

Page 1 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 IPR2024-00928 U.S. Patent No. 9,582,034 VIDEO DEPOSITION OF BRIAN W. ANTHONY, Ph.D. Tuesday, February 25, 2025 9:09 a.m. EST Digital Evidence Group 1730 M Street NW, Suite 812 Washington, DC 20036 202.232.0646	Page 3 1 UNITED STATES PATENT AND TRADEMARK OFFICE 2 BEFORE THE PATENT TRIAL AND APPEAL BOARD 3 4 SAMSUNG ELECTRONICS CO., LTD.; and 5 SAMSUNG ELECTRONICS AMERICA, INC., 6 Petitioner, 7 V. 8 OURARING, INC., 9 Patent Owner 10 11 Case No. PGR2024-00039 12 U.S. Patent No. 11,874,702 13 14 15 16 17 18 19 20 21 22
Page 2 1 UNITED STATES PATENT AND TRADEMARK OFFICE 2 BEFORE THE PATENT TRIAL AND APPEAL BOARD 3 4 SAMSUNG ELECTRONICS CO., LTD.; and 5 SAMSUNG ELECTRONICS AMERICA, INC., 6 Petitioner, 7 V. 8 OURARING, INC., 9 Patent Owner 10 11 Case No. PGR2024-00030 12 U.S. Patent No. 11,868,178 13 14 15 16 17 18 19 20 21 22	Page 4 1 2 3 February 25, 2025 4 9:09 a.m. EST 5 6 7 8 9 Video Deposition of BRIAN W. ANTHONY, 10 Ph.D., appearing at ArentFox Schiff LLP, 800 11 Boylston Street, 32nd Floor, Boston, 12 Massachusetts 02199, held before Dana Welch, a 13 Registered Professional Reporter, Certified 14 Realtime Reporter and Notary Public for the 15 Commonwealth of Massachusetts. 16 17 18 19 20 21 22

Page 5 1 APPEARANCES: 2 Attorney for Patent Owner: Jasjit S. Vidwan, Esq. 3 ARENTFOX SCHIFF LLP 1717 K Street, NW 4 Washington, DC 20006-5344 jasjit.vidwan@afslaw.com 5 Christopher Schultz, Esq. 6 ARENTFOX SCHIFF LLP 800 Boylston Street, 32nd Floor 7 Boston, MA 02199 United States 617.973.6100 8 christopher.schultz@afslaw.com 9 Attorney for Petitioner: 10 John Kappos, Esq. O'MELVENY & MYERS LLP 12 2801 North Harwood Street, Suite 1600 13 Dallas, TX 75201 972.360.1900 14 jkappos@omm.com 15 Argirenia Zervos, Esq. O'MELVENY & MYERS LLP 17 1625 Eye Street, NW Washington, DC 20006 18 202.383.5300 19 rzervos@omm.com 20 21 Also Present: Dr. Patrick Mercier (By Zoom) 22 Shawn Budd, Videographer	Page 7 1 INDEX CONTINUED: 2 EXHIBITS MARKED: 3 Anthony Exhibit 5 75 4 U.S. Patent 11,868,178 5 6 Anthony Exhibit 6 148 7 Wireless Power Transfer for Medical 8 Microsystems, Sun reference 9 10 Anthony Exhibit 7 170 11 U.S. Patent Sheet 4 of 5, U.S. 12 10,303,867, Figure a4 and 5 13 14 Anthony Exhibit 8 228 15 U.S. Patent Application 2012/0016245 A1 16 17 NOTATIONS: 18 Transcript marked by Mr. Schultz 19 20 21 22
Page 6 1 INDEX 2 WITNESS: 3 BRIAN W. ANTHONY, Ph.D. 4 5 EXAMINATION: PAGE: 6 BY MR. SCHULTZ 9 7 8 EXHIBITS MARKED: 9 NO. DESCRIPTION PAGE: 10 Anthony Exhibit 1 21 11 Corrections to Declarations 12 13 Anthony Exhibit 2 27 14 U.S. Patent 10,303,867 15 16 Anthony Exhibit 3 55 17 Declaration of Dr. Brian W. Anthony In 18 Support of Petition for Post-Grant Review 19 of U.S. Patent No. 11,868,178 20 21 Anthony Exhibit 4 73 22 Wikipedia article "Printed circuit board	Page 8 1 PROCEEDINGS 2 THE VIDEOGRAPHER: We are on the record. 3 This is the videographer speaking, Shawn Budd, 4 with Digital Evidence Group. Today's date is 5 February 25th, 2025, and the time is 9:09 a.m. 6 We are here in Boston, Massachusetts to 7 take the video deposition of Dr. Brian W. Anthony 8 in the matter of Samsung versus Ouraring. 9 Counsel, please introduce themselves for 10 the record. 11 MR. SCHULTZ: This is Christopher Schultz 12 of the ArentFox law firm on behalf of Ouraring, 13 the patent owner. 14 MR. VIDWAN: Jasjit Vidwan, also with 15 ArentFox Schiff, on behalf of Oura. 16 MR. KAPPOS: John Kappos and Renia Zervos 17 from the O'Melveny & Myers law firm representing 18 the Samsung petitioners. 19 THE VIDEOGRAPHER: There is no one on 20 Zoom. 21 Would the court reporter please swear in 22 the witness.

