted to use them in operation. 21 Q. And in 2013 -- well, let me ask you this 22 question: When do you -- professionally, when do	Page 332 1 you recall curved batteries becoming commercially 2 available or in use in your work? 3 A. When did they originate? I don't know the 4 date of their origin. 5 Q. Did you -- do you have a sense as to when 6 their use was becoming widespread in any context? 7 A. Well, certainly a POSITA by 2013 would be 8 familiar with curved flexible batteries. 9 Q. You can't pin an earlier date than that? 10 A. It wasn't necessary in forming my opinions 11 here. I don't have it memorized. 12 Q. And you don't know? 13 A. I don't have it memorized. 14 Q. Okay. In 2013 was there a -- is there a 15 general sense as to how curved batteries perform 16 relative to more traditional flat batteries such as 17 the coin battery -- size battery? 18 A. I'm sorry, can you ask the question again? 19 Q. In 2013 is there a general sense as to how 20 curved batteries perform versus more traditional 21 flat batteries? 22 A. Well, curved batteries are far better

Page 333 1 performing and fitting into curved spaces. 2 Q. I was asking more about -- just to clarify 3 my question, I was asking more about the capacity 4 and performance rather than the shape. 5 MR. KAPPOS: Object to form. 6 A. Well, again, it depends on the details of 7 the battery -- of both batteries. 8 Q. Are there performance trade-offs in using 9 a curved battery versus a similar sized flat 10 battery? 11 A. Again, you need to determine -- you need 12 to know the material, the energy density of the 13 material, the size, you know, so all those factors 14 matter, and you can't make a -- an apples-to-apples 15 comparison without a lot more detail. 16 Q. Do or did the flat batteries tend to have 17 greater capacity than curved batteries, in general? 18 A. Again -- 19 MR. KAPPOS: Object to form. 20 A. -- in general, that's -- I was not opining 21 upon the generality of batteries. There are 22 trade-offs in terms of ease of manufacture, the	Page 334 1 materials that can be used. There are trade-offs, 2 but certainly flexible batteries were available. 3 Even if there were design trade-offs on power 4 density, they have a design benefit from being 5 curved as they describe here. 6 Q. That's kind of what I was getting at. Was 7 there in 2013 a design trade-off in terms of power 8 density if you wanted to use a curved battery 9 versus a flat battery? 10 A. Again, in general, if there's no energy 11 capacity that is dictated to be required because 12 there's design trade-offs in terms of the duty 13 cycle you want to use the device, how long you want 14 to use the device, are there trade-offs between 15 different battery types? Yes. Trade-offs between 16 flat batteries or sort of non-flexible batteries 17 there are design trade-offs. There are trade-offs 18 between flexible and non-flexible. 19 Q. Okay. So back to our issue that we 20 discussed with respect to a POSITA and what they 21 would do to find an appropriate battery for an 22 application such as Schr der. You stated that they
Page 335 1 would first search the vendors for an appropriate 2 battery, correct? 3 A. Search vendors, reach out to suppliers 4 that represent battery companies, yes. 5 Q. Okay. And if they couldn't find the 6 appropriate curved battery with the appropriate 7 requirements but they found an appropriate battery 8 having a different shape, such as a coin, would 9 they use the coin versus the unavailable curved 10 battery? 11 A. It depends on what they were trying to 12 accomplish, and there are design trade-offs between 13 the size and the costs and whether they -- if they 14 really didn't want to incur -- if they didn't want 15 to have a custom design in that thing they were 16 specifically looking for, it would be a design 17 trade-off. But they wouldn't necessarily 18 automatically use a coin battery. They would -- 19 design factors would vary, in many instances 20 strongly go to a flexible battery. 21 And, for example, if it didn't have the -- 22 at one volume have the energy density that they	Page 336 1 required, they could consider increasing the 2 frequency with which it needed to be recharged or 3 they could consider making it bigger within the 4 limit of comfort. Again, many factors that would 5 dictate all the individual components as they come 6 together in a complex system that is wearable and 7 manufacturable. 8 Q. But it's easier to choose a commercially 9 available battery versus redesigning a battery 10 according to certain requirements, isn't it? 11 A. In general, you're going to prefer to use 12 a commercially available thing because the cost is 13 generally going to be lower, but it doesn't mean 14 that you wouldn't also consider if you needed 15 something unique or just to improve performance 16 along some axis to have a custom design. 17 Q. Talking about Schr der again, looking at 18 your paragraph 251, and you're talking about 19 Schr der. Schr der's teachings involve methods of 20 capturing information about finger veins, which 21 we've certainly talked a lot about today and 22 yesterday.

Page 337 1 A. I'm sorry, what paragraph are you looking 2 at? 3 Q. 251. 4 A. Yes. 5 Q. Now, correct me if I'm wrong, but in 6 Schr der, the vein pattern is already captured and 7 stored when Schr der is using his ring for 8 authentication; is that accurate? That's what you 9 compare the vein pattern to? 10 A. The image is acquired, for example, when 11 you place the ring on the finger. 12 Q. And I believe Schr der also says you can 13 use an external sensor to acquire that original 14 vein pattern, doesn't he? In column 10 -- 15 A. Of Schr der? 16 Q. Yes. Lines 10 and 11 or 9, 10, and 11 he 17 says the first capture can be affected by means of 18 the at least one biometric sensor of the finger 19 ring 2 or by means off an external biometric 20 sensor? 21 A. That's for the first capture. 22 Q. That's what you use for your baseline and	Page 338 1 authentication, correct? 2 A. That's used to identify the person. 3 Q. What is he talking about when he says 4 "external biometric sensor"? Or an example of what 5 he's talking about. Are you not sure what he's 6 talking about there, Doctor? 7 A. Well, I'm looking for -- what mainly he's 8 talking about is acquiring it with the finger ring. 9 It talks about, for example, having a terminal that 10 can also be used to measure. So there's some 11 external technique image based functionality that 12 would acquire as an alternative. 13 Q. So Schr der discloses acquiring the 14 original vein pattern potentially by something 15 other than the finger ring, right? 16 A. What's disclosed there as a first capture 17 can be affected by means of the biometric center of 18 the finger ring or by means of an external 19 biometric sensor. 20 Q. So if it's the external biometric sensor, 21 it's not the finger ring, right? 22 A. For the first capture, and then the
Page 339 1 sensor -- the finger ring would be used to capture 2 the finger vein image -- subsequent finger vein 3 images. 4 Q. Okay. So you talk about medical 5 diagnostics in paragraph 251. 6 A. In 251 Schr der's teachings involve 7 methods of capturing information about finger 8 veins, which is crucial for applications such as 9 biometric identification or also for medical 10 diagnostics, yes. 11 Q. So any biometric identification or medical 12 diagnostics -- let's focus on medical diagnostics. 13 If you were to use the vein pattern for medical 14 diagnostics, you would use that original pattern, 15 correct, or you could use the original pattern? 16 MR. KAPPOS: Object to form. 17 A. Well, in the medical diagnostic scenario 18 you have both diagnosis that can happen at an 19 instance in time, you have diagnosis that can 20 happen after monitoring the trends of an 21 individual. 22 So if you saw, for example, the finger	Page 340 1 vein pattern of an individual changing over time, 2 growing, changing in properties, disappearing, that 3 would also be very relevant to understanding the 4 vascular health and would be relevant medical 5 information that would serve to help diagnose 6 vascular issues. 7 Q. Schr der doesn't talk about vascular 8 health, does he? 9 A. Well, what I'm talking about here is 10 Schr der and Yuen, and I'm opining about here the 11 finger veins. It's certainly crucial for 12 applications such as biometric identification or 13 medical diagnoses. 14 Q. But again, when I ask questions in 15 isolation about the reference, you can answer them, 16 correct? 17 A. Yes, I can. 18 Q. So Schr der doesn't say anything about 19 vascular health, does he? 20 A. As I said, it does not, but what I'm 21 discussing, just to be clear here, is not that in 22 isolation. It's relevant teachings of Schr der

Page 341 1 combined with Yuen, and indeed, a POSITA 2 understands the utility of the finger vein imaging 3 and other technology to aid in medical and wellness 4 applications. 5 MR. SCHULTZ: Okay. Let's take a break. 6 THE VIDEOGRAPHER: Time is 11:56. We're 7 off the record. 8 (Proceedings interrupted at 11:56 a.m. and 9 reconvened at 12:50 p.m.) 10 THE VIDEOGRAPHER: We are back on the 11 record. The time is 12:50. 12 BY MR. SCHULTZ: 13 Q. Can you turn to paragraph 256 of your 14 declaration for the '178 patent, please. 15 So in this paragraph you're talking about 16 modifying Schr der to include the wireless charging 17 features as taught by Yuen. And that's 18 paraphrasing, of course, but that's the general 19 idea? 20 A. That, in addition to the alignment 21 mechanism to enable the charging, yes. 22 Q. So you say, Yuen further teaches charging	Page 342 1 a battery using magnetic properties of its device 2 or docking station. 3 So Yuen discloses a docking station for 4 charging, correct? 5 A. Did we put Yuen into the record? 6 Q. I can put it into the record, that's fine. 7 MR. SCHULTZ: Let's have marked as 8 Deposition Exhibit Number 10 Petitioner's 9 Exhibit 1006, which is a U.S. patent to Yuen, 10 Y-u-e-n. 11 (Anthony Exhibit 10, U.S. Patent 8,954,135, 12 marked for identification.) 13 A. Correct. Where I cite to is in Yuen, 14 Yuen. 15 Just to decide, how do we want to agree on 16 how to pronounce it, Yuen? 17 Q. I used to say Yuen -- 18 A. Okay. 19 Q. -- then I heard someone say Yuen. 20 A. Okay. 21 Q. I'm not sure. 22 A. I'll use Yuen for your sanity.
Page 343 1 So in Yuen, starting at 42, let's see. 2 Q. I'm sorry. Column 42? 3 A. I'm sorry. Column 14, line 42. 4 Q. Okay. 5 A. Under the circumstance, the portable 6 biometric monitoring device where it includes a 7 rechargeable energy source, for example, a 8 rechargeable battery, may interconnect with a 9 charger using magnetic properties to secure 10 thereto. 11 So I'm talking about a docking station or 12 a charging station. 13 Q. So Schr der by itself doesn't disclose 14 such a docking station, does it? 15 A. By itself Schr der does not talk about a 16 docking station. My analysis is in the combination 17 here. 18 Q. To combine those teachings with Schr der 19 would you need to add components to Schr der's 20 ring? 21 A. Well, as I continue in that paragraph 256, 22 based on Yuen's teachings, would have been obvious	Page 344 1 to use a magnetic alignment mechanism within a 2 charging device to orient the finger ring in 3 Schr der to facilitate wireless charging, and a 4 POSITA would have been motivated to implement an 5 alignment mechanism for Schr der's finger ring 6 using Yuen's teaching to make wireless charging 7 easier and more convenient. 8 Q. Okay. And that -- that's not -- that 9 doesn't, at least in my mind, maybe I don't 10 understand it, answer my question, which is to 11 accomplish your goals -- your stated goal here of 12 using a magnetic alignment mechanism. Would you 13 need to add components to Schr der? 14 A. In order to have magnetic alignment you 15 would have magnetic properties which could be 16 facilitated by the housing or it could be 17 facilitated by adding magnets inside of the cavity. 18 Q. And the next paragraph down, 257, you are 19 referring to in the second sentence, Yuen further 20 teaches adjusting the operational parameters or 21 measurement periodicity of various sensors based on 22 data related to a user's activity, heart rate,

Page 345 1 sleep state, and a sensor's power level. 2 Do you see that? 3 A. Yes, I do. 4 Q. And by itself in isolation, Schr der 5 doesn't discuss any of those features of user 6 activity, heart rate, sleep state, or a sensor's 7 power level, does it? 8 A. By itself Schr der does not. But as I 9 describe, a POSITA would have motivation to combine 10 similar field, and functionality would beneficially 11 be added to Schr der in combination with Yuen. But 12 by itself, no. 13 Q. So in this -- in this combination of Yuen 14 and Schr der that you're discussing in paragraph 15 257 and others, and in particular paragraph 257, 16 are you -- in your proposed combination are you 17 opining that a POSITA would adjust the sampling 18 rate of Schr der's vein pattern imaging when you 19 talk about sampling rate? Does that question make 20 sense to you? 21 A. You asked -- go ahead and repeat the 22 question.	Page 346 1 Q. Yeah, it was a lot of words, but I think 2 it was clear. 3 Are you proposing that a -- well, is it 4 your opinion that a POSITA would in this 5 combination adjust -- use the teachings of Yuen to 6 adjust the sampling rate of Schr der's vein pattern 7 imaging? 8 A. Certainly you could beneficially apply 9 variable sampling depending on the rate with which 10 the ring is pushed on or the resolution that you 11 wanted to achieve. But, again, I'm proposing here 12 a combination that incorporates both functionality 13 and teachings of Yuen into the Schr der ring. 14 Q. So just so I understand your answer, what 15 you're proposing is that the sampling rate 16 adjustment described in Yuen is with respect to -- 17 in this combination is with respect to the sensors 18 Yuen is disclosing as well, not just -- 19 A. As well. 20 Q. As well. 21 And I apologize if I've asked this similar 22 question before. Is there any disclosure -- in
Page 347 1 isolation does Schr der -- 2 MR. SCHULTZ: Strike that. 3 Q. Is there a teaching in Schr der in 4 isolation that suggests his sampling rate for user 5 authentication is inadequate for the purposes 6 stated in Schr der? 7 A. In Schr der -- well, a POSITA reading 8 Schr der even in isolation would understand that 9 sampling rate impacts the quality of the biometric 10 reading of the finger ring of the vein image, and 11 so having the ability to improve sampling rate 12 would certainly be understood and a benefit of 13 improving -- changing sampling rate, and the 14 trade-offs would certainly be understood by a 15 POSITA even reading Schr der in isolation. 16 Q. That answer is -- correct me if I'm wrong, 17 your answer is based on the general proposition 18 that increasing the sampling rate can increase the 19 image quality; is that fair? 20 A. So sampling rate would impact both the 21 quality and the rate with which you can push the 22 ring on and impact the usability, you know, how	Page 348 1 tolerant it is to variable use of the ring, yes. 2 Q. Okay. In 259 of your declaration I have a 3 question about the paragraph right in the middle of 4 the paragraph, a sentence. You say, a POSITA would 5 have understood that both Schr der's and Yuen's 6 techniques involve data collection from veins. 7 This understanding would indicate that advances or 8 techniques developed in one application like pulse 9 oximetry could potentially inform or enhance 10 methodologies in the other like vein pattern 11 biometrics, et cetera. 12 My question is, I'm not quite clear on 13 what you mean by "potentially inform or enhance" in 14 this context. Did you have something specific in 15 mind? 16 A. Well, for example, having higher or lower 17 sampling rate, having redundancy, having additional 18 LEDs, multiple wavelengths would impact the 19 information that you would get from a vein either 20 for pulse oximetry or vein pattern. 21 Q. Okay. The word "potentially" to me 22 suggests that it may or may not have that

Page 349 1 possibility. Is that a fair interpretation of what 2 you wrote here? 3 A. It would inform. It potentially informs 4 just a -- it was a modifier there. But it would -- 5 certainly when you're collecting data from a vein, 6 whether it be for pulse oximetry or for vein 7 pattern biometrics, a POSITA would know to weigh 8 the trade-offs of the lessons taught in one to the 9 other. 10 Design factors lead me to sort of say the 11 potential is not all. Things in a particular 12 design construction would be appropriately used, 13 but certainly the ability to get data from a vein 14 for either application would inform the other. 15 Q. If the vein pattern recognition disclosed 16 in Schr der works for its intended purpose, again 17 in isolation, a POSITA wouldn't be motivated to add 18 components to that structure, would they? 19 MR. KAPPOS: Object to form. 20 A. Well, as we discussed previously, I forget 21 which reference it is, but certainly we believe to 22 have multiple LEDs, and with a single slide of the	Page 350 1 ring on the finger get multiple views of the LED -- 2 sorry -- of the vein would merit potentially the 3 increased components that would enable them. 4 Q. All right. But doesn't that presume that 5 there's a need for increased accuracy in however 6 you're using this ring if you want to add things to 7 it? 8 A. Well, the goal at least in Schr der in 9 isolation is for security. Depending on the level 10 of security, a POSITA reading Schr der in isolation 11 would understand the benefit of being able to add 12 complexity that merited for the application. And 13 so certainly adding as I describe here, adding 14 components around the sensors around the ring would 15 certainly give you more in redundant and better 16 information. 17 Q. And they would balance any need to add 18 components against the need to have the ring be as 19 compact as possible, right? 20 A. Given the design that they were trying to 21 accomplish and the relative benefits of the various 22 design features, all of those factors are certainly
Page 351 1 considered by a POSITA when designing such a 2 device. 3 Q. Can you direct your attention to Yuen, 4 Figure 2? Where does Yuen -- well, first of all, 5 what is Figure 2 showing in Yuen? 6 A. Figure 2 from Yuen, column 2, line 7, 7 Figure 2 is an exemplary portable biometric 8 monitoring device which may be secured to the user 9 through the use of a band. Exemplary portable 10 monitoring device may have a display, buttons, 11 packaging. So it's an exemplary portable biometric 12 monitoring device. 13 Q. And the band of Figure 2 is as stated in 14 column 12, line 30, is intended to be mounted to a 15 user's body part, for example, wrist, arm, ankle, 16 or leg. And further down in column 12, on line 51, 17 52, he states that in preferred embodiments, 18 including the optical heart rate monitor, the 19 device may be wrist worn or arm mounted. Accessory 20 such as a watch or bracelet. See, for example, 21 Figs. 2 through 13. 22 So the device in Figure 2 is intended to	Page 352 1 be worn on the arm or the wrist, correct, according 2 to Yuen? 3 A. So it's certainly described in the 4 sections you pointed out. I do want to review my 5 declaration for a second. I think I highlighted 6 some other places where it talks about it, places 7 to be confused. 8 Q. But just to be clear, I'm only concerned 9 with the embodiment of Figure 2 at the moment. And 10 the section I quoted states that it's wrist or arm 11 mounted; is that accurate? 12 A. In that section, yes, noting that I would 13 like to go look at the other sections that I 14 highlight. 15 Q. Understood. 16 A. Yes. 17 Q. So in Figure 4, which I believe is the 18 same embodiment of Figure 2, also an arm mounted or 19 wrist mounted device is showing a main PCB. 20 Do you see that? 21 A. Yes. 22 Q. Now, the form factor of that PCB design is