Page 9 1 BRIAN W. ANTHONY, Ph.D., 2 having provided proper identification, 3 was placed under oath and testified as follows: 4 EXAMINATION 5 BY MR. SCHULTZ: 6 Q. Good morning, Dr. Anthony. 7 A. Good morning. 8 Q. Would you state your full name and 9 address for the record, please? 10 A. Brian W. Anthony, 347 Windsor Street, 11 Cambridge, Massachusetts. 12 Q. Just to be clear, this deposition is with 13 respect to PGR2024-00030, IPR2024-00928, and 14 PGR2024-00039, and we'll get the deposition 15 notices later and mark those. 16 But Dr. Anthony, what do you do for a 17 living? 18 A. I'm a scientist at MIT. 19 Q. And is that full time? 20 A. Yes. 21 Q. Do you do any work aside from your 22 academic pursuits?	Page 11 1 A. Yes. 2 Q. And they all have the same specification; 3 is that fair? 4 A. Yes. I think there's some formatting 5 differences amongst them, but... 6 Q. How would you characterize the subject 7 matter of these patents, generally? 8 A. Well, I do describe it in my declaration. 9 I have clean copies of my declarations here. But 10 generally they relate to a wearable device for 11 monitoring biological signals. 12 Q. Okay. And so is that a -- 13 MR. SCHULTZ: Let me just restate that 14 and hopefully not change it. 15 Q. The patents at issue involve wearable 16 devices that monitor health-related parameters; 17 is that fair? 18 A. I can give you a more precise answer, 19 make sure I'm not misstating. I have my 20 declarations and the patents here. 21 Q. I understand that, but you are obligated 22 to answer questions that are asked of you, if you
Page 10 1 A. I do consulting. 2 Q. Are you associated with any companies? 3 A. Yes. 4 Q. Aside from expert work in litigations, do 5 you do any other types of consulting work? 6 A. I do engineering consulting, engineering 7 design work. 8 Q. Are you currently consulting for any 9 companies on that type of work? 10 A. Not currently. 11 Q. Okay. What department are you in at MIT? 12 A. Both mechanical engineering and IMES, 13 which is the Institute for Medical Engineering & 14 Science. 15 Q. And what did you do before you became a 16 professor at MIT? 17 A. I worked, going back long enough, Los 18 Alamos National Labs, consulted, started the 19 company called Xcitex. 20 Q. You're aware of the three patents that 21 are at issue in these three different post-grant 22 proceedings?	Page 12 1 can. 2 So is that a fair general 3 characterization? 4 MR. KAPPOS: Objection to form. 5 MR. SCHULTZ: Sure. 6 A. Could you repeat the question, please? 7 Q. The patents at issue relate to wearable 8 devices that monitor health-related parameters? 9 MR. KAPPOS: Object to form. 10 A. That's a generalized area that is the 11 topic of the patents. 12 Q. What's your most -- with the 13 understanding that when I say "wearable devices" 14 I'm referring to that definition we just agreed 15 on, what's your most relevant experience related 16 to wearable devices? 17 A. Again, I do highlight that in my 18 declarations. I describe some of the work that 19 we did at Xcitex developing a ring for monitoring 20 of motion and tremor, that's a very related one. 21 I do a lot of both handheld wearable 22 electronics for monitoring of vital signs or for

Page 13 1 properties related to motion. 2 Q. Okay. You mentioned the Xcitex ring. 3 A. Uh-huh. 4 Q. That's the only -- well, are there any 5 other rings that you've worked on that you would 6 characterize as wearable devices? 7 A. That's the dominant ring that I've worked 8 on. I've worked on other wearable patches for 9 monitoring, for example, of EKG. 10 A long time ago I taught a class in 11 medical instrumentation that ended up with 12 electronics that we deployed as a, not a 13 wearable, but a display over at the Museum of 14 Science here in Boston. So deep expertise in 15 instrumentation, miniaturization of electronics, 16 signal processing, and sensors. 17 Q. And so did you design the Xcitex ring? 18 A. Yes. 19 Q. Could you describe generally the 20 construction of that ring? 21 A. It was generally a ring, it generally fit 22 on the finger, and it was used to monitor the	Page 15 1 and external to the ring. 2 Q. So this ring had a housing; is that 3 correct? 4 A. It had housing components. 5 Q. What do you mean by "housing components"? 6 A. Components that I would describe as 7 housing. 8 Q. You mean components that together form 9 the housing? 10 A. Components that form the structure that 11 would hold the optics and the electronics and 12 also fit on the person's finger. 13 Q. Okay. What was the nature of the housing 14 of this ring? 15 A. What do you mean by "nature"? 16 Q. How did it hold these components? 17 A. They were variously wrapped around it, 18 epoxied to it. I think we probably soldered and 19 glued at times. 20 Q. Okay. So you mentioned some of the 21 components in the prototype were inside the ring 22 and some were external to the ring. What
Page 14 1 tremor and the position orientation of a person 2 targeted for trying to do a replacement to the 3 mouse to do -- detect where and how the person 4 was moving and guide a cursor. 5 Q. What components, if any, were -- 6 MR. SCHULTZ: Strike that. 7 Q. Did the Xcitex ring include any 8 electronic components? 9 A. Yes. 10 Q. What were they? 11 A. LEDs, detectors, photodiodes, 12 accelerometer, some signal processing, both 13 analog components and digital components. 14 Q. Now, the components you just listed, were 15 they embedded in the ring, would you say? 16 A. We never commercialized it to a product. 17 We made prototype rings. And so they were both 18 in the ring and on the ring. 19 Q. In the prototypes you refer to, were 20 they -- these components external to the ring, or 21 were they actually embedded in the ring? 22 A. Correct. In both, so inside of the ring	Page 16 1 components were external to the ring? 2 A. Well, we had a functionality where we 3 would put retroreflectors on the surface of the 4 ring such that when you put light sources around 5 the monitor, the ring would reflect those -- 6 reflect light from the emitters on the monitor 7 back to the detectors that are on the monitor and 8 would allow us to in part triangulate the motion 9 and the position orientation of the ring to 10 complement doing the same with inertial estimates 11 with components that were inside of the ring. 12 Q. So the components that were external to 13 the ring were the light sources that you just 14 referred to? 15 A. There were light sources both on the ring 16 and light sources on the monitor that would 17 communicate with the ring. 18 Q. When you say "monitor," is that a 19 computer monitor? 20 A. Correct. 21 Q. Did this ring monitor health-related 22 parameters?

Page 17 1 A. It monitored -- we were able to monitor 2 tremor, and we were able to monitor motion, which 3 are certainly health-related properties. The 4 ring was more focused on motion properties than 5 trying to get, for example, heart rate of the 6 user. 7 Q. Okay. Well, did the ring have an 8 intended use? 9 A. Yes. 10 Q. Was it for gaming? 11 A. As I described, it was intended to be a 12 replacement, a targeted replacement for an 13 alternative way of interacting with the computer 14 and manipulating the cursor. So instead of 15 having a mouse that you would grab to manipulate 16 the location of the cursor on the screen to be 17 able to point and understand how the person was 18 moving and move the cursor accordingly. 19 Q. So it was intended to be a replacement 20 for a mouse? 21 A. One of the applications, yes. 22 Q. And control a computer without a mouse?	Page 19 1 detect tremors, and we needed to filter through 2 the tremors in order to get the average position 3 of where the person was pointing. 4 Q. To move the mouse? 5 A. Reposition of the cursor, and to know 6 where the person is moving to move the cursor, 7 correct. 8 Q. So you said -- I asked you, did you use 9 the ring to diagnose tremors, and you said, "We 10 certainly could detect tremors." That's a 11 slightly different answer than what I asked. 12 Did you actually use the ring in a 13 medical application or did you just use it to 14 control cursors? 15 A. It was not a medical, and we weren't 16 targeting FDA-regulated device by which we would 17 do diagnosis. 18 Q. Okay. So I usually say this at the 19 beginning, but you understand you're obligated to 20 answer my questions truthfully here today, 21 correct? 22 A. Yes.
Page 18 1 A. Or augment what the mouse can do. 2 Q. That doesn't sound like health-related 3 parameters. 4 A. Well, motion is certainly a significant 5 aspect of health. And the ring is not the only 6 thing that I've done related to monitoring health 7 parameters. 8 So as I described, I used to teach a 9 class in biomedical electronics, making both 10 things like wearable patches and doing all the 11 both electronics and optical processing and 12 sensor development to get vital signs and 13 physiological monitoring of the conventional 14 vitals, if you will, heart rate, respiration 15 rate. And motion certainly is an aspect of 16 health that is very important to diagnosing 17 tremor and other motion disorders. 18 Q. Okay. Did you use this ring to diagnose 19 tremors? 20 A. Yeah. We certainly could detect tremors. 21 It wasn't a diagnostic device. The entirety of 22 use was not FDA regulated, but it was able to	Page 20 1 Q. And you understand that not answering 2 questions truthfully in a deposition constitutes 3 perjury, correct? 4 A. Yes. 5 Q. And perjury is a crime, you understand 6 that, right? 7 A. Yes. 8 Q. How did you prepare for the deposition -- 9 today's deposition, if at all? 10 A. I reviewed my declarations, the primary 11 references of the patents at issue, had meetings 12 and discussion with counsel. 13 Q. Counsel sitting at this table? 14 A. Yes. 15 Q. Did you talk to anybody else? 16 A. No. 17 Q. How long did you meet with counsel? 18 A. On the order of 12 hours, 15 hours. 19 Q. When you reviewed your reports, did you 20 notice any mistakes that you'd like to correct? 21 A. I did. 22 Q. Okay. By all means, let me know what