Page 353 1 too big for a finger ring such as Schr der, 2 correct? 3 A. Again, I was not analyzing Yuen in 4 isolation, but as shown there, particularly that 5 Figure 4, that is a rather large PCB, but, again, 6 I'm not proposing wholesale copying of that PCB. 7 Q. Okay. I understand that. 8 But at any rate, that particular PCB shown 9 in Figure 4 is too large for a ring, correct? 10 MR. KAPPOS: Object to form. 11 A. I would argue that you could take that 12 same sort of form factor and reduce it to a band 13 that would go over the finger. But insofar that 14 Figure 4 is talking about something that goes on 15 the wrist or arm ends at a size then that's bigger 16 than what would be on a finger, but a POSITA could 17 also recognize the benefit of making that into a 18 smaller device that could fit on a ring. 19 Q. So in fact, again, with the qualification 20 that you're reviewing -- that we're discussing Yuen 21 in isolation and that specific embodiment that PCB 22 is several times too large, isn't it, to fit in a	Page 354 1 ring? 2 MR. KAPPOS: Object to form. 3 A. Again, if a POSITA were to take even that 4 same structure and hypothetically reduce it, which 5 is not what I've proposed, but then it would fit 6 into a ring in that case. In the embodiment 7 specifically for a wrist, it's larger than what 8 would be on the ring. 9 Q. Fair to say several times too large? 10 MR. KAPPOS: Object to form. 11 A. A wrist is generally larger than a finger 12 several times. 13 Q. Thank you. 14 And the PCB disclosed in at least Figure 4 15 is shown to be planar, isn't it? 16 A. It appears to be planar there, but I've 17 also featured a highlight, for example, the 18 Figure 11 embodiment, which has band mounted 19 optical sensors and light emitters which would also 20 be on some kind of flexible circuit that would also 21 be flat or curved around the form of the band. 22 Q. So let's look at that for a moment in
Page 355 1 Figure 11 that you just pointed to. There is a 2 reference to band mounted sensors. So those band 3 mounted sensors are not mounted on the main PCB 4 board that is shown in Figure 4, correct? They're 5 on a different location. 6 A. They are on a different location. I'd 7 have to rereview Yuen in isolation to determine 8 whether what's proposed there is a flexible PCB 9 that's connected to that PCB that you pointed out 10 in 2 or if it were separately. 11 Q. Okay. You could certainly construct this 12 where they're not mounted on a PCB at all, correct, 13 they meaning the band mounted sensors shown in 14 Figure 11? 15 A. I don't think that a POSITA would approach 16 it from trying to not -- a PCB. A PCB would be a 17 very natural thing for a POSITA to construct those 18 with in order to provide power and give the signal. 19 So I would -- a POSITA reading that would 20 presumptively want to put them on a PCB, a flexible 21 PCB. 22 And then if I can just apologize, just add	Page 356 1 when I do talk about that in paragraph 303 with the 2 photodetectors on a flexible or a pliable substrate 3 such as a flexible PCB to allow the inner surface 4 to adapt to the shape of the user's appendage. 5 Q. You're saying Yuen says that, or you're 6 saying that's your -- a POSITA's interpretation? 7 A. So for example, column 12, seeing 8 Figure 11 -- I'm sorry -- column 12, line 35, 9 seeing Figure 11 and one embodiment, the light 10 sources and/or associated detectors are disposed on 11 a flat flex cable or a flexible PCB. 12 Q. Could you -- thank you. 13 Could you turn your attention to paragraph 14 268. 15 A. I'm sorry. 268? 16 Q. 268. 17 My question with respect to this paragraph 18 is, when you say or Schr der says his finger ring 19 is charged by means of a readers of a magnetic 20 field, what does that mean in the context of 21 Schr der? 22 A. So for example, in column 5 of Schr der,

Page 357 1 talks about the finger ring being brought close to 2 a device such as a phone to charge with the 3 magnetic field. Talks about furthermore in other 4 arrangements in the bottom of column 5, multiple 5 antenna to make it easier to account for arbitrary 6 orientations, so a magnetic field into which the 7 ring is placed to charge. 8 Q. What reader is being referred to here? Is 9 that an NFC, near-field communications, reader in 10 your quote? 11 A. In column 5, e.g., for example, a finger 12 ring has an antenna coil. 8 for a first frequency, 13 e.g., for NFC application, as well as a chip 14 module. Has an antenna coil for a second 15 frequency, so NFC is one example. 16 Q. So what you're quoting here when you say 17 "Schr der's finger ring is charged by means of a 18 reader's magnetic field," is that referring to an 19 NFC reader? 20 A. Well, it's describing other variance of 21 being able to, like the Helmholtz antenna, arrange 22 orthogonally to each other, so NFC is an example.	Page 358 1 There are other methodologies for charging. 2 Q. Using a reader? 3 A. Using a reader or -- a reader, for 4 example, or a smart phone as is depicted in the 5 cover figure. 6 Q. So I don't profess to understand that 7 technology. Does that mean you hold the ring 8 within proximity to a device that charges the ring? 9 A. Correct, yeah. So magnetic coupling, 10 you're in a field that allows energy to transfer 11 through coupling of the antenna. 12 Q. Not necessarily via contact. There can be 13 some distance between the -- 14 A. There can be distance, but a POSITA 15 certainly understands the benefit. Like the 16 distance decreases by the square of the cube of the 17 energy charging efficiency, so there's certainly a 18 benefit to bring it closer and have it well 19 aligned, as would be suggested in using a magnetic 20 coupling mechanism to keep it aligned. 21 Q. What's a real life example of that, of a 22 reader providing a charge to a device?
Page 359 1 A. Apple watch is a good one, a good example. 2 Q. What would the reader be in that context? 3 A. I'm sorry. Did you say a reader, or... 4 Q. Well, it says "charged by means of a 5 reader's magnetic field." I was wondering what's 6 an example of that. 7 A. So we're discussing previously and with 8 RFID technology or NFC you can do it passively. 9 You can also have certain small capacitors and 10 small batteries that can be charged to provide 11 enhancements, so that's one example just with 12 readers. But broadly, being able to charge 13 magnetically is the benefit describing here. 14 Q. So is an example of this in the RFID world 15 where you leave a store with a tag on it and you 16 pass through the portal, does the tag get charged 17 by the portal, is that what happens there? 18 A. It's not necessarily in that case charging 19 it. It's detecting if a device is going through. 20 But you can certainly charge a device with NFC 21 readers depending on the device that you have. 22 Q. And that type of technology doesn't	Page 360 1 require a docking station, correct? 2 A. No. But as I describe here, there's a 3 benefit for docking and getting the fields aligned 4 with respect to each other because that allows you 5 to transfer energy faster and more of it. 6 Q. So this claim requires one or more that 7 the finger worn wearable -- this, I mean, I'm 8 referring back to your declaration on page 178, 9 which is discussing claim 4. This claim requires 10 that the finger ring wearable device comprises one 11 or more magnetic components configured to 12 magnetically interact with one or more additional 13 magnetic components of a charger device, et cetera. 14 My interpretation of your position is that 15 you're adding Schr der in isolation doesn't 16 disclose these components -- magnetic components, 17 so you're proposing that you add them by virtue of 18 the teachings of Yuen. 19 And my question is, where would you put 20 the magnetic components that -- in the Schr der 21 ring configuration that are discussed here? 22 A. You would put -- you could put them in the

Page 361 1 cavity. Depending on the material you used for the 2 housing, you could also potentially put them in the 3 housing. 4 Q. So you could put them in the inlay of 5 Schr der? 6 A. In that inside gap, yeah. Or depending on 7 which grill you used for the body of the ring, you 8 could also put them in the body of the ring. 9 Q. In one of the ring halves -- 10 A. Right -- 11 Q. -- as disclosed in Schr der? 12 Could you jump to paragraph 275, please? 13 A. 275? 14 Q. 275. 15 And, again, this is in the context of 16 claim 6 which requires selectively adjusting one or 17 more operational parameters of the one or more 18 sensors based at least in part on the data acquired 19 by the one or more sensors. 20 Now, Schr der in isolation does not 21 disclose this, correct? 22 A. As we've discussed, Schr der in isolation	Page 362 1 is not what's discussed here, but in its POSITA 2 reading, Schr der in isolation would certainly 3 understand the benefit of potentially adjusting 4 operational parameters. 5 Q. So let me ask: Specifically with respect 6 to the application of Schr der of vein pattern 7 matching, which is how he discloses authenticating 8 a user, would user motion have any effect on the 9 vein pattern matching disclosed in Schr der? 10 A. Yes. So as you're moving the ring, the 11 motion of the ring impacts the vein image captured, 12 and so a POSITA even reading a unit in isolation 13 would understand if you're in a dark room you would 14 want to have more light. If you're moving -- 15 sliding the ring faster, you'd want to sample 16 faster and potentially use more light. 17 If you find that the finger vein is 18 particularly tortious, meaning it has a lot of 19 additional structure, you may also want to sample 20 more to import the capture of the spatial 21 resolution of that vein. 22 So even Yuen in isolation, a POSITA
Page 363 1 reading that would be motivated to potentially 2 adjust the parameters. 3 Q. So the user to acquire a vein pattern is 4 putting the ring over the user's finger, correct? 5 A. Correct. 6 Q. So the only way to adjust the speed at 7 which that occurs is for the user to adjust how he 8 physically performs that function; is that fair? 9 A. Well, that's the rate with which the user 10 controls that. So if the user goes slow, the ring 11 could sample slowly. If the user is going fast, 12 you'd need to sample faster in order to capture the 13 same resolution because you're sampling temporally 14 but you're moving so your gap between samples is a 15 distance equals rate times time phenomena. 16 The distance that you can tolerate in the 17 spatial resolution that you're trying to achieve 18 would dictate then adjusting both your sampling 19 rate, and in order to as you go faster, you have 20 less time to acquire your imagery, so you'd also 21 need more light. 22 Q. Looking at paragraph 275. So, again,	Page 364 1 Schr der in isolation, this claim talks about 2 selectively adjusting the measurement periodicity 3 used by the one or more sensors to acquire the 4 heart rate data based at least in part on the heart 5 rate of the user. 6 Now, Schr der in isolation doesn't talk 7 about heart rate. I think we've established that, 8 correct? 9 A. I'm sorry. Where were you? You were 10 reading in paragraph... 11 Q. I was reading actually the part of the 12 claim in claim 7 and referred to in paragraph -- 13 A. Claim 7 or claim 6? Sorry. I thought you 14 said "275." 15 Q. 277. 16 A. Oh. 17 Q. I may have said 275 as Dana has me as 18 saying 275. 19 A. Yes. 20 Q. So my question is with respect to claim 7 21 in 277, is that I think we've already talked about 22 how Schr der in isolation doesn't refer to

Page 365 1 measuring heart rate. 2 A. Schr der in isolation does not, but, 3 again, what I'm describing here is the combination, 4 and there would be beneficial reasons to vary the 5 sampling rate, as we discussed for claim 6, and 6 then the combination variably beneficially do that 7 as well for heart rate. 8 Q. So for the vein detection -- 9 MR. SCHULTZ: Strike that. 10 Q. For the vein matching authentication 11 feature, would measuring heart rate have any 12 influence on how that vein pattern matching is 13 performed? 14 A. I hadn't opined about that in isolation, 15 but certainly depending on the heart rate, 16 depending on the resolution -- the spatial 17 resolution that you were trying to resolve. You 18 know, as your heart pumps, the blood vessels in 19 your body modulate, and so if you wanted to, for 20 example, in isolation of Yuen -- of Schr der get a 21 vein image, for example, that was at a constant 22 place in the heartbeat cycle, then in that instance	Page 366 1 you would want to know the heart rate and time your 2 acquisition accordingly. 3 Q. So for -- do you believe that measuring 4 the -- sorry -- imaging the vein pattern as a 5 function of where you are on the heartbeat has 6 utility in the authentication function? 7 A. It could. Again, I was not considering 8 Schr der in isolation, but you asked about is there 9 a benefit potentially acquiring the heart rate with 10 respect to the vein imaging and, indeed, there 11 could be benefits. 12 For example, being able to account for the 13 variable dimension of the vein as a result of the 14 heart rate and knowing, for example, if you were at 15 systolic or diastolic as you were going through the 16 scanning motion would allow you to potentially 17 improve the quality of the image that you acquired 18 by taking that into account. 19 Q. But you don't have any firsthand 20 experience as to whether that would have any 21 influence on the vein pattern authentication 22 discussed in Schr der, do you?
Page 367 1 A. Actually, no. I -- personally, I do have 2 extensive firsthand experience on imaging of veins 3 and have used these concepts to estimate both 4 arterial blood pressure and -- pressure by 5 acquiring imagery of the vein that accounts for the 6 heart rate variability of the veins modulating. 7 So, indeed, even in isolation there's a benefit in 8 imaging veins and knowing the heart rate when 9 you're imaging the veins. 10 Q. Okay. So was it a known issue, or are you 11 aware of a known issue of vein pattern matching 12 authentication errors due to the vein patterns 13 being in different cycles of the heartbeat? 14 A. The vein dimensions would vary as a 15 function of heartbeat. That's very well known, and 16 if the goal in isolation is just to have the best 17 vein pattern possible in order to do the best 18 security job possible, then yes, it would be very 19 important to take all those factors into 20 consideration depending on the design trade-offs 21 that you were trying to accomplish and the level of 22 security you were trying to establish.	Page 368 1 Q. That's not quite what I asked. I asked if 2 it was a known issue in the art as to whether there 3 are vein pattern matching errors due to the vein 4 patterns being taken at different parts of the 5 cycle. 6 Can you cite to any articles that talk 7 about that problem or any textbooks that talk about 8 that problem in the context of user authentication? 9 A. I did not opine about that. You asked me 10 specifically here on the spot whether that would be 11 beneficially applied. And indeed, a POSITA reading 12 Schr der in isolation would understand that veins 13 modulate as a function of the heart beating and 14 that that dimension of the heart vein that you're 15 trying to measure would be impacted. 16 I don't have any references off the top of 17 my head to talk about that. It was not necessary 18 to do that in forming my opinions. But the 19 hypothetical situation that you painted, certainly 20 a POSITA would understand the vein dimension 21 modulates with heart rate and would understand how 22 to use heart rate to help improve the resolution

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1 and quality of the acquired vein pattern image.
 2 **Q. Okay. But POSITAs don't try to solve**
 3 **problems where there's no problem, correct?**
 4 MR. KAPPOS: Object to form.
 5 A. Well, the problem that is solved by
 6 Schr der is vein pattern identification --
 7 **Q. Right.**
 8 A. -- and depending on the level of security
 9 that you're trying to achieve, whether it's you
 10 want to be right 99 percent of the time or
 11 99.999 percent of the time or some other numbers,
 12 you would -- POSITA would certainly consider the
 13 various factors that impact the image that you were
 14 trying to acquire in that hypothetical situation.
 15 **Q. Okay. Apart from the hypothetical, are**
 16 **you aware of known studies, articles, any**
 17 **literature at all that discusses the hypothetical**
 18 **problem you just mentioned that vein pattern**
 19 **recognition varies due to heart rate?**
 20 A. Well, if you image your vein, it changes
 21 with your heartbeat.
 22 **Q. Let's keep in mind what I asked. And I'm**

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1 **not asking about another, for you to opine on a**
 2 **hypothetical. I'm asking about are you aware of**
 3 **any literature, articles, studies of any kind that**
 4 **talk about the issue you just described, which is**
 5 **problems with vein pattern matching and**
 6 **authentication due to the heart rate?**
 7 A. Off the top of my head I'm not aware of
 8 specific articles. But I would also --
 9 **Q. That's all I wanted to know.**
 10 A. I'd have to look at and I may have some
 11 relevant articles. I don't remember when they were
 12 published. Not with respect to security use of
 13 vein imaging but certainly vein imaging.
 14 **Q. Well, since you raised it, what practical**
 15 **applications are you aware of in the real world of**
 16 **vein pattern imaging used for security purposes?**
 17 A. I'm sorry. Repeat the question.
 18 **Q. These are patents, right? You understand**
 19 **that?**
 20 A. Yeah, I'm sorry. I was just asking you to
 21 repeat the question.
 22 **Q. Patents don't need to be reduced to**