Page 21 1 those are. 2 A. Okay. I did prepare a list of them. 3 Q. Okay. We can -- do you have a copy of 4 it? 5 A. I do. I don't have a copy other than 6 this one. 7 Q. That's okay. 8 MR. SCHULTZ: I assume you're familiar 9 with it. I'm going to mark it as Deposition 10 Exhibit Number 1, a document entitled 11 "Corrections to Declarations," which was just 12 handed to me by the witness. 13 (Anthony Exhibit 1, Corrections to 14 Declarations, marked for identification.) 15 Q. If you wouldn't mind taking me through 16 these corrections. 17 A. Absolutely. 18 So we can start with -- so I have my 19 clean copies of my declarations here. So 20 starting with item 1, so start with the 21 declaration for '178, paragraph 153. 22 All right. So this is a sort of a number	Page 23 1 So the Figure 4 would -- and as I've 2 labeled it would be the -- would look the same 3 when referring to a modified Figure 5, which is 4 the circular projection of Figure 7 in that ring. 5 Q. Okay. So for all of these -- for number 6 1 and your Exhibit 1, your correction is the same 7 for all these notations? 8 A. There are -- there are -- I can't say 9 they're the same. I have to go through. I 10 didn't -- I just listed the places that I want to 11 highlight, so I'd need to go through them and 12 remember what the changes are for each of them, 13 but... So that's sort of the general correction 14 at paragraph 153 on page 113. 15 Q. Okay. So let me just make sure I 16 understand this. So 153, you show Figure 4? 17 A. Correct. 18 Q. You didn't mean to put Figure 4 here? 19 A. I meant to put Figure 4. 20 Q. Okay. 21 A. What I should have been clear on is that 22 I probably should have called it "Figure 4 prime"
Page 22 1 of corrections related to how I use Figures 4 and 2 5 versus Figure Number 7. Figure Number 4 3 specifically refers to a construction that is in 4 the -- that's Figure Number 5 in the Schröder 5 reference. 6 What I should have referenced is Figure 7 Number 7, which shows up on page 119, and created 8 a modified Figure 5, which would show the 9 circular projection of Figure 7, which is the 10 U-shaped internal and external housing component 11 that would look similar to what is shown in 12 Figure 5. It would not have the center line. It 13 would have center lines that go through the 14 cavities on the top and the bottom. 15 And then the correction that I'm wanting 16 to make, therefore, on Figure 4 is highlighting 17 that that Figure 4 in cross section would be the 18 same for that circular projection of Figure 7 19 into a ring, whereas it would have, indeed, as 20 I've labeled it, the external housing component, 21 and then not labeled in that figure but on 22 page 115 the internal housing component.	Page 24 1 and referred to a Figure 5 prime, because what I 2 should have done is shown the projection as I 3 highlight when using Figure 7 to describe the 4 internal and external housing components. 5 Figure 7 when formed into a ring would 6 indeed have an internal -- would have the 7 cavities as shown in Figure 5, but it would not 8 have that center line. It would have a line 9 across the cavity here, across the cavity here, 10 which would be the inner and outer housing 11 components that come from Figure 7. 12 And then when looking at that modified 13 Figure 5 in cross section, which is what Figure 4 14 effectively is, modified Figure 4, then, again, 15 that external housing component would be as I've 16 label it in green. 17 In the patent Figure 4 is described as 18 the housing that comes from Figure 5. So I would 19 like to call Figure 4 a Figure 4 prime, which 20 comes from a Figure 5 prime that is formed from 21 the Figure 7 projection into a ring form. 22 Q. Okay. Let me take that apart a bit. Are

Page 25 1 you not relying on Figure 4 anymore in paragraph 2 153? And I understand what you just said about 3 prime, but I'm talking about the actual figure in 4 Schröder. Are you still relying on that figure 5 in paragraph 153? 6 A. Yes. To highlight what the circular 7 projection of Figure 7 is into a ring and 8 highlighting where the external housing component 9 would be in that cross section. 10 Q. But Figure 4 doesn't show the circular 11 projection of Figure 7, does it, in the patent? 12 A. Well, as I just described, the correction 13 that I wanted to make was to describe how 14 Figure 7 when formed into a ring would look 15 different than Figure 5. So it would be a Figure 16 5 prime with a ring structure with an X with that 17 cavity inside but formed by an inner and outer 18 housing component, which is an inner ring and an 19 outer ring with two U-shapes. 20 And then the cross section through a 21 slice of that ring would look like Figure 4, 22 which is why I labeled it as such. But I should	Page 27 1 How does Figure 4 and 5 relate to 2 Figure 7? 3 A. So that's the correction that I'm trying 4 to describe. 5 Q. Figure 4 and Figure 5 are different 6 embodiments, correct, than Figure 7? 7 A. So I also have clean copies of the 8 references. I'm going to open Schröder. 9 MR. SCHULTZ: Let's have it marked as 10 Deposition Exhibit Number 2, U.S. Patent Number 11 10,303,867 to Schröder. 12 (Anthony Exhibit 2, U.S. Patent 13 10,303,867, marked for identification.) 14 Q. And my question was, Figure 4 and 15 Figure 5 are different embodiments from Figure 7, 16 correct? 17 A. So as I was describing, Figure 4 is in 18 the patent described as being an embodiment that 19 also is in Figure 5. But the correction I'm 20 trying to highlight is that the other embodiments 21 that include Figures 6 through 10, which 22 specifically I'm pointing to the embodiment of
Page 26 1 have correctly stated it as a Figure 4 prime to 2 correctly refer to the use of Figure 7. 3 Q. What's wrong with the way this is written 4 that requires a correction? 5 A. That's what I'm highlighting. 6 Q. Well, correction implies a mistake. 7 What's your mistake here? 8 A. My mistake is referring to Figure 4 -- 9 Q. Okay. Can I just follow up on that 10 statement? 11 A. Sure. 12 Q. So the mistake is referring to Figure 4 13 here in 153? 14 MR. KAPPOS: Object to form. 15 Q. That's what you just said, right? 16 A. So the mistake is related to the ensemble 17 of Figure 4 as it refers to Figure 5 as I use 18 Figure 7. 19 Q. Okay. Let me ask you a follow-up. How 20 does Figure 4 and Figure 5 relate to -- and I'm 21 not asking for your annotations. I'm not talking 22 about Schröder.	Page 28 1 Figure 7, and Figure 7 has, as I describe on 2 page 119, the extra housing component 18, the 3 internal housing component 16, and the correction 4 that I'm trying to describe is that in using that 5 embodiment, the -- 6 Q. I'm sorry. That embodiment? 7 A. The Figure 7 embodiment. 8 Q. Okay. 9 A. The way that Figure 5 would look is a 10 modified version of Figure 5 such that it doesn't 11 have that center line that comes from assembling 12 two halves of the ring together. It comes from 13 two rings that are of the Figure 7 embodiment, 14 and that's what I should have shown as Figure 5 15 prime. 16 And similarly, I should -- even though 17 the figure would look the same, Figure 4 I would 18 refer to as Figure 4 prime that comes from the, 19 as described, Figure 7 embodiment in a ring that 20 would have the internal housing component and the 21 external housing component as I've labeled them 22 on both 16 and 18.