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1 **practice. They don't need to be made. They can**
 2 **just exist in paper. Have you seen -- and even**
 3 **outside of the context of a finger ring, what**
 4 **security applications are you aware of that use**
 5 **vein pattern matching?**
 6 A. Well, outside of Schr der, just there's
 7 retinal imaging that can be used to patterns in the
 8 eye. There's handprint vascularity in the hand.
 9 **Q. What about finger veins?**
 10 A. Well, Schr der certainly teaches --
 11 **Q. Schr der is a patent?**
 12 A. Yes.
 13 **Q. Did Schr der become a product?**
 14 A. I just don't know.
 15 **Q. Okay. Are you aware of any products,**
 16 **finger rings that use vein pattern imaging for**
 17 **authentication and security purposes?**
 18 A. Well, initially you asked even outside of
 19 finger rings. Certainly the hand pattern includes
 20 hand and finger and could be used on with the
 21 finger by itself depending on the level of
 22 security. And you can get vein finger pattern

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1 using IR, near IR of the finger pads to enhance
 2 beyond fingerprint as well.
 3 **Q. Okay. What security applications that**
 4 **you're talking about?**
 5 A. Well, any security application where
 6 you're trying to hide the -- a person, you know,
 7 car access, access to an area where you want to do
 8 identification.
 9 **Q. Okay. Again, tell me what vein pattern**
 10 **security applications you're aware of, just a**
 11 **discrete one that exists in the real world. Who**
 12 **makes it?**
 13 A. I don't know the manufacturers of the
 14 companies that do the vein pattern imaging or the
 15 retinal imaging or -- yeah.
 16 **Q. Where have you seen vein -- what building**
 17 **have you entered that you've seen vein pattern**
 18 **matching?**
 19 A. Certainly entered buildings that use at
 20 least part of the hand and maybe the fingers, but
 21 I'm not sure whether they -- the ones I've accessed
 22 before have used those or not. I suspect some of

29 (Pages 369 to 372)

Page 373 1 them at Los Alamos may have. I don't know. 2 Q. All right. So sitting here today we can't 3 identify any actual implemented vein pattern 4 matching security devices or systems that you're 5 personally familiar with. 6 MR. KAPPOS: Object to form. 7 A. Again, you know, I took the teachings of 8 Schr der. I didn't find it necessary to identify 9 vendors of vein pattern matching machines. But as 10 I described here, this original line of questioning 11 was asking whether or not heart rate would be 12 beneficial in DBS. Do I have off the top of my 13 head vendors of those such products? No. 14 Q. You have a discussion in paragraph 278 15 about what a POSITA would have understood with 16 respect to Yuen? 17 A. I'm sorry. What was the question? 18 Q. You understand your discussion in 19 paragraph 278 about Yuen? 20 A. Yes. 21 Q. Okay. So you're making -- you make 22 statements about what a POSITA would have	Page 374 1 understood interpreting Yuen in this paragraph? 2 A. Well, 278 is Schr der Yuen. The 3 combination teaches that its processors selectively 4 measure to adjust periodicity, explains optical 5 detectors. POSITA would have understood that a 6 user activity or context could be determined based 7 on measurements from the sensors. 8 A POSITA would have understood that a 9 processor could selectively adjust a measurement 10 period of a sensor. A POSITA would recognize from 11 Yuen's teachings that whether a user is sedentary 12 can be determined at least in part from the user's 13 heart rate. The processor can decrease the 14 sampling rate for the heart rate sensor. 15 So I'm opining about the Schr der Yuen 16 combination. Significant aspects of that are, 17 indeed, directly coming from Yuen. 18 Q. So Yuen, correct me if I'm wrong, doesn't 19 expressly disclose adjusting a measurement 20 periodicity used based on sensors to acquire the 21 heart rate data based at least in part on the heart 22 rate of the user. And by "expressly," I mean
Page 375 1 expressly stated in Yuen, because it seems to me 2 here you're talking about how a POSITA would 3 interpret Yuen. 4 MR. KAPPOS: Object to form. 5 A. Can you reask your question, please, just 6 to make sure I'm answering it correctly. 7 Q. Yes. 8 So I was wondering if there's an explicit 9 disclosure of adjusting measurement based on the 10 heart rate of the user disclosed in Yuen. 11 A. So for example, at least in, for example, 12 column 18, line 34, in a preferred embodiment, the 13 strength of the heart rate signal may be determined 14 by the energy of the signal and the frequency band, 15 for instance, between .5 hertz and 4 hertz. It 16 continues there talking about other ways to get a 17 heart rate. 18 At the bottom of that same paragraph at 19 line 44, a signal quality metric may be calculated 20 with these contact sensors alone or in combination 21 with data from the heart rate signal, and that 22 quality metric is then used to control the system.	Page 376 1 Q. So you added a function to the end of this 2 sentence. It says, a signal quality metric may be 3 calculated with these contact sensors either alone 4 or in combination with data from the heart rate 5 signal. That's on line 46. 6 A. 46. 7 Q. Where does it say that signals used to 8 adjust -- 9 A. Earlier on it describes the -- 10 Q. -- the measurement? 11 A. -- using the signal quality measurement to 12 adjust. Let me find that. 13 Right. So going back, the quality in 14 column 10 at line around 48, the wavelength of the 15 light emitted by the LED is adjusted or controlled 16 to optimize and enhance the quality of the 17 physiological data obtained or sampled by the 18 detector. 19 And here we're determining the quality of 20 the heart rate signal that would be used to control 21 or adjust the LEDs. 22 Q. But this doesn't say heart rate, does it?

Page 377 1 And by "this," I mean the part you just read in 2 column 10. 3 A. Well, it's determining the quality of the 4 physiological data, and under 18 it's talking about 5 getting quality of the heart rate signal. So they 6 are certainly talking about the quality of the 7 signal acquired, and that would be used to adjust 8 the LEDs. 9 Q. Okay. The example they give is on line 50 10 of column 10. The color of the light emitted by 11 the LED may be switched from infrared to green when 12 the user's skin temperature or the ambient 13 temperature is cool in order to enhance the signal 14 in corresponding to cardiac activity. 15 That's not adjusting measurement 16 periodicity based on heart rate, is it? 17 A. Well, that's one example. It's the 18 sentence before that, at 48, the wavelength of the 19 light emitted by the LED is adjusted or controlled 20 to optimize or enhance the quality. So that could 21 include modulating the wavelengths of light and the 22 rate with which those are being modulated	Page 378 1 absolutely are included in the ways you might want 2 to optimize the acquisition of the data relevant to 3 how the data is varying. 4 And then also, for example, it talks about 5 in column 17, for instance, the sensor device may 6 measure the physiological parameter of interest, 7 e.g., heart rate using analog conditioning 8 circuitry whilst the user is immobile or sedentary 9 to reduce power consumption by switch to 10 oversampling of the light detector output during 11 whilst the user is active. 12 So, again, a measure of the heart rate, 13 the rate at which it was going, would be indicative 14 of sedentary or active and can be used then to 15 adjust the light parameters. 16 Q. I'm sorry. Where in column 17 were you 17 just reading from? 18 A. Column 17, line 11. For instance, the 19 sensor device can measure the physiological 20 parameter of interest, heart rate, and oversample 21 when active versus passive or active versus 22 sedentary. I think I also talked about that --
Page 379 1 let's see. There's another part where it's 2 discussed as well. 3 Q. Okay. Doctor, we can move on to paragraph 4 288, please. Now, this claim 10 and 11 here, you 5 discuss -- this is discussing adjusting operational 6 parameters in response to power level of the 7 battery, a power usage of the one or more sensors 8 or both, correct? 9 A. Yes, that's what's in that claim. 10 Q. Where does Yuen, if at all, describe that 11 he adjusts parameters based on a power level of the 12 battery? 13 A. So just to be clear, what's discussed is 14 by selectively adjusting one or more operational 15 parameters of one or more sensors based at least in 16 part on a power level of the battery, a power usage 17 of the one or more sensors, or both. So -- 18 Q. Okay. 19 A. -- just to meet that claim, it has to 20 either be one or the other or both. 21 Q. I agree with you. 22 Where does Yuen disclose either of those	Page 380 1 possibilities? 2 A. Well, as I describe in column or in 3 paragraph 288, Yuen describes that upon such a 4 determination, that the -- let's see. 5 Yuen describes a monitoring device. It 6 may implement replaced in the lower power mode of 7 operation when it's -- for example, the heart rate 8 is high or low or sedentary, but here further 9 describes that upon such determination the device 10 may reduce its power consumption, disable or adjust 11 the operating conditions of the stress and/or heart 12 rate detection sensors or circuitry. 13 So a POSITA would have understood that 14 Schr der Yuen can adjust the operating conditions 15 of the heart rate sensors based on the device being 16 placed in the lower power mode of operation. For 17 example, when -- go ahead. 18 Q. So does it discuss why it's placed in a 19 low power mode? 20 A. I'm sorry. Can you repeat that question? 21 Q. Well, the claim requires that the 22 operational parameters are adjusted in response to

Page 381 1 a power level of the battery or a power usage of 2 the one or more sensors, as you pointed out. 3 So where does Yuen disclose, for example, 4 going into a low power mode based on either of 5 those possibilities? 6 A. Okay. For example, at least in column 17 7 where the -- measuring the heart rate, and if the 8 heart rate measurement takes power from the LEDs, 9 and so if the user is sedentary, the rate with 10 which the heart is beating does not need high rate 11 sensing, high rate sampling. 12 So in order to reduce the power 13 consumption that was being used before the user 14 became sedentary, switched to an undersampling 15 versus oversampling that would be used while the 16 user is active. 17 Q. Okay. So that's not based on what -- the 18 example you just gave me is not based on a power 19 level of battery. It's based on a power usage of 20 the one or more sensors? 21 A. Power usage of the one or more sensors. 22 Q. Can we look at, Doctor, paragraph 298.	Page 382 1 And you annotated Figure 5 of Yuen, 2 correct? 3 A. Yes. 4 Q. And why did you do that? 5 A. To highlight where the photodetector and 6 LEDs are. 7 Q. As well as a flexible PCB? 8 A. As well as a flexible PCB. 9 Q. Okay. So this, can I call it a sensor 10 module; is that fair? 11 A. Sure. 12 Q. This sensor module shown in Figure 5 of 13 Yuen, you also indicate where the skin side is, 14 correct? 15 A. Yes. 16 Q. So as shown here, this module looks like 17 it's slightly curved away from the skin side; is 18 that true? 19 A. So Figure 5 corresponds to the sensor 20 profusion -- protrusion, for example, at least as 21 in Figure 3. 22 Q. All right.
Page 383 1 A. Yeah. 2 Q. And I'm just asking about the shape of 3 that protrusion. It's as shown in Figure 5, I 4 suppose, as well as Figure 3. It appears to 5 have -- it appears, at least from these figures, to 6 be slightly curved away from the skin side, as 7 you've labeled it. 8 A. Well, it's protruding into the skin. It's 9 not curving away from the skin where the sensors 10 are. 11 Q. Right. So it's not -- I guess it's not 12 curved in the shape of the arm to which it's 13 attached. It's rather, as you point out, 14 protruding into the arm. 15 A. It's a -- protruding into the arm, and I 16 also point out in Figure 11, so similar sort of LED 17 arrangements, that are around the arm and the band. 18 Q. Right. Those other LEDs that you pointed 19 to. 20 A. Uh-huh. 21 Q. Is it your testimony that this protrusion 22 of Yuen that you've drawn in your paragraph 298	Page 384 1 would be incorporated into the finger ring of the 2 Schr der Yuen combination that you're talking 3 about? 4 A. Well, what I'm describing here in 5 paragraph 298 that talks about both Figure 5 and 6 then in paragraph 299, referring to Figure 11, for 7 example, Yuen's device can be integrated into 8 Schr der's finger ring because a toe band is 9 structurally equivalent to a finger ring, and here 10 what I'm highlighting is the radial arrangement of 11 the -- the LED and the photodetectors having the 12 claimed second radial position different than the 13 first radial position in both of the examples on 14 the combined construction of Schr der and Yuen. 15 Q. Okay. And here you're specifically 16 relying on the protrusion of Figure 5 and shown in 17 Figure 3 as well, right? 18 A. Both Figure 5 and also Figure 11 19 highlighting the radial arrangement. 20 Q. And as you pointed out, the Figure 5 21 arrangement is shown as a sensor protrusion in 22 Figure 3, correct?

Page 385 1 A. That is correct, which could also be 2 implemented as a toe band, as also taught by Yuen. 3 Q. Okay. So is it your -- in your proposed 4 combination, that sensor protrusion as shown in 5 Yuen is incorporated into the finger ring of 6 Schr der. Is that a fair characterization of what 7 you've said here? 8 A. Well, what I'm analyzing here is the 9 Schr der review of Yuen in this teaching of the 10 arrangement of the LEDs in a band, for example, 11 that could incorporate something similar to Figure 12 5 or something similar to Figure 11, Figure 11 13 having a flexible band that would be arranged in 14 the variable radial positions as articulated in the 15 claim. 16 Q. You refer to Figure 11. That includes the 17 sensor protrusion as well, right? 18 A. Well, in Figure 11 I'm not highlighting 19 the protrusion. I'm highlighting the band mounted 20 optical sensors and emitters, that being the first 21 radial position and the second radial position. 22 Q. Just so the record is clear, are you	Page 386 1 proposing that -- I mean, in paragraph 298, you're 2 pointing to the sensors and the protrusion of 3 Figure 5, correct? So you're relying on that. 4 A. What I'm relying on is the teachings of 5 Yuen and the combination that demonstrate the 6 arrangement of the radial positions of the emitters 7 and detectors, and there are at least two examples 8 of that. One is in Figure 5, and the other is in 9 Figure 11 in isolation. 10 What I'm proposing is in the combination, 11 the proposed combination meets that limitation of 12 the light-emitting, finger-worn wearable device 13 having a first radial position and a second 14 light-emitting component with a second radial 15 position where there are different positions. 16 Q. Okay. So are you proposing using the 17 sensor protrusion in Schr der, or are you proposing 18 something less than that? 19 A. I'm not proposing a wholesale, just copy 20 and paste. I'm proposing the teachings and the 21 combination, and the teachings and the Yuen -- 22 Schr der Yuen combination teach the arrangement of
Page 387 1 the second and first radial positions of the 2 light-emitting components. 3 Q. Okay. So the -- how would a POSITA 4 incorporate the sensor protrusion that's taught by 5 Yuen into the finger ring of Schr der? 6 MR. KAPPOS: Object to form. 7 A. Again, I was not suggesting a wholesale 8 copy, but there could be a protrusion that better 9 couples the body; but there does not have to be a 10 protrusion as shown in Figure 11. So it's not a 11 wholesale copy, but what's taught is an arrangement 12 of LEDs and that would be -- that within the 13 structure of the ring would not require a 14 protrusion. 15 Could there be a variant where there was a 16 protrusion? Sure. But what I'm proposing is 17 incorporating the teachings of Yuen into Schr der 18 which has the cavity that would then contain the 19 LEDs and the detectors. 20 Q. Okay. Does Yuen state why he uses a 21 protrusion in this case? 22 And if you don't know without -- I don't	Page 388 1 need you to read Yuen. 2 A. Roughly paraphrased, there's a benefit in 3 having good contact. A ring has good contact by 4 itself, so a band that is larger like on a wrist in 5 order to have good contact, often a protrusion, 6 would be beneficially used, but a ring would not 7 necessarily require that because a ring can be worn 8 in a more coupled and tight fashion with little, as 9 they say, little to know gap between the skin. 10 Q. So we agreed earlier, and the patent 11 states, indeed, that the embodiment shown in 12 Figures 2 through 13 of Yuen are attached to the 13 arm, correct? 14 A. Yes. And also, as well as highlighted in 15 column 24, the device of Yuen can also be 16 integrated and worn in a necklace, a chest band, 17 bra, patch, glasses, earring or toe band. 18 Q. You read my mind because I was going to 19 ask you about that. So the embodiment, as stated 20 in column 12, line 55, the embodiment in Figures 2 21 through 13 is a -- and I said arm-mounted. It says 22 wrist-worn or arm-mounted accessory such as a watch

Page 389 1 or a bracelet. 2 You don't dispute that with respect to 3 Yuen, do you? 4 A. No. 5 Q. So the part you reference in column 24, he 6 says, the biometric monitoring device of the 7 present invention may also be integrated and worn 8 in a necklace, chest band, et cetera, et cetera, 9 and he does mention a toe band. 10 And then he says, the device may be built 11 in such a way that the sensor package portion of 12 the biometric monitoring device is removable and 13 can be worn in any number of ways including, but 14 not limited to, those listed above. 15 I want to take that apart a bit. So he's 16 not referring to here the device of Figures 2 17 through 13, is he? And I apologize to Ms. -- I 18 assume Yuen is -- Shelton is a man, so I'll say he. 19 So my simple question is -- well, two 20 questions: First, the device of Figures 2 through 21 13, as we've established, are arm or wrist mounted, 22 correct?	Page 390 1 A. And other places, yes. 2 Q. And the toe band option that you mention 3 here, he hasn't specifically disclosed how that 4 would be constructed because he says the device may 5 be built in such a way, et cetera. So the toe band 6 construction isn't specifically disclosed in Yuen, 7 is it? 8 A. Well, what's described there is, the 9 biometric monitoring device of the present 10 inventions may also be integrated and worn in a 11 necklace, chest band, bra, patch, glasses, earring 12 or toe band, period. The device may be built in 13 such a way that the sensor package of the biometric 14 monitoring device is removable and can be worn in 15 other ways including, but not limited to, those 16 above. 17 So it may be removable, but what's 18 described there is the teachings of the biometric 19 monitoring device can be also incorporated, for 20 example, into a toe band, which would be, as I 21 describe, have the LEDs arranged in such a way that 22 would be in variable radial positions around the
Page 391 1 circumference. 2 Q. Okay. It's fair to say, though, whatever 3 he has in mind for a toe band would look different 4 from Figures -- what's disclosed in Figures 2 5 through 13, correct? 6 A. Again, it was not opining about Yuen by 7 itself but in combination. It could look very 8 similar, but it could be different. In the 9 combination it would be in the form of a ring or a 10 toe band, as I propose in the Schr der Yuen 11 combination. 12 Q. So you say it could be very similar or it 13 could be different, and that's because Yuen doesn't 14 specifically have figures directed to the toe band 15 embodiment, correct? 16 A. It does not, but it teaches the toe band 17 construction. A POSITA even reading Yuen in 18 isolation would understand the various design 19 trade-offs in order to how to accomplish that and 20 how to accomplish a toe band. And what I'm 21 proposing is the teachings of Yuen incorporated 22 into Schr der such that it would be in a ring with	Page 392 1 the variable radial positions around the 2 circumference. 3 MR SCHULTZ: I heard a sigh. Why don't we 4 take a five-minute break. 5 THE VIDEOGRAPHER: Time is 2:27. We're 6 off the record. 7 (Proceedings interrupted at 2:27 p.m. and 8 reconvened at 2:45 p.m.) 9 THE VIDEOGRAPHER: We are back on the 10 record. The time is 2:45. 11 BY MR. SCHULTZ: 12 Q. Can we jump to paragraph 309 of your '178 13 declaration. My question is with respect to the 14 first sentence. Your first sentence of paragraph 15 309 you say, a POSITA would have been motivated to 16 implement Schr der's teachings and Niwa's ring 17 because doing it would then be easier to replace 18 defective parts. 19 Can you explain to me what you mean by 20 that? 21 A. Well, that paragraph is talking about sort 22 of Niwa in view of Schr der, Schr der teaching the