Page 29 1 Q. So referring to Figures 4 and 5 -- 2 MR. SCHULTZ: Or rather, strike that. 3 Q. Referring to Figure 4 without that 4 qualification was your mistake in paragraph 153? 5 A. So the miss -- the collective mistake 6 that I'm highlighting is how I should have 7 created a modified Figure 4 to go with a modified 8 Figure 5 to be consistent with how I use 9 Figure 7. 10 Q. Why do you have to modify Figure 4 the 11 way you've used it there? 12 A. Well, what's described is Figure 4 in the 13 patent, Figure 4 shows a longitudinal section 14 through a finger ring, Figure 5 shows a cross 15 section corresponding to Figure 4. So what's 16 described as Figure 4 is indeed a cross section 17 of Figure 5. Figure 4 would also be a cross 18 section of the Figure 7 embodiment. 19 Q. Okay. In paragraph 156 -- 20 A. Of? 21 Q. -- of your declaration -- 22 A. Yeah.	Page 31 1 Q. I understand that. 2 And what I'm saying is I'm taking what 3 you're saying and drawing a conclusion that when 4 you say ring half 16 is in green, that's not item 5 16 of Schröder, is it, in the Figure 4? 6 A. And this is the correction that I'm 7 highlighting here, that the Figure 16, Figure 4, 8 when I show the ring halves 16 and 18, that is 9 coming from, as I described, the use of Figure 7. 10 Q. Okay. I think you just agreed with me. 11 But what you're saying is ring half 16, as you've 12 labeled it here in Figure 4 in paragraph 156, is 13 not, in fact, ring half 16 of Schröder, is it? 14 MR. KAPPOS: Object to form. 15 A. It is the inner housing component of the 16 Figure 7 embodiment. 17 Q. But Figure 4 in Schröder is not the 18 Figure 7 embodiment, is it? 19 A. As I've described -- I'm trying to 20 correct how I've used Figure 4 to correctly refer 21 to the Figure 7 embodiment in a ring, and as I've 22 labeled here, indeed, then in that situation the
Page 30 1 Q. -- you state that "As shown in Figure 4 2 below, ring half 16 (green) is the internal 3 housing component." 4 So that's one of your mistakes, right? 5 That's not item 16 in Schröder, is it, that 6 you're pointing to? 7 A. It is, as I've described with the 8 correction that I'm trying -- 9 Q. I didn't ask about your correction. I'm 10 asking about what you stated here with respect to 11 Figure 4 of the patent is incorrect, right? 12 MR. KAPPOS: Object to form. 13 Q. That's not item 16, is it, in Figure 4 of 14 the patent? 15 A. As I've described, Figure 4 in the patent 16 is referring to Figure 5, which has the ring 17 constructed with two fully formed rings that are 18 coming together with a split down the center. 19 And the correction that I'm making is noting that 20 as I've labeled Figure 4, I should have labeled 21 it Figure 4 prime, to refer to the Figure 7 22 embodiment.	Page 32 1 internal housing component is indeed as I've 2 labeled there. 3 Q. So in Figure 4 that you've highlighted in 4 green, that's actually item 18, isn't it? 5 A. That is item 16 in the Figure 7 6 embodiment as I'm describing in my correction. 7 Q. I'm not talking about the figure, and 8 you're not answering my question. 9 I'm asking, in Figure 4 of Schröder that 10 you've highlighted in green on page 115 of your 11 declaration, that's actually item 18, correct, in 12 Schröder, not associated with your correction or 13 Figure 7? 14 A. So as I've described, Figure 4 and 5 are 15 referring to themselves, and the correction that 16 I'm highlighting is that as of labeled Figure 4, 17 it is correct for the correction that I'm making, 18 which is the use of Figure 7 in the -- in the 19 ring. 20 Q. Okay. So maybe we need to go away from 21 your declaration. 22 Can you open up Exhibit 2?