Page 393 1 two ring halves in Figure 7 embodiment, for 2 example. So making explicit the location of the 3 cavity to which the components would be placed to 4 make it easier to assemble as they further describe 5 or potentially to disassemble and replace defective 6 parts by having the parts that you would replace 7 inside that cavity, for example, the Schr der 8 Figure 7 embodiment. 9 Q. Does Schr der talk about replacing 10 defective parts? 11 MR. SCHULTZ: I'll strike that question. 12 Q. In paragraph 310, and I think you've 13 already talked about this issue but I just wanted 14 to confirm, you state in the second sentence that a 15 POSITA would have understood that these wearable 16 electronic devices, specifically a ring shape, are 17 restricted by form factors. 18 Could you enumerate what form factors 19 you're talking about there? 20 A. Restricted by size, and they can't be -- 21 you wouldn't want them so large that it would 22 impede the use of your hand, and generally, a	Page 394 1 ring-type structure. 2 Q. Can you look at the annotated figure of 3 Niwa in paragraph 314? Can you see that? 4 A. Yes. 5 Q. Niwa states that in paragraph 107 at -- in 6 so many words, Figure 22 is a diagram in accordance 7 with the implementation Example 2 of the invention. 8 And it also says Figure -- in paragraph 111, 9 Figure 26 is a prospective diagram of the 10 implementation Example 2 of the invention. 11 So is it true that Figure 22 and 26, as 12 shown here, are the same embodiment from different 13 perspectives of Niwa? 14 A. Did you say "different" -- I'm sorry. Can 15 you just -- 16 Q. I asked whether Figures 22 and 26, based 17 on what Niwa says about them, is that the -- are 18 they two different perspectives of the same 19 implementation Example Number 2? 20 A. Well, Figure 22 is not a perspective 21 drawing of 26. It's a cross-section diagram of 22 implementation Example 2, and Figure 26 is a
Page 395 1 perspective diagram. 2 Q. And according to paragraphs 107 and 111 of 3 Niwa, those are from the same -- those are two 4 different views, if you will, of the same 5 embodiment? 6 A. I'm not sure what you mean by "views." 7 One is a cross-sectional diagram showing general 8 shape, and one is -- in Figure 26 is a perspective 9 diagram. 10 Q. Okay. Let me ask -- try and ask a better 11 question. Figures 22 and 26 are both figures 12 conveying information about the same ring 13 embodiment of Niwa, correct? 14 A. Both are referring with the implementation 15 of Example 2. 16 Q. Thank you. 17 Now, Figure 22 states that, again, back to 18 paragraph 107, that it's illustrating a 19 construction example. What would a POSITA 20 understand Niwa to mean by describing that figure 21 as a construction example? 22 A. So Figure 22 at paragraph 191 is further	Page 396 1 described, a cross-section diagram illustrating a 2 construction example of the plethysmogram sensor 3 schematically. The plethysmogram sensor 1 of this 4 construction includes a construction to measure the 5 plethysmogram at the third joint of finger 2 as 6 illustrated in Figure 21. To be more concrete, a 7 finger ring construction to measure the 8 plethysmogram which is worn on the third joint of 9 finger 2. 10 In addition, it focuses -- I think it 11 should be it -- it focuses attention to the 12 construction elements. The plethysmogram sensor 1 13 of this construction includes a first unit 10, 14 second unit 20, and cable and a finger ring-type 15 housing. So the construction example is showing, 16 in general, the components that are embodied in the 17 Example 2. 18 Q. Okay. And how would -- I guess I haven't 19 seen that phrase used a whole lot in patents 20 construction example. How would a POSITA interpret 21 that, that phrase? 22 A. Well, here it's further modified with the

Page 397 1 adjective, a schematic construction. So I think a 2 POSITA reading this would illustrate the general 3 components and a general arrangement for the 4 schematic, but it's not a detailed drawing, for 5 example, in comparison. 6 Q. Okay. And how would you contrast that to 7 what he calls a perspective view of Figure 26? Is 8 a perspective view meant to convey different 9 information than a construction example? 10 A. So in paragraph 0206, Figures 24 through 11 26 are perspective diagrams illustrating a 12 situation where the pulse sensor 1 of the 13 implementation Example 2 is worn on the third joint 14 of the finger, respectively. 15 Figure 24 is see-through illustration. 16 Figure 25 is a see-through illustration to see the 17 plethysmogram sensor from the palm side of the 18 hand. And Figure 26 is a see-through illustration 19 to see the plethysmogram sensor 1 from the side. 20 So it's highlighting the -- seeing the 21 internal components within a perspective drawing, 22 seeing more detail on the internal housing or on	Page 398 1 the internal components. 2 Q. Okay. So staying with that, those 3 annotated figures for a moment, you label Figure 22 4 the "external housing component" in green? 5 A. Yes. 6 Q. Okay. The top portion of -- above of the 7 external housing component above unit 20, that's 8 shown to be planar in this figure, isn't it? 9 A. I'm sorry. Which is shown to be planar? 10 Q. The top portion of the -- the portion of 11 the external housing component above the unit 20. 12 A. In that figure it appears to be planar. 13 Q. Okay. So planar is not circumferential, 14 is it? 15 MR. KAPPOS: Object to form. 16 A. Well, you could certainly have a -- 17 hypothetically you could have -- for example, I 18 would -- often could use the example of a stop 19 sign. You can describe the circumferential 20 position around the stop sign. They could have 21 planar segments. 22 Here it's, you know, generally
Page 399 1 circumferential refers to a radial coordinate 2 system or a polar coordinate system, and so you can 3 certainly describe that flat surface as existing 4 along a circumference and a radius. 5 Q. So that flat portion, planar portion above 6 unit 20, you'd characterize that as 7 circumferential? 8 A. Well, it's encircling the finger. Yeah, 9 again, it's a flat portion that can be described as 10 a -- in a polar coordinate system and can be 11 described by where it exists at an angle with 12 respect to the origin around the clock, if you 13 will, in a radial position. But it's generally a 14 flat portion that's depicted in Figure 22. 15 Q. The circumference refers to the area 16 surrounding -- I'm sorry -- the length of a circle, 17 correct? 18 A. The perimeter of a circle. 19 Q. Thank you. Perimeter. I couldn't get 20 that word out for some reason. 21 And circumferential is a -- has 22 circumference-like properties, doesn't it?	Page 400 1 A. It has circle-like products. But, again, 2 as I describe here, you know, I think a POSITA 3 reading Niwa would understand that it would be 4 beneficially placed into a generally circular 5 structure. Could you have flat sections and have 6 it also be circular? Certainly, and they would 7 still be described as circumferential. 8 Q. So under that scenario would you say 9 overall the shape would need to be circular in 10 nature and could have some flat portions; is that 11 your testimony? 12 A. Well, I think a POSITA reading Niwa would 13 understand circumferential is going to go around a 14 circle generally. I think design variants would 15 allow sort of a smooth circle. Design variants 16 could also allow sections that had locally planar 17 and still be described as a circumferential 18 surface. 19 Q. So based on that, a circumferential does 20 not -- according to the view of a POSITA, 21 circumferential does not require a perfect circle, 22 does it?

Page 401 1 A. I'm sorry. Can you repeat that question? 2 MR. SCHULTZ: Could you repeat it, Dana? 3 (Whereupon, the record was read as follows: 4 Question: "So based on that, a circumferential 5 does not -- according to the view of POSITA, 6 circumferential does not require a perfect 7 circle, does it?") 8 A. I think a POSITA reading Niwa would 9 consider a smooth -- a perfect circle and a 10 circumferential construction that generally 11 encircles the finger. 12 Q. So generally encircles the figure but not 13 in a perfect circle would be circumferential? 14 A. A perfect circle would also be 15 circumferential. 16 Q. No, I understand you said that. I was 17 just trying to get the other part of it. 18 You're saying a non-perfect circle could 19 also be circumferential or a non-perfectly circular 20 shape surrounding the finger could be 21 circumferential? 22 A. Yes, as I'm highlighting there in	Page 402 1 Figure 22. 2 Q. Thank you. 3 So under the two possibilities we just 4 talked about, we could have a -- a perfect circle 5 would certainly be circumferential, and you also 6 described, I guess, a non-perfect circle -- 7 circular shape could be circumferential as well. 8 Regarding the latter possibility of a 9 non-perfect circumferential -- not-perfect circular 10 circumferential shape, would that shape have a 11 diameter, or could you characterize that shape as 12 having a diameter? 13 A. As having a nominal diameter, yes. 14 Q. Can you move on to paragraph 317, please? 15 Do you see that? 16 A. Yes. 17 Q. And you state here, a POSITA would have 18 been motivated to combine the teachings of Niwa and 19 Schr der to have an explicit external housing 20 component in Niwa's ring, et cetera. 21 My simple question is, you use a modifier 22 here of the word "explicit." And is that meant
Page 403 1 to -- is that meant to address what you said 2 yesterday, I believe, about Niwa being silent on 3 the construction of the housing? 4 A. So Niwa in view of Schr der, Schr der 5 teaches the construction, for example, in Figure 7 6 which has the external housing component and the 7 internal housing component. So yes, Schr der is 8 giving explicit construction of that external 9 housing component. 10 Q. So the contrast you're making there is 11 that Niwa does not explicitly show an external 12 housing component? 13 A. Correct. But what would be understood in 14 the view of the knowledge of a POSITA, but in 15 combination, Schr der makes it explicit. 16 Q. In your Niwa Schr der combination -- well, 17 let's point again to your annotated Figure 22 of 18 paragraph 314. Would your Niwa Schr der 19 combination include the unit 20? 20 A. Well, I think as I described yesterday, 21 that unit 20 would be on the inlay that is inside 22 the -- in 12 of the highlighted Figure 4 of	Page 404 1 Schr der. 2 Q. Okay. And I apologize if we're repeating 3 some ground here, but there's combinations that are 4 similar to one another. 5 Would your Niwa Schr der combination -- 6 MR. SCHULTZ: Strike that. 7 Q. Schr der discloses that his inlay, at 8 least in his figures, is of a uniform shape, 9 correct? 10 A. It's showing where the inlay would go 11 between -- in the cavity between, for example, the 12 external housing component 18 and the internal 13 housing component 16. I believe quite explicitly 14 Schr der teaches as well having pieces that are 15 connected together that would not be a singular 16 shape. 17 Q. Well, I was more referring to your 18 Figure -- your annotated Figure 4, for example, in 19 316. 20 A. Uh-huh. 21 Q. That discloses a uniform ring as formed by 22 inlay 12, correct?

Page 405 1 A. That's where the inlay would go, yes. 2 Q. So your testimony is that in your modified 3 Niwa Schr der combination, the unit 20 would go in 4 the inlay 12 of Figure 4? 5 A. So there's a cavity form, as I described, 6 you know, two ring halves, 16 and 18, with a recess 7 and an inlay 12 is inserted there. So inlay 12 8 goes into that cavity defined by the internal and 9 external housing components. 10 Q. So would your Niwa Schr der combination 11 still have a uniform shape as shown in Figure 4 12 here of Schr der? 13 A. In the proposed construction of Niwa 14 Schr der, it's using the external housing component 15 of external ring and the internal ring forming a 16 cavity into which the inlay is inserted into that 17 cavity, so it would be a perfect circle, 18 circumferential circle. 19 Q. So it would look like Figure 4? 20 A. Figure 4. 21 Q. It wouldn't look like Figure 22 in 22 paragraph 314?	Page 406 1 A. No. 2 Q. Okay. So how much thicker would you have 3 to make the ring shown in Figure 4 to accommodate 4 the unit 20 of Niwa? 5 A. It's -- you know, we wouldn't necessarily 6 have to make it any thicker. Depends on all the 7 size of the various components and the actual real 8 dimensions. It's unclear on the actual real 9 dimensions in either figure. 10 Q. Okay. It's certainly possible that the 11 real dimensions of the unit 20 in Niwa would be too 12 big for the layout shown in Figure 4, isn't it? 13 A. Well, it's also possible that it would be 14 smaller and fully fit, and even in the Figure 22 15 would be potentially smaller than the outer surface 16 of 40. So size varies depending on the specifics 17 of the components. 18 Q. Well, Niwa shows -- Niwa puts item 20 on 19 the top of his ring because he stacks the 20 components there, correct? 21 A. Yes. 22 Q. And he stacks the components there, he
Page 407 1 says, so that the substrates do not extend -- well, 2 essentially he stacks the components on top of the 3 ring so he doesn't enlarge the sides of the ring to 4 impede the user; isn't that true? 5 A. I believe that's what's described. But as 6 I'm explaining in the combination, those components 7 could fit inside of the recess. Depending on the 8 components and the sizing of batteries and lifetime 9 expected and manufacturing, you know, the ring 10 could be made smaller or larger and have 11 variability in the comfort or the fit, but wouldn't 12 preclude having everything inside of the recess as 13 I describe. 14 Q. It's also possible that the -- using the 15 components that Niwa teaches in a stacked layer 16 configuration that Niwa teaches, that the ring 17 would be -- the ring layout shown in paragraph 316 18 of your declaration would be too thick to be 19 practical; isn't that a possibility? 20 A. Well, you could put a refrigerator in 21 there and have it be too big. But a POSITA would 22 scale it to, you know, have the power, design	Page 408 1 trade-offs to have it be a wearable device and 2 would consider design trade-offs to achieve that. 3 Q. Okay. So under my hypothetical that 4 Niwa's unit 20 is too big to make a practical ring, 5 would a POSITA alter the stacked arrangement of 6 unit 20? 7 A. Well, in the proposed combination, the -- 8 you would put the PCB on the inside of the -- in 9 the recess on the inlay and still can stack but 10 would have both some ability to stack and some 11 ability to go around the full circumference. 12 Q. So you may have to alter the structure of 13 Niwa's unit 20 to accommodate Schr der's layout 14 here? 15 A. Well, a POSITA would know how to stack and 16 put elements on a band or on an inlay that would 17 sit within the recess 12. 18 Q. To have the uniform inlay as shown here in 19 Figure 4, stacking components is somewhat 20 inconsistent with that layout, isn't it? 21 A. Well, I didn't say it would be inlay. The 22 recess is a uniform hollow ring. The inlay is not

Page 409 1 necessarily uniform. It is inserted into the 2 recess between the external housing component and 3 the internal housing component. 4 Q. Okay. I just want to clarify something. 5 The inlay shown in Figure 4 here is uniform, 6 correct? 7 A. Well, that is the recess defined by 8 Figure 12 -- I'm sorry -- by the external housing 9 component, and the internal housing component 16 10 there's a recess there into which the inlay is 11 inserted. 12 Q. Right. 13 A. The recess is not -- the inlay is not 14 uniform. The recess is that cavity between the 15 external housing and internal housing. 16 Q. Well, the inlay is item 12 in Schr der, 17 isn't it? 18 A. That's, the inlay goes into that recess. 19 Q. So there's another element here that 20 you're calling the recess that's not labeled? 21 A. Well, that's where the inlay is. And if 22 you take -- just look at the description of what's	Page 410 1 on the inlay, there's no way that it's a uniform 2 thing. You have components in there. This is a 3 schematic showing where the inlay sits inside of 4 that recess. 5 So schematically 12 is inserted into that 6 recess. It's the recess in the inlay that's in 7 there, but there's nothing that would suggest that 8 that inlay has to be a perfect circle. There's 9 stuff on it that would have a shape other than that 10 perfect circle that's shown inserted into the 11 recess, schematically in the figure. 12 THE VIDEOGRAPHER: Off the record. Time 13 is 3:24. 14 (Proceedings interrupted at 3:24 p.m. and 15 reconvened at 3:25 p.m.) 16 THE VIDEOGRAPHER: We're back on the 17 record. The time is 3:25. 18 BY MR. SCHULTZ: 19 Q. We're going to jump to paragraph 329, if 20 you will, of your declaration. And I'd just like 21 for you to define a term you've used there. 22 Halfway down you say, apportionment placement is
Page 411 1 crucial for maintaining the structural integrity of 2 the assembly. 3 And I'm not sure what you mean by "a 4 portioned" -- actually, I just misspoke -- 5 "apportioned placement is crucial." What do you 6 mean by "apportioned placement" in this context? 7 A. So as I fully describe in 329, my opinion 8 that a POSITA would have understood that placing 9 the battery between the internal and external 10 housing components means that the battery is 11 positioned to extend through at least a first 12 portion of the cavity. 13 This portioning is intentional as the 14 cavity is designed to accommodate not only the 15 battery but also other components and parts 16 effectively utilizing the available space within 17 the devices framework. And that apportioned, 18 meaning portions of the cavity, placement is 19 crucial for maintaining the integrity of the 20 assembly in the ring. 21 Q. And can you explain to me what influence 22 the apportioned placement that you're talking about	Page 412 1 here has on structural integrity? 2 A. Well, I think it would have better said 3 sort of the -- in achieving the design goal, having 4 everything accommodated in the cavity of the ring, 5 and so -- 6 Q. Okay. What does that have to do with 7 structural integrity, though? 8 A. Well, the portioning is important to be 9 able to accommodate all the materials, and this 10 also allows you to keep the materials inside of the 11 ring so as to have an integral structure of the 12 ring as well. 13 Q. When I read "structural integrity," I 14 think the ring is going to fall apart if you 15 don't -- 16 A. Structural integrity meaning no 17 protrusions, for example, through the assembly, so 18 the integrity of a ship hull, for example. Like if 19 the integrity of ship hull is broken, then the ship 20 sinks. So here you would have everything 21 apportioned and fit within the space between the -- 22 in the housing.