Page 33 1 A. You asked me to go through my 2 corrections, so do you want to continue going 3 through the corrections? 4 Q. We'll get to that. 5 A. I'm sorry. Which figure are we at? 6 Q. Figure 4. 7 So Figure 4 has three concentric circles, 8 I guess, is that fair, or three rings, I would 9 say, maybe that's a better description? 10 A. Three concentric rings. 11 Q. Okay. So the outer ring is labeled "18." 12 A. (Nodding head up and down.) 13 Q. What is 18 of Schröder? 14 A. 18 is described as the outer ring half. 15 Q. Okay. And in the middle is item 12, 16 which is an inlay, correct? 17 A. Figure 12 is an inlay or item 12 is an 18 inlay. 19 Q. And the inner circle of the view of 20 Figure 4, that's also item 18, isn't it? 21 A. In the Figure 5 embodiment, the Figure 5 22 embodiment, as is shown there, has a split line	Page 35 1 correction. I'm asking you -- 2 MR. KAPPOS: Counsel, you're cutting off 3 the witness. 4 Q. -- a very simple question. 5 MR. SCHULTZ: He needs to answer the 6 question. 7 MR. KAPPOS: Yeah, let him complete his 8 answer. 9 MR. SCHULTZ: And if you want a break 10 and talk to him -- 11 MR. KAPPOS: Let him complete his answer 12 before you interrupt him, okay? 13 MR. SCHULTZ: That's not an -- it's a 14 nonresponsive answer. 15 MR. KAPPOS: Okay. Go ahead. 16 Q. So, again, on the record, I'm asking you, 17 in Figure 4 of Schröder, the inner circle is item 18 18, correct? 19 A. So as I've described, Figure 4 and 20 Figure 5, as described, are an embodiment where 21 there are two halves that are brought together. 22 And the correction that I'm highlighting is that
Page 34 1 across two rings that are brought together across 2 that large plane, and what I'm highlighting is 3 the correction, which is -- 4 Q. I'm not asking for your highlighting. 5 I'm asking you how -- you've read Schröder, 6 right? 7 A. Just to understand, so my prior 8 declarations I should be able to continue to 9 finish my answers. 10 Q. Not unless I ask you a question about it. 11 That's not the way this works. 12 A. Okay. 13 Q. So, again, I asked you a simple question 14 about Figure 4. If you don't understand 15 Schröder, by all means, you can tell me that. 16 A. I understand Schröder. 17 Q. But the inner circle is item 18, isn't 18 it, of Figure 4? 19 MR. KAPPOS: Object to form. 20 A. So as I am attempting to show in the 21 correction, indeed -- 22 Q. Sir, I'm not asking you about the	Page 36 1 I should have labeled Figure 4 prime to be 2 consistent with the -- with the Figure 7 3 embodiment -- 4 Q. I'm not asking you about the correction. 5 (Simultaneous speaking and interruption 6 by the reporter.) 7 MR. KAPPOS: You're cutting him off 8 again, counsel. Allow him to complete his 9 answer. 10 Q. You're not answering the question. It's 11 a simple question. 12 Figure 4 in Schröder -- you said you 13 understood Schröder, right? 14 A. I do. 15 Q. And you understand what item 18 is, 16 right? 17 A. Yes. 18 Q. Okay. So the -- and you know what I'm 19 talking about when I say the inner circle of 20 Figure 4, right? I think we've already 21 established that, right? 22 A. I'm sorry.

Page 37 1 Q. You know what I'm referring to when I say 2 the inner circle of Figure 4? 3 A. In Figure 4, I've labeled it as the 4 internal housing component. 5 Q. I'm not asking you how you've labeled it. 6 Well, that is how you've labeled it. I'm asking 7 you about Schröder right here. 8 A. Right. I'm just making sure that I'm 9 understanding what it is that you said you were 10 pointing to, which is what I've labeled as 11 internal housing component. 12 Q. And what element of Schröder is the inner 13 circle? It's 18, isn't it? 14 A. In my incorrect use of Figure 4 to refer 15 to Figure 7 -- 16 Q. I'm not asking about -- 17 (Simultaneous speaking and interruption 18 by the reporter.) 19 Q. Okay. Go ahead. 20 A. Indeed, Figure 4 as described in the 21 patent is referring to the Figure 5 embodiment 22 where it's two halves brought together. The	Page 39 1 embodiment, as I describe later on when I get to 2 like, for example, paragraph 162. 3 So I did not correctly make a modified 4 version of Figure 4 and Figure 5. But to be 5 consistent with my text, because, as I say here 6 in paragraph 157, Schröder's internal housing 7 component is coupled with the external housing 8 component to form the finger ring, as shown below 9 in Figure 5, Schröder's inner ring half and outer 10 ring 18 are interconnected by a suitable 11 technology, right? 12 I'm describing that inner ring and outer 13 ring that is coming from Figure 7, and that is 14 how I should have created a modified Figure 4 and 15 a modified Figure 5 to be consistent with how I 16 was describing how a POSITA would understand the 17 Schröder reference. 18 Q. Okay. So is the inner circle on 19 Figure 4, is that 16 or 18? 20 A. As I've described in my correction, that 21 inner circle is 16, the inner housing component. 22 Q. So in Schröder you're saying Figure 4 --
Page 38 1 correction that I'm making is that I'm using 2 Figure 7 in a ring where the internal housing 3 component would be as I've labeled it here in 4 Figure 4, which should have been a Figure 4 5 prime. 6 Q. So is the inner circle 16 or 18 in 7 Figure 4? 8 A. In the -- 9 Q. Or neither. 10 A. The Figure 4 as it's used just in the 11 patent is referring to one half of the two rings 12 that are brought together. The correction that 13 I'm describing -- 14 Q. Which half? 15 A. Two rings that are brought together. 16 Like I don't know a better way to describe 17 it. Two rings that are brought together like 18 this. And the correction that I'm highlighting 19 is Figure 7 would also be a ring that is an inner 20 ring and an outer ring, and that is how I was 21 using Figure 4 to describe that internal housing 22 component that stems from the Figure 7	Page 40 1 and let me mark the exhibit for you. You're 2 saying this is 16? 3 A. In my modified Figure 4. 4 Q. No. I'm asking you about Schröder. 5 A. I think I have answered the question in 6 that I do highlight -- 7 Q. I haven't heard an answer to my question 8 yet. 9 A. I think I've consistently said that 10 indeed the way that it's described in the patent, 11 Figure 4 and Figure 5 are describing an 12 embodiment that go together as two halves of a 13 ring split down the long axis -- 14 Q. Okay. 15 A. -- and the correction that I'm making -- 16 Q. So let's stop right there. Does that 17 mean that what I labeled as 16 is actually 18 in 18 Schröder? 19 MR. KAPPOS: Object to form. You're not 20 allowing the witness to complete his answers. 21 A. So just to be -- is it okay to mark up 22 the --

Page 41 1 Q. What are you going to mark? 2 A. I'm going to draw the Figure 5, -- 3 modified Figure 5 and the modified Figure 4. 4 Q. No. I just want you to answer my 5 question as to whether what I just labeled as 16 6 or 18 in Schröder, as Schröder is written. 7 A. As I've described how a POSITA would 8 understand the Figure 7 embodiment -- 9 Q. I didn't ask you about Figure 7. It's 10 nonresponsive, and we're going to have to strike 11 this. And this is going to last for more than 12 two days unless you just can answer a simple 13 question. 14 Is that item 18 or 16, as I've labeled 15 it, in Schröder? I'm not asking about your 16 correction, I'm not asking about your 17 declaration. I'm asking you about a reference 18 you said you understood as an expert, but 19 apparently you don't because you can't ascribe a 20 simple label to that figure, can you? 21 MR. KAPPOS: Object to form. Object 22 to --	Page 43 1 A. Indeed, Figure 4 and Figure 5, as I've 2 described, are talking about an embodiment with 3 two halves that go together and there is two 4 housings, an 18 and a 16. The embodiment that I 5 describe comes from Figure 7 -- 6 Q. I'm not asking you about the embodiment 7 that you describe. 8 A. -- and I'm trying to explain -- 9 Q. I'm asking you about the -- I'm entitled 10 to ask you questions about these references, am I 11 not? 12 (Simultaneous speaking and interruption 13 by the reporter.) 14 MR. SCHULTZ: Let's take a break. I'll 15 try and get someone on the phone. 16 THE VIDEOGRAPHER: The time is 9:52. 17 We're off the record. 18 (Proceedings interrupted at 9:52 a.m. and 19 reconvened at 10:04 a.m.) 20 THE VIDEOGRAPHER: We are back on the 21 record. The time is 10:04. 22 MR. SCHULTZ: Dr. Patrick Mercier is on
Page 42 1 Q. And if you can't, then say so. But 2 answer my question because I asked a very simple 3 question. 4 Is it 16 or 18 in Figure 4 on the inner 5 circle? Can you answer that question? If not, 6 we'll move on. And I'll -- my understanding is 7 that you cannot because you don't understand it. 8 But if you do understand it, you can answer that 9 question. 10 MR. KAPPOS: Object to form, counsel, 11 harassing. 12 Q. 16 or 18? 13 A. I have answered the question a couple 14 times, and I will -- 15 Q. Did you say 16 or 18? 16 A. Can I answer the question? 17 Q. It's one or the other. 18 A. I'm sorry you don't like my yes or no -- 19 I'm not giving you a yes-or-no answer. I'm 20 trying to describe. The answer is more complex 21 than what you're hearing. 22 Q. Okay.	Page 44 1 the phone via Zoom. 2 BY MR. SCHULTZ: 3 Q. Okay. Just to close that line, are you 4 prepared to answer the question of whether the 5 inner circle on Figure 4 is, refers to item 16 or 6 18 in Schröder? 7 MR. KAPPOS: Object to form. 8 A. So as I think I've already answered, 9 Figure 4 and Figure 5, as described in the 10 patent, indeed Figure 4 is one half of the ring 11 that is assembled with the other half of the 12 ring. But as I've tried to correct, as I've 13 described in paragraph 157, Figure 5, modified 14 Figure 5, the inner ring in my construction using 15 Figure 7 would be the internal housing component. 16 Indeed, as I've described, yes, Figure 4 17 in the patent and Figure 5 in the patent, 18 describe these two rings that go together, and 18 19 and 16 are two halves of these rings. But in 20 Figure 7, the internal housing component is the 21 inner ring and the external housing component is 22 the outer ring, which would look as I've labeled

Page 45 1 Figure 4, which is why I'd like to correct Figure 2 4 to be a Figure 4 prime. 3 Q. Does Figure 4 of Schröder show component 4 16 of Schröder? 5 A. As I've -- I think I just answered. 6 Q. That's a yes-or-no question, Doctor. 7 A. As I just answered, indeed, Figure 4 8 shows one half of the ring, which is 18, coupled 9 to the other half of 16. But in the Figure 7, 10 which I use in my description in paragraph 157, 11 the internal housing component would be 16, as 12 I've labeled it. 13 Q. So does Figure 4 show item 16? 14 MR. KAPPOS: Object to form. 15 A. The modified Figure 4 that I'm trying to 16 correct. 17 Q. I didn't ask about the modified Figure 4. 18 I'm asking about Schröder's Figure 4. 19 A. As I've described, indeed Figure 4 and 5 20 in Schröder describe an embodiment where two 21 halves go together with a cross section down the 22 center as shown in Figure 5, and the correction	Page 47 1 Figure 5 are an embodiment where you have two 2 housing components that go together. The 3 correction that I'm making is referring to both 4 to be consistent with as I described it in 5 Figure 157. 6 MR. VIDWAN: Go off the record. 7 MR. SCHULTZ: Let's go off the record. 8 THE VIDEOGRAPHER: Time is 10:08. We're 9 off the record. 10 (Proceedings interrupted at 10:08 a.m. and 11 reconvened at 10:26 a.m.) 12 THE VIDEOGRAPHER: We are back on the 13 record. The time is 10:26. 14 BY MR. SCHULTZ: 15 Q. Dr. Anthony, we've obviously been talking 16 about a mistake you made in your report. With 17 respect to the correction number one you referred 18 to on Exhibit 1, do you have an understanding as 19 to why you made that mistake? 20 A. I was referring to -- it's a consistent 21 cross section with the Figure 7 embodiment, which 22 is why I made the mistake.
Page 46 1 that I'm highlighting is indeed different than 2 what the Figure 4 is in Schröder. It's a 3 Figure 4 prime, where I've correctly labeled how 4 a POSITA would understand Figure 7 in that 5 Figure 4 prime. 6 Q. And apart from your correction, does 7 Figure 4 show item 16, ring half 16? 8 A. As I've described, the Figure 4 and 9 Figure 5 embodiment are two halves of a ring that 10 go together with 16 on the one side, 18 on the 11 other. But in the Figure 7 embodiment that I'm 12 trying to correct for, Figure 4, the modified 13 Figure 4 would be 16, which is the internal 14 housing component. 15 Q. Okay. So Figure 4 of Schröder is 16 labeled, you see, 18, correct? 17 A. Correct. 18 Q. Do you see a label for 16? 19 A. As I've described, Figure 4 and Figure 5 20 are the embodiment that are two rings going 21 together, 18 on one side, as shown on Figure 4. 22 As I've described several times, Figure 4 and	Page 48 1 Q. So you misread Schröder, is that fair? 2 A. No. I missed making a correction to 3 Figure 4, modified Figure 4, to be explicit, 4 that, as I'm trying to describe, comes from 5 Figure 7. 6 Q. So your belief when you wrote this report 7 was that Figure 4 was a modified version of 8 Figure 4? 9 MR. KAPPOS: Object to form. 10 A. No. Figure 4 is Figure 4. 11 Q. Okay. 12 A. The correction that I would make would be 13 a modified Figure 4. 14 Q. Right. And I'm curious as to how you 15 made that mistake. 16 A. Because, as I described, Figure 4 is a 17 consistent cross section with what the Figure 7 18 embodiment would be. 19 Q. Okay. And what's the mistake? 20 A. The mistake is in the Figure 4, as I 21 stated in the patent, it's two halves of a ring 22 that go together. And on one side it's 18 on the