Page 413 1 Q. So you're trying to keep everything as 2 uniformly spaced as possible along that recess? 3 A. Well, to maximally utilize the space 4 available to accommodate the battery and components 5 utilizing the space for the device. 6 Q. Okay. So, again, correct me if I'm wrong, 7 you're saying that the structural integrity you're 8 talking about is achieved through avoiding 9 protrusions from the ring? 10 A. Maintaining the structural integrity of 11 the assembly so that there's not components 12 protruding through, for example, or needing to be 13 placed outside of the inside of the cavity of the 14 ring. 15 Q. So you don't want -- so let me see if I 16 can -- if I understand this. So if we look at the 17 Asada or Rhee prototypes where the battery and 18 circuit board are mounted on top of the ring, 19 that's an example that would not have the 20 structural integrity that you're talking about 21 here? 22 A. In that situation where you have things on	Page 414 1 the outside of the ring, that is not keeping 2 everything -- so the integrity of a ring structure, 3 if you're making connections through the ring, 4 would potentially allow transmission of particulate 5 or oil or water through the assembly. So, again, 6 trying to maintain everything inside integrally 7 into the assembly to keep it safe from the 8 environment and sealed. 9 Q. Okay. So keeping all components contained 10 within the housing to accomplish that? 11 A. (Nodding head up and down). 12 Q. Nods don't work at depositions. 13 A. I was just waiting for the question. 14 Q. I just asked you to confirm that. Thank 15 you. 16 A. Yes. 17 Q. Let's move down to paragraph 330. And I 18 just have a clarification here. In the first 19 sentence you refer to single structure formation or 20 multi-structure assembly techniques. What's an 21 example of a single structure formation versus a 22 multi-structure assembly?
Page 415 1 A. So as I describe in back on page 55, 2 starting at paragraph 72 through 77, talking about 3 the various ways to create -- put electronics into 4 a device, having components that are assembled, or 5 as I describe, having components that can be formed 6 by molding techniques or thermoforming techniques, 7 for example. 8 Q. Okay. So the latter examples you just 9 gave, molding techniques and thermoforming 10 techniques, those are single structure examples? 11 A. In the industry if you used a single -- 12 sort of a cast all of the material, then, yeah, I 13 think that would in general be considered a single 14 structure formation versus having a multi-structure 15 that is then assembled. 16 Q. Okay. So Schr der is an example of a 17 multi-structure formation? 18 A. Yes. 19 Q. Can you go to paragraph 363, please. 20 A. I'm sorry? 21 Q. 363. 22 So you have an annotation here, Figure 26	Page 416 1 from Niwa, which we looked at before. 2 Do you see that? 3 A. Yes. 4 Q. So you labeled a "first side wall" and a 5 "second side wall." Is the first and second 6 sidewall part of the internal housing component or 7 external housing component in your annotation here, 8 because it's not clear to me? Or neither. 9 MR. KAPPOS: Object to form. 10 A. Well, the side wall would have 11 connectivity either to the external housing 12 component, the internal housing component. Could 13 look very similar to say, for example, Figure 7 of 14 Schr der or look very similar to I think it was 15 Figure -- the one that had the U-shape of Schr der 16 which had the side wall coming from one of the -- 17 either of the outer or the inner housing component. 18 Q. Okay. So you're not opining that either 19 of these side walls are part of the internal or 20 external housing components? 21 A. No. They would be part of the internal -- 22 of the housing component, either the external or

Page 417 1 the internal. 2 Q. Okay. So let me try and be -- I'm asking 3 a very simple question, which is, are you saying 4 it's part of one or the other -- 5 A. Yes. 6 Q. -- or it could part of -- it could be 7 either one or the other? 8 A. It could be either one or the other or a 9 combination. 10 Q. Thank you. 11 A. And just to correct here, as I was 12 referring to the U-shaped version on page 229, it's 13 Figure 8, not Figure 9 of Schr der. 14 Q. I'm sorry. I didn't catch that. 15 A. So prior when talking about the -- where 16 the side walls were, I referred to either Figure 7 17 or Figure 9 of Schr der. It's actually Figure 8 of 18 Schr der which has the side wall only on the 19 external, in this case, housing component. 20 Q. So in the text you say Figure 9, but 21 that's not correct, it's Figure 8? 22 A. Verbally what I just said moments ago.	Page 418 1 Q. Oh, you're correcting what you just said. 2 Okay. 3 A. Yeah. 4 MR. SCHULTZ: Let's have marked as 5 Deposition Exhibit Number 11 the Declaration 6 of Dr. Brian W. Anthony in case number 7 PGR2024-00039. 8 (Anthony Exhibit 11, Declaration of 9 Dr. Brian W. Anthony, Case Number PGR2024-00039 10 marked for identification.) 11 Q. Can you identify Exhibit 11 for me, 12 Doctor? 13 A. It is my declaration with respect to what 14 I refer to as the '702 patent. 15 Would it make sense to introduce the '702 16 patent as we're going to be talking about it? 17 Q. If we talk about it, I will. 18 Can you go to paragraph 154, please. 19 This claim limitation that you're 20 discussing in paragraph 154 states that the 21 internal housing component comprises a 22 substantially transparent material.
Page 419 1 Do you see that? 2 A. Yes. 3 Q. Is it -- where does Schr der say that the 4 internal housing component or I guess what you're 5 calling the ring half is transparent or 6 substantially transparent? 7 A. Well, as I describe a POSITA reading 8 Schr der, so Schr der includes biometric sensors 9 such as infrared diode sensor arranged opposite to 10 each other to capture a partial vein image. POSITA 11 would have understood Schr der's figure ring to 12 include one or more transparent regions arranged 13 facing the finger in order to allow light to pass 14 and to capture an image of the finger. Otherwise, 15 if it weren't partially transparent, no light would 16 get in or out. 17 Q. You cite column 9, lines 28 through 34 for 18 the notion that Schr der's figure ring may have 19 transparent regions. 20 Do you see that? 21 A. Yes. 22 Q. And that says that, quote, the external	Page 420 1 security unit 2, e.g., a finger ring 2, has 2 security elements, for example, incorporated into 3 the surface applied thereto or integrated thereon 4 such as holograms, kinograms, security threats, 5 microprint, et cetera. 6 Isn't that saying that those items can be 7 integrated on the external surface of the ring? 8 A. What's described there is talking about 9 the external surface, and so in general, that's 10 talking about having the structure of the ring 11 having light transmissive portions. And as well, a 12 POSITA reading and understanding how it works, the 13 biometric sensor, the inner surface also has to 14 have those transparent portions to allow light to 15 come in and out. 16 Q. So the portion I just read, that you 17 agreed talks about the external surface, that 18 doesn't talk about a transparent region of the 19 internal housing component, does it? 20 A. Well, again, I'm pointing to both 21 description there of the housing and -- of the 22 external housing and the internal housing, and a

Page 421 1 POSITA reading that in its entirety would certainly 2 understand that the internal housing components are 3 also having light transmissive sections to 4 accomplish the goal of capturing the vein image. 5 Q. So the section I just read doesn't talk 6 about vein imaging, column 9, lines 28 through 34. 7 Are you not relying on that citation to show the 8 internal housing component has transparent regions? 9 MR. KAPPOS: Object to form. 10 A. No. I'm pointing to the fact that in 11 order to acquire that image you need to have -- be 12 able to have the light into the finger and out of 13 the finger, and so you'd have structure that has 14 the internal housing component be transparent to 15 allow the light to come in and out. 16 Q. So the first citation there that I was 17 talking about, 9, 28 through 34, by itself that 18 doesn't support the notion that -- by itself that 19 doesn't say anything about the internal housing 20 component, does it? 21 MR. KAPPOS: Object to form. 22 A. What's generally described there is that	Page 422 1 the housing component would have those functions 2 embedded in them and would be transparent in order 3 to interact with those. And also as I describe, 4 the POSITA reading that would also understand that 5 the LEDs and sensor in order to capture the vein 6 image described in the latter part of 9, column 9, 7 down around 62 through 10, would have transparent 8 regions in order to allow the light to go in and 9 out to capture the vein image. 10 Q. So regarding that -- I guess, that second 11 citation that you quote to here or you cite to, 12 column 9, 62 through 10, 4, it's true that infrared 13 can pass through non-transparent materials, isn't 14 it? 15 A. No. 16 Q. No? 17 A. Infrared material has to be transparent to 18 the infrared. 19 Q. Infrared can pass through materials that 20 are not transparent to other types of light? 21 A. And that's true for every wavelength. 22 Transparency is respect to a wavelength. So
Page 423 1 transparency with respect to IR means transparency 2 with respect to IR. 3 Q. Okay. So where they're talking about 4 visual in column 9, the term "transparent regions" 5 is used on line 34 in connection with talking about 6 holograms and fluorescent inks and other types of 7 microprint and kinograms. In that context, that's 8 not necessarily talking about transparent to 9 infrared, is it? It's talking about transparent to 10 a user's vision. 11 MR. KAPPOS: Object to form. 12 A. Well, it depends on how that security 13 element is being used. If it's being asked to be 14 viewed by a person that relies on visible light but 15 if it's being read by something that is not being 16 read by the person, you know, has other sensing 17 technique, other wavelengths, it would be 18 transparent to those wavelengths. For example, I 19 can't see -- I can't see fluorescent. 20 Q. So I think we already -- you already said 21 this in part, but I just want to confirm. Infrared 22 can pass through objects which appear opaque to the	Page 424 1 human eye; isn't that true? 2 A. And similarly, visible light can pass 3 through things that are opaque to IR. Transparency 4 is a function of the wavelength, and in order to 5 capture the infrared imagery, you would need 6 transparency for the infrared light to get in and 7 out of the ring. 8 Q. But to look at a -- for a person to 9 physically look at a hologram, that would not need 10 to be transparent to infrared, would it? 11 A. Wouldn't need to be, but it could be. 12 Q. And one final thought on that final 13 question, Schr der doesn't explicitly say when he 14 uses the word "transparent" in that section, he 15 didn't say specifically whether it's transparent to 16 visible light, the human eye, or infrared. He 17 doesn't specify that, does he? 18 MR. KAPPOS: Object to form. 19 A. Well, I disagree because a POSITA reading 20 that would understand if you want to get the light 21 in and out, it needs to be transparent to the 22 light. So it would be silly to have to say that it

Page 425 1 needs -- we're going to use IR light and it has to 2 be transparent to that. 3 Q. Okay. But in the section that you cite 4 to, he doesn't say anything about anything being 5 transparent, does he? 6 A. There's no need to say that it's 7 transparent. If the light is going to get in and 8 out, it has to be transparent. 9 Q. Well, it doesn't need to be transparent if 10 the light isn't passing through the ring, does it? 11 A. If the light were not passing through the 12 ring, you wouldn't need to have the ring 13 transparent, but the biometric sensors in the 14 situation where they're employed in the 15 construction of Figure 7 and 9, the POSITA would 16 understand they would have to be transparent, 17 Figure 7 and 8. 18 Q. Could you go to, I guess, paragraphs 169 19 through 172. And the claim you're discussing here, 20 claim 12 of the '702 patent, and I will mark the 21 '702 patent. 22 MR. SCHULTZ: Let me have marked as	Page 426 1 Deposition Exhibit 12, Petitioner Exhibit 1001 2 of the PGR2024-00039 case, which is United 3 States Patent to Curt von Badinski. 4 (Anthony Exhibit 12, Petitioner 5 Exhibit 1001 of the PGR2024-00039, marked for 6 identification.) 7 Q. So are you with me on those paragraphs 169 8 to 172? 9 A. That's under claim 12. Okay. 10 Q. So could you -- I wasn't clear from 11 reviewing these paragraphs as to what you were 12 pointing to in Schr der that constitutes the power 13 management module that's claimed in claim 12. 14 Could you identify that for me in Schr der? 15 A. So as I point to in description of 16 paragraph 170 and 171, generally column 11, 17 starting at -- 18 Q. Of Schr der? 19 A. I'm sorry. Schr der, column 11. In the 20 further embodiment -- column 11, line 46. In the 21 further embodiment, the external security unit has 22 an energy storage device, an accumulator or a
Page 427 1 battery. Energy storage device is connected to the 2 chip module to supply module with energy outside an 3 electromagnetic field of a reader. 4 Within the reader's field, the energy of 5 the field storage device can be additionally 6 employed in order to increase the range of the 7 antenna coil. The energy storage device is 8 preferably charged by means of the reader's 9 electromagnetic field. 10 Further down there, the energy storage 11 device can also be employed to operate 12 communications channels. Further, the energy 13 storage device can be employed for operating 14 electronic displays. 15 Down on line 61, the energy storage device 16 further enables uninterrupted operation. In line 17 63, energy storage device can recharging be 18 connected directly to the antenna coil via a 19 rectifier circuit with a chip module 10 connecting 20 the energy storage device to the antenna coil. 21 So a POSITA reading that, as I explain 22 here, has that functionality that is controlled --	Page 428 1 controlling the energy storage. 2 Q. Okay. So you said earlier in the 3 deposition that the energy -- you cited to this 4 portion of the -- of Schr der as disclosing a 5 battery, right? 6 A. An accumulator or a battery. 7 Q. A battery is not the same as a power 8 management module, is it? 9 A. Well, the rectifier that charges the 10 battery and controls how power is coming out, that 11 functionality is either serving to charge the 12 accumulator or charge the battery. 13 Q. Okay. So your -- the rectifier is the 14 power management module; is that your testimony? 15 A. Well, all those components taken together, 16 the battery and the rectifier, the chip module that 17 controls the connectivity to the antenna serves to 18 manage the power. 19 Q. Okay. I don't want to -- I don't want 20 there to be any vagueness about this. So the power 21 management module -- unless you want there to be 22 vagueness about it. The power management module

Page 429 1 includes the rectifier circuit that's discussed on 2 column 11, line 65. 3 A. Includes the rectifier, the battery, the 4 chip circuit that's -- the chip module that's 5 controlling the connection between that and the 6 antenna. So all that is serving to manage the 7 power and transfer. 8 Q. Okay. So the chip module 10, the battery, 9 the rectifier circuit, and the antenna constitute 10 the power management module? 11 A. Serving the function of managing the 12 power, charging it and using it. 13 Q. Okay. 14 MR. SCHULTZ: Let's mark as Deposition 15 Exhibit 13 a document identified as 16 Petitioner's Exhibit 1012, which is a patent, 17 U.S. Patent Number 8,700,111 to LeBoeuf. 18 (Anthony Exhibit 13, U.S. Patent Number 19 8,700,111 to LeBoeuf marked for 20 identification.) 21 Q. When you have a chance, can you identify 22 Exhibit 13 for me?	Page 430 1 A. It's the patents that I discuss in my 2 declaration referred to as LeBoeuf. 3 Q. Let's go to paragraph 184 of your 4 declaration. 5 A. I'm sorry. Paragraph 184? 6 Q. I'm sorry. 182. 7 A. 182. 8 Q. So in this paragraph and surrounding 9 paragraphs you're proposing to combine Schr der in 10 view of LeBoeuf; is that right? 11 A. A POSITA would have been motivated to 12 combine the teachings of Schr der and LeBoeuf, yes. 13 Q. So if you could look at Figure 22B of 14 LeBoeuf. 15 A. Which I've annotated on page 118. 16 Q. Yes, you have. 17 And I'm curious when you say, would have 18 been obvious to conform Schr der's finger ring to 19 have a structure similar to LeBoeuf's wearable ring 20 device that includes windows 74, you're proposing 21 to add windows similar to 74 to the inner ring half 22 of Schr der?
Page 431 1 A. So I'm proposing the combination of the 2 teachings of Schr der and LeBoeuf, and LeBoeuf 3 teaches explicitly windows and windows that -- with 4 the ability to optically filter one or more 5 wavelengths. So the windows is taught by LeBoeuf, 6 and the combination would have that functionality. 7 Q. So central to the functioning of LeBoeuf 8 is this -- actually, you label it in your annotated 9 figure on page 118. It's that light guiding 10 region? 11 A. Yes. 12 Q. What is that used for? 13 A. Well, as I describe, I believe, the light 14 emits from the emitter, passes through the window, 15 into the finger, and then into the other window and 16 to the detector. 17 Q. So essentially, the light travels around 18 that light guiding region, which essentially 19 travels around the circumference of the ring or the 20 interior cavity of the ring? 21 A. Well, the light would go -- so 24, I 22 believe, is the emitter in this figure. And	Page 432 1 there's a detector 26 prime and detector 26. So 2 light would emanate from the transmitter, follow 3 through the light guiding region, pass into the 4 finger. Some of it would transmit through into the 5 other window and go up to detector 26, and some 6 would reflect back and go back up to detector 26 7 prime. 8 Q. So are you suggesting in your proposed 9 combination that this light guiding region be 10 incorporated into Schr der? 11 A. It would not have to be used, no. What 12 I'm proposing here is this taught windows to 13 provide, you know, would there be some benefit of 14 sometimes using different ways of getting light in 15 and out, having windows just above the LEDs or 16 incorporating that. But the teachings here are the 17 teaching of the window to allow variable 18 wavelengths to filter wavelengths. 19 Q. So in paragraph 185 you're referring to -- 20 you're describing the functionality of LeBoeuf's 21 ring when you refer to the transmission of 22 lightwaves guided through the ring and also which