Page 49 1 inner and outer ring, 16 on the inner and outer 2 ring. Then on the Figure 7 embodiment, it's two 3 rings that are concentric with each other, and 4 the outer housing component 18 would be on the 5 outside and the modified Figure 4 would show, as 6 I've labeled it here, the internal housing 7 component being 16. 8 Q. So when you say the mistake in that 9 Figure 4, as I stated in the patent, it's two 10 halves of a ring that go together. When you 11 wrote your report, did you not believe -- did you 12 not interpret Figure 4 as two halves of a ring 13 that go together? 14 A. As I described, the way I was using 15 Figure 4 was as a consistent cross section with 16 the Figure 7 embodiment. I understood and I 17 understand how Figure 4 is described in the 18 patent as two halves going together, but the way 19 that I've labeled it as the internal housing 20 component and the way that I describe it is 21 referring to the Figure 7 embodiment. 22 Q. Okay. So how you originally wrote your	Page 51 1 and have you studied that? 2 A. I did not. 3 Q. Are you aware of Oura's ITC case that was 4 tried last year? 5 A. I know there is one, but I'm not -- I do 6 not know. 7 Q. In preparation for -- well, in connection 8 with any of your work in this case, have you 9 reviewed any documents from the ITC case to your 10 knowledge? 11 A. I have not. 12 Q. Have you reviewed any expert reports or 13 depositions from that case? 14 A. No. 15 Q. Do you know who Mr. Alarcon is? 16 A. No. 17 Q. That doesn't ring a bell? 18 A. No. 19 Q. In November 29th, 2013, what were you 20 doing professionally? 21 A. 2013? 22 Q. And it's not a trick question.
Page 50 1 report in this respect was inconsistent with how 2 Schröder describes Figure 4, correct? 3 MR. KAPPOS: Object to form. 4 A. I think that is correct because that's 5 why I'm trying to make the correction to describe 6 how I was using Figure 4 in the Figure 7 7 embodiment. 8 Q. Okay. Are you aware of Oura's -- you're 9 aware of Oura, correct? 10 A. Yes. 11 Q. What's your understanding of what Oura 12 is? 13 A. They're a company that makes the Oura 14 Ring. 15 Q. Are you familiar the Oura Ring? 16 A. Yes. 17 Q. Do you have one? 18 A. I do not. 19 Q. Have you studied the Oura Ring? 20 A. I've studied the patents that are at 21 issue here. 22 Q. Did you acquire a sample of the Oura Ring	Page 52 1 Thereabouts is the priority date of the patent. 2 A. Yeah. So 2013, I would be at MIT. I 3 would have been teaching, I think at that point 4 either still running the Singapore MIT Alliance 5 Program or maybe transitioning -- 6 (Clarification by the reporter.) 7 A. I may have still been running the 8 Singapore MIT Alliance Research Collaboration at 9 that point or I may have been already 10 transitioned to Skoltech, which is another large 11 collaboration, doing research in medical 12 electronics, doing research in manufacturing and 13 developing academic programs. 14 Q. What is Skoltech? 15 A. Skoltech is a university in Moscow, just 16 outside of Moscow. 17 Q. Had you worked with Xcitex at that point? 18 A. That was prior, so that was 2006 when I 19 left. 20 Q. The ring that you designed at Xcitex, 21 that was never -- I think you already said was 22 never commercially developed?

Page 53 1 A. We developed a prototype. We were 2 self-funded as a company, which meant we were 3 spending our own cash. And then once we 4 developed it, it functioned, it worked. But as 5 it turns out, the mouse still worked pretty well. 6 So we pivoted into something that would more 7 rapidly give us some positive revenue. 8 Q. And what was that pivot to? 9 A. We focused on video and instrumentation 10 that combined video and sensor data, sensors for 11 things like accelerometry and vibration and 12 developed products that added, if you will, the 13 sound to the motion picture. In this case, so 14 high speed data streams to high speed video. 15 So we developed both electronics to 16 control and configure cameras, electronics to 17 control and configure data acquisition systems. 18 We developed sensors for various types of 19 monitoring and manufacturing environments, 20 medical environments, R&D environments. Two 21 halves of the company, one half focused on the 22 electronics to control and configure	Page 55 1 Q. I looked on their website. I didn't see 2 any reference to the optical ring. Is there a 3 reason it didn't get pursued there either? 4 A. Again, we pivoted to be cash positive on 5 to something that was at the time sort of better 6 suited to the market. 7 Q. So you're referring to Xcitex as 8 pivoting? 9 A. Yes. 10 Q. I'm going to -- you have your 11 declaration. 12 A. Yes. 13 MR. SCHULTZ: I need to mark that. And 14 Deposition Exhibit Number 3 is the Declaration of 15 Dr. Brian Anthony, Case Number PGR2024-00030. 16 (Anthony Exhibit 3, Declaration of Dr. 17 Brian W. Anthony In Support of Petition for 18 Post-Grant Review of U.S. Patent No. 11,868,178, 19 marked for identification.) 20 A. Is it okay if I continue to use my 21 bindered version? 22 Q. Fine with me.
Page 54 1 instrumentation systems and do everything from 2 data analysis to closed-loop control, and then 3 the other half of the company, technology-wise, 4 software, to enable the noncomputer scientist, 5 the technician to analyze complex data, do things 6 like filtering and foray analysis and signal 7 processing to get actionable information out of 8 the data that we were then able to collect. 9 Q. And were all those applications you just 10 talked about that used the optical ring you 11 developed? 12 A. No. We developed a prototype of the ring 13 and then pivoted into more of an instrumentation, 14 developing a general base of instrumentation. 15 Q. So the pivot was away from the ring? 16 A. Correct. 17 Q. What became of the ring? 18 A. It was a prototype, and we moved on to 19 other things. 20 Q. So Xcitex is still a going concern, 21 right? 22 A. Correct.	Page 56 1 So in paragraph 6 of your declaration, 2 you state that -- and this is about six lines 3 down -- "Many of the structural elements of our 4 optical ring - developed nearly a decade prior to 5 the '178 patent's earliest priority date - 6 addressed the same system issues as those 7 described and claimed in the '178 patent. 8 Do you see that? 9 A. Yes. 10 Q. Can you tell me what structural elements 11 you're talking about there? 12 A. Well, as far as I describe there, for 13 example, our optical ring included optical 14 structures for light blocking, light redirection 15 and light capture. We estimated human hand 16 motion based on how that motion changed the 17 detected light. We were not trying to eliminate 18 motion artifacts. We were measuring it, so we -- 19 in developing the ring, we considered one of the 20 problems such as extraneous light and motion, 21 which are also discussed in the '178. 22 Q. Is there any documentation on the