Page 433 1 enable, quote, light to pass through the internal 2 housing components. 3 So just to be clear, are you proposing 4 here that that light guiding portion is part of 5 your Schr der LeBoeuf combination, or are you not? 6 A. So in this situation, the light guiding 7 material is bringing the light from the emitter to 8 the window, but the window is providing the 9 transmissive material. The light guiding material 10 also has to be light transmitting, but the window 11 is allowing it to pass in and out of the inner body 12 portion. 13 Q. Okay. So is it fair to say you're just 14 relying on LeBoeuf for the teachings of the window? 15 A. And the window with the optical 16 properties. 17 Q. Okay. You label a portion of this 18 annotated LeBoeuf on page 118, you label it the 19 "internal housing component"? 20 A. Yes. 21 Q. That's not touching the finger, is it? 22 A. It should have incorporated the piece	Page 434 1 that's touching the finger, the place where the 2 windows are. 3 Q. Does the light -- is the light guiding 4 region filled with air or some other medium? 5 A. So in this case, this is described as 6 being a soft, light transmissive material made in 7 soft resilient material such as silicone. 8 Q. I'm sorry. Where are you reading that? 9 A. Paragraph 185. 10 Q. Claims 2 and -- well, claim 2 talks about 11 modifying one or more wavelengths and claim 3 talks 12 about altering one or more optical properties of 13 the light. And the -- again, referring only to the 14 vein pattern matching application in Schr der, 15 would you want to do either of those things to 16 accomplish vein pattern matching? 17 A. I'm sorry. Would you want to either one 18 of which things? Could you repeat. 19 Q. The modifying of wavelengths on claim 2 or 20 the altering of optical properties in claim 3. 21 A. Well, in isolation, for example, if you 22 had a broadband LED and you wanted to get a
Page 435 1 preferred single wavelength higher resolution image 2 of the vein images -- of the vein, beneficial to 3 have a narrower wavelength band so that you don't 4 have as much distortion or as much spatial 5 distortion from a broad wavelength band. 6 So certainly in isolation it would be 7 beneficially used to have a narrow band of light to 8 help with increased resolution of the vein image. 9 Q. Can you just get a source that generates 10 that band of appropriate wavelengths? 11 A. Design trade-offs. Narrow band LEDs are 12 more expensive often than a wide band. So you can 13 get a white LED and use a window design trade-offs, 14 but certainly a POSITA would understand to use a 15 window to beneficially achieve that. 16 Q. In the sole context of Schr der's vein 17 matching, you would use a window to modify the 18 wavelengths of the infrared detector? 19 A. You would potentially use -- just in 20 Schr der in isolation, which is not what I'm 21 discussing here. But in Schr der you could, for 22 example, use a broader band LED and filter it with	Page 436 1 the window to ensure that the light coming back was 2 a narrower band. 3 Q. Well, the light's already in an infrared 4 band, isn't it? 5 A. But there's still a band, so you can 6 control the width of the band depending on the 7 filtering properties of the window. 8 Q. So your testimony that it's -- that a 9 narrower band LED would be more expensive to 10 accomplish that goal than putting a window in the 11 ring. 12 A. That wasn't the question you asked. But 13 would it be beneficial, would a POSITA know how to 14 consider the design trade-offs between combination 15 of LED and detector and windows in order just in 16 Schr der in isolation, which is not what I was 17 considering, but would understand that a window 18 could beneficially be used to either -- to narrow 19 the band of the light that is being used to image 20 the band. 21 Q. And, again, same question with respect to 22 claim 6, which is discussed in your paragraph 189.

Page 437 1 Would there be any reason to use a tinted material 2 in the context of using infrared for vein pattern 3 matching? 4 A. Again, I was not considering Schr der in 5 isolation, but certainly having, as I describe 6 here, a tint to prevent being able to see what's 7 going on inside would be a design consideration, as 8 one example. 9 For aesthetic purposes, I highlight the 10 bottom of the paragraph, tints manage broad 11 spectrum light for aesthetic purposes providing 12 general light control through uniform coloration. 13 So the aesthetic benefits would also be beneficial 14 if -- even with Schr der in isolation. 15 Q. And I will take a break after I just 16 finish this line of questioning. What would tint 17 do to the infrared nature of the LED? 18 A. That depends on the tinting. And if you 19 want to accomplish, for example, in the 20 hypothetical, just an aesthetic purpose, you could 21 use a tint that didn't impact the IR but only 22 impacted the visible.	Page 438 1 So that, for example, a person couldn't 2 see into the ring to understand how it was 3 constructed, for example, or how to be more 4 elegant, aesthetically pleasing. 5 Q. So one of the possibilities you just 6 mentioned was so a person couldn't see into the 7 ring. Do you mean so that they couldn't -- so you 8 could keep the functionality or components of the 9 ring hidden from the external environment? 10 A. As one example, yes. So the person 11 looking at the ring would not be able to see inside 12 the ring. 13 MR. SCHULTZ: All right. Let's take a 14 break. 15 THE VIDEOGRAPHER: Time is 4:27. We're 16 off the record. 17 (Proceedings interrupted at 4:27 p.m. and 18 reconvened at 4:45 p.m.) 19 THE VIDEOGRAPHER: We are back on the 20 record. The time is 4:45. 21 BY MR. SCHULTZ: 22 Q. Could you turn to paragraph 192 of your
Page 439 1 declaration, please. You refer to in this 2 paragraph the light guide region, again, of 3 LeBoeuf. 4 A. You said paragraph 192? 5 Q. I did say 192, I hope. 6 Now, I believe you said previously that 7 you weren't necessarily relying on the light 8 guiding region of LeBoeuf in your Schr der LeBoeuf 9 combination? 10 A. We were talking about the windows back 11 there. 12 Q. Right. 13 So in this claim are you relying on 14 modifying Schr der to include the light guiding 15 region as well as the transmissive material that 16 you refer to here in paragraph 192? 17 A. Right. So as I describe here, a POSITA, 18 in the combination Schr der and LeBoeuf in 19 paragraph 192, the light transmissive material, 20 contacts and covers optical emitter 24, optical 21 detector 26, and optical noise detector 26 prime as 22 shown in Figure 22.	Page 440 1 The light transmissive material serves as 2 a light guide to deliver light from the light 3 emitter to the finger and back to the light 4 detector. The light guide region is also referred 5 to as a cover that serves as a light guide that 6 delivers light. 7 A POSITA would have understood the 8 transmissive material, which serves as a light 9 guide, would contact and cover the optical emitter 10 and optical detector to avoid unnecessary internal 11 reflections caused by optical index discontinuities 12 at the interfaces with light guiding region 19 13 ensuring optimal light transmission and detection 14 by minimizing losses and distortions that could 15 occur due to mismatched optical indices. 16 Q. So in this case with respect to claim 8, 17 you're incorporating the teachings of LeBoeuf -- 18 LeBoeuf's light guiding region and window into 19 Schr der, correct? 20 A. The teachings of LeBoeuf include the light 21 guiding material which covers and is on top of the 22 optical components and provides a guiding function

Page 441 1 to the windows, yes. 2 Q. Where would you put the light guiding 3 region in the structure of Schr der? 4 A. Well, a POSITA would in the combination, 5 would use a light guiding material to guide the 6 light from wherever the LEDs are to the window and 7 back to the detector. So there would be the 8 connecting at least physically between the emitter 9 and window and detector. 10 Q. So would it be in the inlay of Schr der, 11 the light -- 12 A. It would be in the recess between the -- 13 it could be in the recess. It could also be I 14 think the -- if I recall -- hold on one second. I 15 think the external -- this is 72. 16 Right. So in this case, the internal 17 housing component would be partially comprised of 18 the light guiding material in order to guide the 19 light from the LED through the window to the tissue 20 and back. 21 Q. So just to make sure I understand this, in 22 the context of Figure 7 of Schr der, which you are	Page 442 1 relying on, I believe -- 2 A. In the combination, LeBoeuf Schr der 3 combination, LeBoeuf teaches an internal housing 4 that's also partially consisting of the component 5 comprising a substantially transparent material. 6 So that internal has both a rigid structure 7 potentially and substantially transparent material 8 as described in Figure 22B, for example. 9 Q. So in terms of Schr der, if you look at 10 Figure 7, that would be in -- in your modification 11 or your proposed combination, that would be in ring 12 half 16? 13 A. The inner ring. 14 Q. Inner ring half? 15 A. Yeah. 16 Q. Okay. And a POSITA would know how to do 17 that? 18 A. Yes. As taught, at least, by LeBoeuf. 19 Q. That would be a complete redesign of the 20 ring of Schr der, wouldn't it? 21 MR. KAPPOS: Object to form. 22 A. Well, I propose here a combination
Page 443 1 combining the teachings of Schr der and LeBoeuf. 2 So certainly within the skill of a POSITA. 3 Q. I eschew going backwards, but in 4 paragraph -- of the same section, at the end of 5 paragraph 190 you say, a POSITA would have 6 understood that Schr der's window contacts and 7 covers the infrared diode and sensor. Schr der 8 doesn't say that. 9 Is it your testimony a POSITA would 10 somehow understand that? 11 A. In Schr der in isolation here as I 12 describe, so Schr der's finger ring includes the 13 transparent regions incorporated into the internal 14 housing component, as we discussed previously, to 15 allow the vein image to be captured. And so that 16 window, that transparent region would be covering 17 the infrared diode and sensor so the light could be 18 transmitted from the diode to the tissue and then 19 back to the sensor. 20 Q. And you said the window contacts, the 21 infrared diode. Why does it have to contact it? 22 A. The benefits to contact in order to avoid	Page 444 1 internal reflections between the components. 2 Certainly the POSITA would consider design 3 trade-offs to include the situation where it's 4 beneficial to make contact and have the window be 5 able to contact and cover. 6 Q. You mentioned trade-offs. Are there 7 advantages to not contacting? 8 A. There may be design trade-offs when 9 considering everything, but there's a strong 10 benefit to have a contact to avoid internal 11 reflections, for example. 12 Q. So looking at your annotated Figure 22B in 13 paragraph 191, the LED shown in LeBoeuf doesn't 14 contact the window, does it? 15 A. Well, in the proposed combination that 16 would include LeBoeuf's teaching, you have the -- 17 what's required is the substantially transparent 18 material contacts and covers. The -- in the 19 situation if we were to have just a window, that 20 would be beneficially made direct contact. It 21 would both cover, make contact. 22 And in the situation where there were

Page 445 1 beneficially, due to arrangements, incorporating 2 the light guide, it would be a substantially 3 transparent material to make the physical 4 connection. Another way to eliminate internal 5 reflections between things that are going through 6 air with significant index changes. 7 And so the internal transparent material 8 light guide and window are covering the LED in the 9 proposed combination. 10 Q. Could you turn to paragraph 193, please. 11 And you're talking about claim 9 here, which talks 12 about a first and second light-emitting component. 13 Do you see that? 14 A. Yes. 15 Q. And in the body of paragraph 193 you talk 16 about Schr der's finger ring includes a -- and it's 17 about halfway down on page 126, includes a 18 biometric sensor with at least one infrared diode 19 and at least one infrared sensor and further 20 light-emitting diode for indicating different 21 operating modes. 22 My question is, with respect to that	Page 446 1 further light-emitting diode for indicating 2 different modes, that's a visual indication to the 3 wearer, correct? 4 A. Yes. And that is described in Schr der. 5 What I'm proposing is a Schr der LeBoeuf 6 combination that would have the biometric sensor 7 with at least one infrared diode and at least one 8 infrared sensor. 9 Q. You're not relying on this further 10 light-emitting diode as being one of the 11 light-emitting components in claim 9, are you? 12 A. No. 13 Q. At the end of paragraph 193 you say, Doing 14 so in part will enable the ring to assess multiple 15 biological parameters. 16 Do you see that? 17 A. Yes. 18 Q. Again, Schr der in isolation doesn't talk 19 about assessing multiple biological parameters, 20 does he? 21 A. And, again, I'm not opining about Schr der 22 in isolation, but the Schr der LeBoeuf combination
Page 447 1 where multiple biological parameters such as PPG, 2 pulse ox would be enabled by multiple wavelengths. 3 Q. Just to make your answer clear, and I 4 asked you to confirm Schr der in isolation does not 5 talk about assessing multiple biological 6 parameters, and you agree that he does not? 7 A. It talks about biometric identification, 8 but I'm not opining here about Schr der in 9 isolation. 10 Q. Okay. But that doesn't -- I know you're 11 not opining about it, but you can confirm that 12 Schr der in isolation -- 13 A. Yes, I confirm it. Sorry. Yes. 14 Q. Thank you. 15 In paragraph 200, which is a long 16 paragraph of your declaration, you talk about a 17 number of reasons you'd have multiple light 18 emitters in this paragraph; is that right? 19 A. LeBoeuf's ring could include several 20 light-emitting elements, optical detectors, 21 additional light emitters. A POSITA would have 22 understood having a wearable biometric sensing	Page 448 1 device that includes multiple light emitters and 2 detectors is beneficial to provide accurate 3 real-time information. 4 So yes, I talked about the reasons for why 5 that would be helpful for both improving 6 signal-to-noise ratio. That's one example. 7 Q. Does Niwa, Schr der, or LeBoeuf -- and 8 obviously we can't read them all now, but do you 9 recall whether any of those references discuss the 10 reason you discussed here improving redundancy by 11 using multiple LEDs? 12 A. Multiple references discuss the importance 13 of signal-to-noise ratio using multiple -- for 14 example, improving signal quality when somebody is 15 moving fast. So I'm happy to go back into the 16 references. But yes, certainly signal-to-noise 17 ratios without a doubt -- 18 Q. Okay. I was asking about -- I was just 19 asking about redundancy, not signal-to-noise ratio. 20 And if you don't know off the top of your head, you 21 don't need to look through all of them now. 22 A. I don't recall off the top of my head.

Page 449 1 Q. Okay. Thank you. 2 A. But as I was describing here, it's the 3 knowledge of a POSITA would absolutely understand 4 the benefit of doing so. 5 Q. The next sentence you say that if a light 6 emitter -- 7 A. Next sentence where? 8 Q. I'm sorry. After you talk about 9 redundancy, which is at the bottom of page 131, you 10 talk about if one light emitter fails, looses 11 contact with the skin, or is occluded by a mole, 12 scar, or other skin irregularities, the remaining 13 light emitters can continue to function. 14 This -- skin irregularities, is that -- 15 off the top of your head, is that disclosed in any 16 of Niwa, Schr der, or LeBoeuf? 17 A. What's described is imaging through the 18 skin. The POSITA understands that there's 19 variability in the skin so -- and the benefit of 20 having good contact to the skin, so it's 21 certainly -- POSITA reading any of the references 22 would understand the benefit of providing and	Page 450 1 dealing with variability in humanity, in the human 2 skin, both for an individual and for a population. 3 Q. So you're not citing to any of the 4 references in any of -- from where we were just 5 talking about on page 132 and 133. So is it fair 6 to say these reasons that you're giving are within 7 the knowledge of -- in your opinion, within the 8 knowledge of a POSITA but not specifically 9 mentioned in these references? 10 A. Well, without a doubt they are -- without 11 a doubt, in the knowledge of a POSITA. And using 12 multiple LEDs are described in various places, but 13 without a doubt, all these things are absolutely 14 within the knowledge of a POSITA. 15 Q. If they were discussed in the references, 16 you would have cited to the references, wouldn't 17 you? 18 MR. KAPPOS: Object to form. 19 A. I've certainly made mistakes and 20 oversights in my declaration, as we've pointed out. 21 So I probably would have, but I may have missed 22 them as well. But certainly the knowledge of a
Page 451 1 POSITA is well articulated here. 2 Q. So in the -- you have Schr der LeBoeuf 3 Niwa combination or Dependent Claims 8 through 11 4 and on page 135 you have annotated picture of Niwa, 5 Figure 27. 6 Do you see that? 7 A. Yes. 8 Q. So does the Schr der LeBoeuf Niwa 9 combination, does that use the light guiding region 10 of LeBoeuf? 11 A. So as I describe in paragraph 202, 12 Schr der LeBoeuf teach internal housing component 13 coupled to the PCB such that the substantially 14 transparent material contacts and covers the one or 15 more light-emitting components and the one or more 16 light-receiving components, so indeed combining the 17 teachings of Schr der, LeBoeuf and Niwa. 18 Q. Where's the light guiding region in 19 Figure 27 of your annotated version of Niwa? 20 A. Well, as I explained previously, you know, 21 here we have the window making contact directly 22 with the light sensor. So that serves both as the	Page 452 1 window and the light-guiding material in isolation. 2 Q. So the light guiding would not have -- the 3 transmissive material that was shown in LeBoeuf you 4 said was silicone? 5 A. Well, you asked specifically about 6 Figure 27, and then Figure 27 asked me to point out 7 where the material was, and that's the light 8 transmissive material in isolation in 27. The 9 measurement window is making contact and would be 10 the window and transmissive material. 11 In combination, the housing component 12 would include the transmissive -- partially be 13 comprised of the transmissive material and make 14 contact. Variance and design choices would dictate 15 how that all went together. 16 Q. On the bottom of page 136 you talk about 17 when light transitions between materials with 18 different refractive indices such as from an LED to 19 air and then air back to the window. Substantial 20 changes in the index of refraction can introduce 21 internal reflections. 22 MR. SCHULTZ: Strike that.

Page 453 1 Q. So Niwa's teaching that you have a -- as 2 shown in, again, your annotated Figure 27, Niwa is 3 teaching -- 4 A. Page 135? 5 Q. Yes, page 135. 6 -- that his -- the measurement window and 7 the light sensor are abutting one another in Niwa? 8 A. In Niwa, yeah, that's what's depicted 9 there. 10 Q. That's a different construction than 11 LeBoeuf where the light-emitting portion is spaced 12 from the window within intervening transmission 13 material, isn't it? 14 A. Correct. And I'm proposing the 15 combination that would substantially comprise the 16 housing component with light-emitting -- light 17 transmissive material and have a window as well. 18 Q. Can you go to paragraph 215, please. 19 A. 2-1-5? 20 Q. Yeah. We talked about a similar paragraph 21 in the other case before -- in your other 22 declaration, but I have a slightly different	Page 454 1 question. 2 You again talk about miniaturization here. 3 You say, as miniaturization of electronic -- and 4 this is the top of page 144. As miniaturization of 5 electronic components improved, a POSITA would have 6 found it trivial to implement Mestas's teachings 7 into a ring form like that of Schr der's finger 8 ring. 9 When you say, "as miniaturization of 10 electronic components improved," you're referring 11 to the miniaturization of components that occurs 12 over time; is that fair? 13 A. Well, to be sort of -- at the time of 14 2013, POSITA would have been familiar with the 15 miniaturized electronic components that were 16 available and found it trivial. The improved is 17 superfluous to the point I'm trying to make here. 18 Miniaturization of electronic components, 19 a POSITA would have found it trivial to implement 20 with the electronic components available in circa 21 2013. 22 Q. I'm just trying to isolate this statement
Page 455 1 you're making. It's true, is it not, that 2 components do over time or can over time 3 miniaturize? 4 A. Certainly. Over time components can be 5 shrunk and miniaturized, yes. 6 Q. And that can be over the course of years, 7 correct? 8 A. Correct. But certainly as of 2013, you 9 know, the available miniaturized -- the available 10 electronic components would be miniature enough to 11 enable the POSITA to implement the teachings. 12 Q. Okay. In paragraph 216, what -- 13 specifically, I have a question with respect to 14 your use of the term "market forces" there. What 15 market forces are you referring to? 16 A. Including small devices, cost sensitive 17 devices, aesthetically pleasing devices, 18 comfortable form factor devices that would be 19 compact and include, for example, device containing 20 curved batteries. 21 Q. So in your view, the market calls for such 22 attributes in a product that you just mentioned?	Page 456 1 A. Well, people would like a reasonable sort 2 of useful device at a reasonable price point, 3 reasonable appearance. So POSITA would have 4 certainly market motivations and technical 5 motivations to combine the teachings as I 6 described. 7 Q. So the consumer market has a need for such 8 devices, correct? 9 MR. KAPPOS: Objection to form. 10 A. Well, design incentives and market forces 11 would motivate a POSITA to combine the teachings 12 and the wearable finger ring containing curved 13 batteries. 14 Q. And market forces refers to the -- in this 15 context the consumer market? 16 A. The customer that is going to be buying 17 the device, yes. 18 Q. They want these features that you 19 mentioned in a wearable ring device, correct? 20 A. It's one of the motivations that a POSITA 21 would use to be motivated to, for example, have a 22 curved battery in a small form factor.

Page 457 1 Q. Could you go to paragraph 218. You state 2 that a POSITA would have been motivated to mount a 3 curved battery on the printed circuit board as 4 taught in Mestas and electrically couple it to the 5 components in Schr der for the reasons discussed 6 above, including for the benefit of having a 7 somewhat larger battery. 8 You're drawing a comparison to something 9 there by saying "somewhat larger battery." What do 10 you mean by that? And I'll follow-up. Do you mean 11 larger than the battery disclosed in Schr der? 12 A. Well, I think what I'm referring to when 13 we discuss above, having the battery be curved 14 allows it to fit more optimally within the 15 structure as opposed to something that was 16 constrained to only be flat, for example. So you 17 could more optimally use the space available to 18 have a larger battery than if you didn't have it 19 curved. 20 Q. Okay. I understand. 21 You're saying that the nature of a 22 curved -- the shape of a curved battery allows you,	Page 458 1 in this context, to have a larger battery than you 2 otherwise would with a flat battery? 3 A. Correct. 4 Q. Paragraph 220, and you're talking about 5 claim 17 where you say the curved battery comprises 6 an arc -- the claim says the curved battery 7 comprises an arc that approximates an arc of the 8 cavity. 9 You would agree with me, would you not, 10 again, talking about Mestas in isolation, which is 11 a wrist-worn device, the arc of the batteries in 12 Mestas would not by themselves as they are 13 disclosed in Mestas match the arc of a ring, would 14 they? 15 A. Well, what's described here is -- let's 16 see. So what I'm describing is the combination of 17 Schr der and Mestas. 18 Q. I understand that. 19 A. And Schr der -- or sorry, Mestas by itself 20 is also describing a made battery in a curved form, 21 but in the combination that battery in the ring 22 form would be following the arc of the cavity.
Page 459 1 Q. Right. 2 But in Mestas alone in isolation, the arc 3 of Mestas batteries follows the arc of essentially 4 your wrist, correct? 5 A. Follows the arc of the cavity for the 6 battery. 7 Q. For a bracelet? 8 A. Or the other places that Mestas 9 considered applying the teachings. 10 Q. And the arc of a bracelet is different 11 from the arc of a ring, correct? 12 A. Not necessarily, no. I mean, arcs are 13 described as they're radial sections. So the 14 data -- or an angle of 30 degrees at a radius of 10 15 miles is still an angle of 30 degrees at a radius 16 of a millimeter. 17 MR. SCHULTZ: Let me just take a break and 18 see if I have anything else. 19 THE VIDEOGRAPHER: Time is 5:26. We're 20 off the record. 21 (Proceedings interrupted at 5:26 p.m. and 22 reconvened at 5:30 p.m.)	Page 460 1 THE VIDEOGRAPHER: We are back on the 2 record. The time is 5:30. 3 BY MR. SCHULTZ: 4 Q. In paragraph -- can we look at your 5 annotation in paragraph 233? 6 A. I'm sorry. Paragraph 233? 7 Q. Yes. 8 A. Okay. 9 Q. At the bottom -- 10 A. Page 160? 11 Q. Page 161. 12 A. Okay. 13 Q. So you have an annotation of LeBoeuf, 14 Figure 22B here, correct? 15 A. Yes. 16 Q. And LeBoeuf discloses a base 50, which you 17 label? 18 A. Yes. 19 Q. And your opinion is that base 50 is a 20 circuit board? 21 A. Yeah. Base 50 may be a flexible printed 22 circuit board.

Page 461 1 Q. And is that base located in the outer ring 2 of LeBoeuf? 3 A. So in LeBoeuf, as I've labeled it here, 4 it's in the external housing component. 5 Q. So as disclosed by LeBoeuf, the base is 6 rectangular and planar, correct? 7 A. Well, it's also envisioned as being a 8 flexible printed circuit board and existing in the 9 cavity defined by the internal housing component 10 and the external housing component. 11 Q. Okay. Can you answer my original 12 question, though? In LeBoeuf in Figure 22B, it's 13 shown as a planar rectangular body; is that right? 14 A. In Figure 22B it's shown as a -- 15 schematically as a rectangle. It doesn't mean it's 16 not a flexible rectangle, though. 17 Q. Well, just because you're flexible doesn't 18 mean you're not planar, does it? 19 A. No. You can be flexible and planar. 20 Q. And in Figure 22B that you've annotated, 21 you've extended that base around the circumference 22 of the ring of LeBoeuf?	Page 462 1 A. Well, what's shown there is sort of 2 annotated as the base following more of the 3 curvature of the ring, yes. 4 Q. So that's not something LeBoeuf discloses. 5 That's something you wrote in your annotation or 6 something you marked up in your annotation, 7 correct? 8 A. I've annotated 22B prime, and the POSITA 9 would have understood that LeBoeuf base 50 has a 10 flex printed circuit board disposed between the 11 internal and external housing component as 12 electronic components arranged. 13 Although base 50 is depicted as 14 rectilinear in the figures, a POSITA would also 15 have understood the cavity defined by the circular 16 inner and outer body portions of LeBoeuf is curved 17 to provide, and thus, the flexible printed circuit 18 disposed within the cavity would be curved to 19 conform with the shape of the cavity. 20 Q. I see you've annotated LeBoeuf to include 21 a base that conforms to the shape of the cavity as 22 recited in the claim, correct?
Page 463 1 A. No. I think what I've done here is 2 annotated what another POSITA reading LeBoeuf would 3 understand as a design variant. 4 Q. So just to be clear, in paragraph 236 you 5 talk about Schr der with respect to the same claim. 6 And my question is, are you relying on Schr der or 7 LeBoeuf's teaching to meet this claim or some 8 combination of them? 9 A. So what I'm discussing here is the 10 combination, and Schr der's figure ring starting in 11 paragraph 235. Similarly, LeBoeuf Schr der's 12 finger ring printed circuit board also is 13 configured to conform to an arc within the cavity. 14 And Schr der's finger ring includes the external 15 housing component 18 that extends and connects to 16 internal housing component 16. The internal and 17 external housing components are U-shaped that 18 define a cavity such that the recess in to which 19 the inlay is inserted. 20 And then the inlay 12 in paragraph 236 21 consists of a flexible carrier material, and the 22 combination like PET or Kapton, but materials that	Page 464 1 are understood to be printed circuit board 2 materials. 3 And as shown in Figure 4, which was 4 discussed yesterday, should have been a modified 5 Figure 4 that has the 18 on the outside and then 6 the 16 on the inside, the inlay would be configured 7 to conform to an arc within the cavity. 8 Q. Okay. So I'm still not clear, based on 9 that explanation, which reference you're relying on 10 to meet this limitation since you talk about 11 LeBoeuf in 233 and 234 and then you modify LeBoeuf 12 in 22B prime. And then you talk about Schr der 13 disclosing a flexible carrier in 236. So I'm not 14 clear what you're -- which combination is -- 15 A. The combination is LeBoeuf and Schr der, 16 and I've talked about the teachings of both, and 17 highlight both how a POSITA in the combination and 18 in the annotated Figure 22B. 19 And also, when I lead with paragraph 235, 20 similarly the LeBoeuf Schr der finger ring printed 21 circuit board is conformed to an arc within the 22 cavity and highlighting in that case how it would

Page 465 1 look in one annotating Figure 4 of Schr der. 2 Q. So Figure 4 of Schr der to use LeBoeuf's 3 printed circuit board? 4 A. Again, it's not a -- combining the 5 teachings. It's not just the copy and paste of the 6 circuit board from one to the other, but as I 7 described in the combination, it would sit in the 8 internal housing component as -- it would sit in 9 the Figure 4 in between the external housing 10 component and internal housing component as in the 11 Figure 4, which should be a modified Figure 4. 12 Q. Okay. So LeBoeuf's -- you're using the 13 teaching of LeBoeuf's printed circuit board, and 14 you're applying those to the inlay in Schr der? 15 A. Schr der also teaches a flexible circuit 16 board, so there's a flexible carrier material and 17 flexible circuit board envisioned in Schr der as 18 well. 19 Q. Okay. Just a couple questions on a 20 slightly different topic. Are you familiar with 21 the term "potting material" as it's used in the 22 patents at issue?	Page 466 1 A. Yes. And I think I described a whole 2 section on that in the various background 3 materials. 4 Q. What would a POSITA understand to be meant 5 by "potting material" in this -- in the context of 6 these patents? 7 A. So, for example, in the page 54 of the 702 8 declaration, describe molding for material or 9 potting material that cover electronics was known 10 including the motivations for doing so. 11 Q. Okay. My question was more not what it 12 was used for but what is it in terms of potting 13 material? 14 A. Material that would fill a space and 15 starts out generally liquid and then cures and 16 covering, providing electrical or thermal or 17 mechanical strength. 18 Q. And the term "internal potting material" 19 is also used in the patents at issue. Does that 20 have any special definition as far as you're 21 concerned? 22 A. I know I do discuss that at some point in
Page 467 1 the declaration. 2 Q. Is it fair to say that internal potting 3 material is potting material, as you've described 4 it, that forms the inner part of the ring? 5 A. Well, it's -- as I describe here in 6 talking about the 702, the internal housing 7 component -- it has an internal housing component 8 comprising a substantially transparent material 9 that could be constructed with potting material. 10 Q. So in that context, the potting material 11 could form the internal housing component? 12 MR. KAPPOS: Object to form. 13 A. Comprise it in part. 14 Q. I didn't mean to interrupt you if you had 15 something further to add about -- 16 A. No. 17 Q. -- internal potting material. 18 A. No. Actually, I forget now the question. 19 Q. Well, you had provided a perfectly fine 20 definition of potting material, and I asked you if 21 there's -- the term internal potting material is 22 used in the patent, and does that have any meaning	Page 468 1 to you? 2 A. If you can just highlight for expediency 3 where you want me to refer. 4 Q. Yeah. I have the '178 patent up, and in 5 the first place it's mentioned in column 2, line 45 6 of the '178. 7 A. Line what? 8 Q. 45. 9 A. So in one example, the internal housing 10 portion comprises a substantially transparent 11 internal potting which, as I described using the 12 LeBoeuf combination, was in the art in forming part 13 of the internal housing component partially 14 comprised of transparent -- partially, that's the 15 '178. I'm getting patents mixed up now. 16 Q. Promise we're almost done. 17 A. That's all good. Just getting them mixed 18 up. 19 MR. KAPPOS: We're over seven hours now. 20 We need to finish up. 21 A. So you pointed to the specification in 22 '178, but it's the same specification in '702. In

Page 469 1 '702 the internal housing component is -- wherein 2 the internal housing component comprises a 3 substantially transparent material that enables 4 light to pass through. And as I described in 5 LeBoeuf, potting -- the light guide being formed 6 from transparent potting material. 7 Q. So in Figure 13 of the '702, you see item 8 314? 9 A. Item 314, yes. 10 Q. The patent says that's internal potting 11 material. Does that form the internal housing 12 component? 13 MR. KAPPOS: Object to form. 14 A. Well, what's claimed is the internal 15 housing being partially comprised of a 16 substantially material -- the transparent material. 17 So transparent material would be used to partially 18 comprise the -- 19 Q. I'm sorry. What claim are you reading? 20 A. Claim 1 of the '702. Internal housing 21 component coupled to external housing component. 22 The internal housing component defining inner	Page 470 1 circumferential surface of the finger worn wearable 2 ring device wherein the internal housing component 3 comprises a substantially transparent material that 4 enables light to pass through the internal housing 5 component. 6 Q. With that understanding, is item 314 in 7 Figure 13 the internal housing component? 8 A. Can you point to me where in my 9 declaration I talk about Figure 13? 10 Q. I don't know if you do. You've read the 11 patent, so... 12 A. I have, but just wanted to see whether I 13 opined about it. 14 Q. I don't think you have referred to it in 15 your declaration. And just for your benefit, 16 Figure 13 has referred to column 18, line 63. I'm 17 sorry. I'm referring to the '178, by the way. 18 I'll give you the '172 if I have it. 19 A. What was the -- what number? I have the 20 '178. 21 Q. You have the '178. Okay. Column 18, line 22 63.
Page 471 1 A. So this is a situation where there's 2 internal housing -- external housing and internal 3 potting. 4 Q. And my question is, in the context of what 5 you just read in claim 1, is item 314 the internal 6 housing component? 7 MR. KAPPOS: Object to form. 8 A. There's an external housing 312 and 9 internal potting or encapsulant that is not 10 described as internal housing. It's described as 11 internal potting. In the context of the patent, 12 it's partially comprising. It seems as if that 13 construction is all potting, which would not be 14 what's claimed. 15 Q. Is it performing a function of the 16 internal housing component here? 17 A. Well, the internal housing component is 18 different when partially -- than something that is 19 purely internal potting or encapsulant. I don't 20 opine upon internal potting by itself serving as 21 anything other than internal potting. 22 Q. Okay. 314 is internal potting, according	Page 472 1 to the patent, right? 2 A. Yeah. Internal potting, but that is not 3 housing and partially comprised of internal 4 potting. That's just internal potting. 5 Q. Okay. So I guess that's my question -- 6 that was my original question five minutes ago, 7 which was, what's your understanding of what 8 internal potting is? 9 A. Well, in this case, referring to 10 Figure 13, what's described there as -- is internal 11 potting, that is potting or encapsulant. The 12 internal potting 13, 14 conceal the partially 13 enclosed internal space of 13, 20. So it's serving 14 a purpose of sealing as described there in column 15 19, but it's different than a partially comprised 16 external -- sorry -- internal housing. 17 MR. KAPPOS: Counsel, you're now at ten 18 minutes over the seven-hour limit. 19 MR. SCHULTZ: I'm also entitled to three 20 days, so I'm not asking for that. 21 Q. I'm just curious about your point you're 22 making in claim 1.

Page 473 1 A. Claim 1 of -- I'm sorry -- which patent? 2 Q. Of the '702. 3 It says, the internal housing component 4 comprises a substantially transparent material. 5 A. Yes. 6 Q. So you're saying that means the internal 7 housing can't be potting material? 8 A. It's in this -- what's described here, 9 internal housing component comprises. So it's in 10 part conformed of a substantially transparent 11 material, which could be potting. 12 Q. Okay. So in this claim the internal 13 housing component could be potting material? 14 MR. KAPPOS: Object to form. 15 Q. In your opinion? 16 A. In my opinion, what's described in claim 1 17 is an internal housing component comprising -- 18 comprises a substantially transparent material but 19 not just potting material or not just the potting 20 material, as you're trying to point to in the two. 21 Q. Okay. Is it your understanding that 22 comprises means that what's listed after comprising	Page 474 1 has to include something else? 2 A. Well, I was not opining around -- about 3 whether 13 was a -- it was described as external 4 housing, internal potting, then what's described as 5 internal -- internal -- what's described as 6 internal housing, external potting, and then inner 7 and outer bands. And the bands are the things that 8 are discussed as the housing components. Potting 9 material I don't believe was described as being the 10 housing component. 11 Q. Okay. I'm more curious about your 12 interpretation of the word "comprising" that you 13 just told me. Back to that claim wherein the 14 internal housing component comprises a 15 substantially transparent material. 16 Is it your testimony that that means if 17 the internal housing component includes a hundred 18 percent substantially transparent material, that 19 that can't be true? 20 MR. KAPPOS: Object to form. 21 A. It needs to be substantially a transparent 22 material. I was not opining around -- on that
Page 475 1 figure that you point as to whether it is a housing 2 component. 3 Q. But you agree with me that if the internal 4 housing component is comprised 100 percent of 5 substantially transparent material, it's still 6 comprised of substantially transparent material 7 according to the claim, right? That's what the 8 word "comprising" means. 9 A. So what's described there is a housing 10 that includes an external -- I'm sorry. Column 18 11 of the '178, line 65. In this example, the WCD 12 includes a housing that includes an external 13 housing and an internal potting or encapsulate. 14 I believe if they intended that to be 15 described as a housing, they would have describe it 16 as a housing that was partially comprised of the 17 internal potting. 18 Q. So in Figure 13, item 314 is not a 19 housing; is that your testimony? 20 A. It's described as internal potting or 21 encapsulant. And in the context of the patent, if 22 it were intended to be described as internal	Page 476 1 housing, I think it would have been described as -- 2 in the claim as an internal housing partially 3 comprised. It would be quite explicit that's 4 what's described here in describing '314. It's 5 internal potting or encapsulant. 6 Q. So you interpret the word "comprising" in 7 a claim as partially comprising? 8 A. You asked me how a POSITA would -- or how 9 I read this and how I'm reading it. How I 10 interpret what is being described here is that 13, 11 14 is internal potting or encapsulant. 12 In the context of the patent, I believe 13 they would have described it as if it were intended 14 to be the housing, as housing partially comprised 15 of, and describe it as housing instead of just 16 potting or encapsulant. 17 MR. SCHULTZ: I have no further questions. 18 MR. KAPPOS: I have a few questions. 19 EXAMINATION 20 BY MR. KAPPOS: 21 Q. Dr. Anthony, do you recall earlier, just a 22 short while ago, there was quite an extensive

Page 477 1 discussion of Schr der in view of LeBoeuf? 2 A. Yes. 3 Q. And you were looking in your declaration 4 on the '702 patent at, I believe, paragraphs 187 5 and a number of paragraphs after that, but let's 6 start with 187. 7 A. Yes. 8 Q. And the second sentence says, as discussed 9 above, LeBoeuf's windows 74W alone or together with 10 the light guiding region are a light transmissive 11 material that delivers light through the inner body 12 portion. 13 Do you see that? 14 A. Yes. 15 Q. And then on the next page in paragraph 16 188, again you say about four lines down, LeBoeuf's 17 windows alone or together with the light guiding 18 region are configured to alter one or more optical 19 properties of the light that passes through the 20 internal housing component. 21 Do you see that? 22 A. Yes.	Page 478 1 Q. And then again in paragraph 189, four 2 lines down there's a sentence that reads, As I 3 discussed in section 9 (b)(2)(a) claim 2, windows 4 74W alone or together with the light guiding region 5 may include optical filters to selectively pass one 6 or more optical wavelengths and reflect and/or 7 absorb other optical wavelengths. 8 Do you see that? 9 A. Yes. 10 Q. So looking at that description, does that 11 refresh your recollection on whether you rely on 12 the light guiding regions from LeBoeuf in the 13 combination with Schr der? 14 A. The windows alone I think, as I did 15 articulate, but maybe not clearly, can satisfy the 16 limitation. 17 Q. You were asked a number of questions 18 earlier today about the relative dimensions of 19 batteries in bracelets versus in rings and how many 20 times -- by how many factors you would need to 21 scale to go from one to the other. 22 Do you recall that?
Page 479 1 A. Yes. 2 Q. What is your understanding as to whether 3 any of the figures in the patents that you've 4 looked at today, Mestas, Schr der, Niwa, Yuen, et 5 cetera, are drawn to scale? 6 A. They are not drawn to scale. 7 Q. Okay. I'd like to direct you to the 8 Schr der patent, which I think has been entered as 9 Exhibit 2. Can you take a look at Schr der? 10 A. Yes. 11 Q. And yesterday there was quite a bit of 12 discussion in Schr der with respect to Figures 6 to 13 10. I'll let you get to those figures. 14 A. Yes. 15 Q. So what's the right way to think about 16 Figures 6 to 10? Are they different configurations 17 of the ring, or would you use some other term to 18 describe those figures? 19 MR. SCHULTZ: Objection, vague. 20 A. I would describe them as different 21 embodiments. 22 Q. Okay. There was discussion yesterday	Page 480 1 about the Schr der Niwa combination, and I think 2 this came up again today. You had discussed the 3 desirability of adding additional light sources, 4 and I think you used the term "redundancy." 5 Do you remember that discussion? 6 A. Yes. 7 Q. Can you explain why redundancy would be a 8 good thing to have in the Schr der ring even for 9 vein monitoring or vein measuring? 10 MR. SCHULTZ: Objection, leading. 11 A. Redundancy allows you to still function if 12 one component were to fail. Redundancy also allows 13 you to take multiple measurements of the same thing 14 in order to improve signal-to-noise ratio. It also 15 allows you to deal with unexpected variability such 16 that if you had an occlusion or scar or mole. So 17 at least those three are good examples of how 18 redundancy is beneficial. 19 Q. And are you generally familiar with the 20 idea that different humans, if you look at a 21 population of humans, right, they have different 22 skin pigmentation. Is that true to your

Page 481 1 understanding? 2 A. Yes. 3 Q. Like, for example, people that are of 4 European decent might have different skin 5 pigmentation than those of African descent and 6 those of South American descent. Do you agree with 7 that? 8 A. Yes. 9 Q. Does redundancy play any role in taking 10 account of different skin pigmentation? 11 MR. SCHULTZ: Objection, leading. 12 A. Yes. And I think I did describe that in 13 terms of dealing with skin variation. And 14 parenthetically, it's one of the issues that most 15 photoplethysmographs that are available medically 16 have a racial bias that will work well for my skin 17 tone as opposed to African Americans. And so 18 having further wavelengths and redundancy can help 19 you beneficially deal with variation in the human 20 population. 21 Q. Why is that, that having different -- 22 having different wavelengths and redundancy can	Page 482 1 beneficially deal with variation in the human 2 population? 3 A. Different skin colors have different 4 ratios of melatonin, and for variability absorb 5 different wavelengths of light. And so having 6 redundancy to sort of see through that variability 7 is very beneficial. 8 Q. Yesterday I believe that you mentioned a 9 device that you worked on -- or I can't remember if 10 it was you or your group had worked on under your 11 direction that ended up in a museum. 12 Do you remember that discussion? 13 A. Yes. 14 Q. What device is that? 15 A. That's an EKG monitor for a display that 16 measures the electrical signals for a -- to 17 demonstrate how you collect the electrical activity 18 of the heart through just touching surfaces. 19 Q. What kind of sensors does that device use? 20 A. It was using electrical sensors for the 21 electrical signal but also optical signals for 22 demonstrating photoplethysmograph.
Page 483 1 Q. And what museum is that device in? 2 A. Museum of Science. 3 Q. In Boston? 4 A. In Boston. 5 Q. Is there a name of the device? 6 A. It was -- not that I know of. It was an 7 exhibit. I'm actually not a hundred percent 8 certain the exhibit is still there, but I don't 9 know the name of the exhibit. 10 Q. Approximately when do you understand that 11 it was there? 12 A. That would have been ten, 15 years ago. 13 If not earlier. 14 Q. And you said it was in the Boston Museum 15 of Science? 16 A. Correct. 17 Q. Is that the one that's suspended over the 18 river? 19 A. Yes. 20 Q. Exhibit 1 to the deposition was a sheet 21 that listed a number of corrections that you had 22 indicated you had come across in preparing for your	Page 484 1 deposition. And that was entered as Exhibit 1. 2 Do you have that? 3 A. Yes. 4 Q. And I think you talked a bit about the 5 first item on that list, which was the Schr der 6 Figure 4 and 6 versus Figure 7. 7 Do you recall that yesterday? 8 A. Yes. 9 Q. Is that correction -- is there anything 10 that you need -- I see that it's listed. There are 11 many paragraphs for which you listed that 12 correction to be applicable in the '178. And my 13 question is, what you described yesterday, is that 14 applicable to all the entries that are under '178? 15 A. Yes. 16 Q. What about -- 17 A. And '702 and '034. 18 Q. And so there's nothing to add with regard 19 to the correction -- correction that's listed as 20 number 1 on that table? 21 A. I believe it's an exhaustive list, but I 22 may have missed things as well.

Page 485 1 Q. Okay. I want to move on because I don't 2 think that you ever talked about 2, 3, and 4. So 3 can you go through each of 2, 3, and 4 and explain 4 what the correction is that you intend to make for 5 us to know about. 6 A. So starting with the '178 at page 69, so 7 that's referring to the text in paragraph 92 on 8 that page, though. That talks about the annotated 9 dark purple below and the light purple. So in 10 there there's a singular purple that describes 11 the -- let me go to the annotations of Figure 14 12 and 16. 13 So the "below" that I refer to is far 14 below the description of Mestas, which is on 15 page 109. The rigid zones and flexible zones are 16 all sort of one color as opposed to the dark purple 17 or light purple. 18 Q. Okay. That's the correction to the '178? 19 A. Correct. 20 Q. In the '7 -- 21 A. On that page 69. 22 Q. Got it.	Page 486 1 What about the '702, is it the same 2 correction? 3 A. Yes. That would be the same correction. 4 At the top of page 52, the rigid zones annotated 5 dark purple below, flexible zones light purple, 6 that was not how I labeled them in the figure. 7 Q. And then in '034? 8 A. Did we enter the '034 into -- 9 Q. We did not, but I think you've got a copy 10 of it in your binder. 11 A. Do we need to enter it into? 12 MR. SCHULTZ: It's not an exhibit, no. 13 MR. KAPPOS: Yeah. Do you guys have a 14 copy of it? 15 MR. SCHULTZ: We do. 16 MR. KAPPOS: May we enter it as an 17 exhibit? 18 (Anthony Exhibit 14, Declaration of 19 Dr. Brian W. Anthony in Support of Petitioner 20 for Inter Partes Review of US. Patent 21 9,582,034, marked for identification.) 22 A. And yes, it's the same for that. Now, I
Page 487 1 do -- my recollection, I'd have to double-check. 2 I'm not sure I even include that Mestas figure in 3 the '034. Yes. I don't believe I included that 4 figure in the 034. 5 Q. And so should it have been included on 6 page -- you've got page 53 here marked. 7 A. 53 is where I describe it, so it should 8 have been after that. 9 Q. Okay. So if you're ready to move to 10 item -- there's two more, there's 3 and 4. Let's 11 go to item 3. Can you explain on the record what 12 was the correction that you noted here? 13 A. So I'm going to '178 first. 14 Q. Yes. 15 A. Right. So in paragraph 186, I describe 16 the recessed compartments 50, 52 as light blue; and 17 that's not what is labeled. Those are, I believe, 18 the recesses 59, but the light blue piece should be 19 the region where the battery is disposed. So it's 20 not shown in that -- not numbered in that figure. 21 But if we pull up the Mestas. 22 For example, in Figure 8A points out 50	Page 488 1 with the battery recess, which is what I should 2 have had there. And 59 is what I colored, which 3 should not be colored there for the recess. 4 Q. And then I think you described this, you 5 came upon this, incidentally, during the discussion 6 this afternoon for paragraph 245? 7 A. Yes. As I listed on that, my correction 8 sheet as well. 9 Q. So same issue there? 10 A. Same issue. 11 Q. Then what about for the '702 patent? 12 A. I believe that is the same issue. 13 Q. Or I should say your declaration in 14 connection with the '702 patent. 15 A. Same issue. 16 Q. Okay. And then, can you move to number 4 17 on the list? 18 A. That's the '702, page 148. So that's with 19 respect to claim 17 wherein the curved battery 20 comprises an arc that approximates an arc of the 21 cavity. And in the declaration, paragraph 220, 22 describe the curved battery blue comprises an arc

Page 489 1 that approximates an arc of the cavity as opposed 2 to that -- what I call labeled in green, and that's 3 not the cavity. The cavity is where the battery 4 is. 5 Q. So what's the change that you would make? 6 A. That approximates the arc of the cavity 7 without the green. That is where the blue is, 8 where the battery is sitting. 9 MR. KAPPOS: Okay. No further questions. 10 MR. SCHULTZ: I have no questions. Thank 11 you for you time, Dr. Anthony. 12 THE VIDEOGRAPHER: Time is 6:25. We're 13 off the record. 14 (Whereupon, this deposition was concluded 15 at 6:25 p.m.) 16 (Transcript order requested by reporter.) 17 MR. KAPPOS: Regular delivery and rough. 18 MR. SCHULTZ: Two-day and rough. 19 20 21 22	Page 490 1 CERTIFICATE 2 Commonwealth of Massachusetts 3 Suffolk, ss. 4 I, Dana Welch, Registered Professional 5 Reporter, Certified Realtime Reporter, do hereby 6 certify that BRIAN W. ANTHONY, Ph.D., the witness 7 whose deposition is hereinbefore set forth, was 8 duly sworn by me before the commencement of 9 such deposition, and that such deposition was taken 10 before me and is a true record of the testimony 11 given by such witness. 12 I further certify that the adverse party was 13 represented by counsel at the deposition. I further 14 certify that I have no disqualifying interests, 15 personal or financial, in any party in this action. 16 I further certify that the deposition of BRIAN 17 W. ANTHONY, Ph.D., occurred IN PERSON on February 26, 18 2025 in Boston, Massachusetts, commencing at 9:07 a.m. 19 and concluding at 6:25 p.m. 20 21 22 _____ Dana Welch, CSR, RPR, CRR Notary Public My Commission Expires: August 21, 2031
Page 491 1 Brian W. Anthony, Ph.D., Vol II, c/o 2 O MELVENY & MYERS LLP 3 2801 North Harwood Street, Suite 1600 4 Dallas, TX 75201 5 6 Case: Samsung Electronics Co., Ltd., et al. v. Ouraring, Inc. 7 Date of deposition: February 26, 2025 8 Deponent: Brian W. Anthony, Ph.D., Vol II 9 10 Please be advised that the transcript in the above 11 referenced matter is now complete and ready for signature. 12 The deponent may come to this office to sign the transcript, 13 a copy may be purchased for the witness to review and sign, 14 or the deponent and/or counsel may waive the option of 15 signing. Please advise us of the option selected. 16 Please forward the errata sheet and the original signed 17 signature page to counsel noticing the deposition, noting the 18 applicable time period allowed for such by the governing 19 Rules of Procedure. If you have any questions, please do 20 not hesitate to call our office at (202)-232-0646. 21 Sincerely, 22 Digital Evidence Group Copyright 2025 Digital Evidence Group Copying is forbidden, including electronically, absent express written consent.	Page 492 1 Digital Evidence Group, L.L.C. 2 1730 M Street, NW, Suite 812 3 Washington, D.C. 20036 4 (202) 232-0646 5 6 SIGNATURE PAGE 7 Case: Samsung Electronics Co., Ltd., et al. v. Ouraring, Inc. 8 Witness Name: Brian W. Anthony, Ph.D., Vol II 9 Deposition Date: February 26, 2025 10 11 I do hereby acknowledge that I have read 12 and examined the foregoing pages 13 of the transcript of my deposition and that: 14 (Check appropriate box): 15 () The same is a true, correct and 16 complete transcription of the answers given by 17 me to the questions therein recorded. 18 () Except for the changes noted in the 19 attached Errata Sheet, the same is a true, 20 correct and complete transcription of the 21 answers given by me to the questions therein 22 recorded. _____ DATE WITNESS SIGNATURE _____ DATE NOTARY

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6 ERRATA SHEET

7

8 Case: Samsung Electronics Co., Ltd., et al. v. Ouraring, Inc.

9 Witness Name: Brian W. Anthony, Ph.D., Vol II

10 Deposition Date: February 26, 2025

11 Page No. Line No. Change

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22 Signature _____

Date _____

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