Page 57 1 prototype optical ring you developed? 2 A. Not public documents. There are -- 3 certainly we developed documents that we never 4 published on the ring. 5 Q. So there's no publicly available 6 documents describing the ring? 7 A. Not that I'm aware of. 8 Q. Did your ring have a battery? 9 A. We had variants that were used to power 10 the LEDs. 11 Q. What do you mean by variants? 12 A. So we had some that would just rely on 13 light coming from the monitor and some that used 14 light coming from the ring. 15 Q. You had some that -- some LEDs, you mean? 16 A. We had versions of the ring that had 17 active LEDs on the ring itself that were powered 18 with battery, and then we had variants of the 19 ring that were more passive in nature where the 20 light that was interacting with it would come 21 from other LEDs that were not on the ring. 22 Q. Where was the battery located?	Page 59 1 A. Yes. 2 Q. What was the housing made out of? 3 A. I think the first version was PVC. PVC 4 piping was the first version, and then we had 5 milled versions from aluminum. Then we had -- 6 certainly PVC and aluminum. There were other 7 variants. I don't remember what all the 8 materials were that we used. 9 Q. How big was the ring? 10 A. Ring size of finger -- it would fit on 11 the index finger. 12 Q. You're wearing lots of rings. Would you 13 compare it to any of the ones that you have on? 14 A. Probably comparable to this one, the 15 thumb ring. 16 Q. Was there a printed circuit board on the 17 ring? 18 A. Yes. 19 Q. And where was that located on the ring, 20 if on the ring? 21 A. It was on the outer surface of the ring. 22 So you have the ring that was making contact with
Page 58 1 A. On the ring. 2 Q. What type of battery was it? 3 A. I don't recall what the batteries were. 4 Sort of the, like the watch batteries of the 5 time, the little -- oh, I forget, the CR, or 6 whatever they're called. 7 Q. The coin batteries? 8 A. Well, they're not the -- so the coins are 9 like the bigger ones. So the ones that are 10 smaller than a coin. They're sort of coin-like, 11 but they're thicker and the hearing -- more you 12 find them often at least the older versions in 13 hearing aids. 14 Q. So it was the shape of a disk more or 15 less? 16 A. Well, coins are more disc; these were 17 more cylindrical, a little thicker than smaller 18 diameter. 19 Q. Were they off-the-shelf batteries? 20 A. Yes. 21 Q. Were the batteries mounted within a 22 housing in the ring?	Page 60 1 the body and then the circuit board was wrapped 2 around it. 3 Q. So if I asked you for a description of 4 this ring, would you have those documents? 5 A. I do not have any relationship with 6 Xcitex anymore, so those would have been the 7 property of Xcitex. 8 Q. You don't personally have any? 9 A. No. 10 Q. So paragraph 7 through 10 describe, 11 again, a number of experiences you've had 12 professionally. And we've talked about your 13 optical ring. Are any of the experiences here -- 14 did any of the experiences here include the 15 design of a wearable device? 16 A. So certainly in the -- for example, when 17 I was teaching introduction to electrical 18 engineering and computer science through the lens 19 of biomedical instrumentation, we would develop 20 patches for monitoring of EEG and pulse ox, blood 21 oxygenation. 22 Q. Okay.

Page 61 1 A. And you know, certainly also there's an 2 adjustable, definitely not wearable, but 3 adjustable pill that we developed as well. And 4 then some of the things that we did in the 5 microfluidics center were for characterization of 6 a sweat sort of patch on the body. 7 Q. You didn't mention any wearable ring 8 devices. Does that mean -- 9 A. Well, you had asked other wearables, so 10 patchables are wearable. 11 Q. You mentioned patchables. What about 12 wearable ring devices? 13 A. Didn't do any other ring devices other 14 than the ring that we were working on at Xcitex. 15 Q. On paragraph 11 you list four articles. 16 Why did you pick these four articles to list in 17 your declaration? 18 A. I think my full -- I forget which exhibit 19 it is lists all of my publications, at least 20 circa when that document was put together. But 21 these highlight different physiological 22 monitoring approaches that combine light and	Page 63 1 The next one, again, now this is now sort 2 of a handheld device that combines both optical 3 and ultrasound techniques to characterize both 4 skin properties, optically and sub-skin 5 properties, and you do that in a very 6 quantitative way. So that's a handheld device. 7 The next bullet is highlighting a lot of 8 the miniaturization that I've been involved with, 9 so this is an ingestible pill that images the 10 small intestines as it passes through your 11 system. 12 And then the next bullet is talking about 13 various techniques to estimate physiological 14 properties from different types of signals. So 15 it's highlighting the breadth and depth of my 16 sensor and instrumentation. 17 So I'm a complex instrumentation person. 18 I do everything from novel sensors to algorithms 19 to the mechanics that embed those sensor in their 20 function and form and then develop algorithms to 21 then use those data to close the loop, whether it 22 be with the human in the loop or automatic to
Page 62 1 sound. 2 Like the first bullet, the first paper 3 uses both optical techniques and ultrasound 4 techniques to do volumetric imaging; that's not a 5 wearable. It's a large ring. 6 It's a tank-based structure to 7 characterize the full cross section of the limb 8 that allows us to get both the mechanical 9 properties of the limb and the geometric 10 properties of the limb so that you can then 3D 11 print a -- not of the limb, of the residual limb, 12 so that we can then 3D print a custom socket that 13 is the perfect mechanical impedance match to the 14 limb so that you maximize comfort and reduce 15 pressure sores between the -- between the 16 residual limb and the prosthetic coupled with a 17 prosthetic cup. 18 So if you have an uncomfortable shoe, you 19 know it. If you have an uncomfortable 20 prosthetic, you know it. This was targeted to 21 using multiple techniques to get the important 22 properties of the limb.	Page 64 1 estimate properties of health or to improve 2 health. 3 So it's trying to highlight the breadth 4 of my experience and background in areas related 5 to developing physiological monitoring 6 technologies. 7 Q. So is it fair to say you -- well, you -- 8 correct me if I'm wrong. You reviewed your list 9 of publications and you chose these four listed 10 in the declaration; is that fair? 11 A. I think all of my entire CV is listed as 12 part of my background, but these are four that 13 picked to highlight the breadth of -- 14 Q. What criteria did you use to pick these 15 four? 16 A. Again, just highlighting the breadth of 17 my expertise and, you know, representing both me 18 having the knowledge of a POSITA and beyond a 19 POSITA in designing instrumentation and sensing 20 techniques that integrate complex sensing 21 electronics and structures to enable the 22 realization of tools to monitor humans.

Page 65 1 Q. Would you say that these are the four 2 most relevant articles related to the subject 3 matter of the '178? 4 A. I would say that these are four that sort 5 of showed the breadth and depth of the expertise 6 that I have in all the related areas. 7 Q. Relevant to the '178 patent? 8 A. Yes. 9 Q. And none of these relate to wearable 10 devices, do they? 11 A. These references are not wearable. These 12 are further, you know, I used the pointing to the 13 ring and some of the coursework, classes that I 14 teach, those embody a lot of wearables, and here 15 I was rounding out the breadth and depth of my 16 knowledge in the combination of electromechanical 17 structures and housing of complex sensors to 18 ascertain properties of the human. 19 Q. So the only ring you designed is the 20 optical ring that you spoke of earlier with 21 Xcitex; is that right? 22 A. Well, as I described, that was a ring,	Page 67 1 of the coursework. 2 Q. Part of what coursework? 3 A. As part of the courses I teach. For 4 example, introduction to electrical engineering 5 and computer science through the lens of medical 6 engineering, and in that class, it's lab-based, 7 and we teach sensors, EEG, EKG, 8 photoplethysmographs. 9 Q. I'd like to go to paragraph 21 of your 10 declaration where you talk about the level of the 11 ordinary skill in the art. 12 You talk about, one skill I guess you 13 list here is optical engineering. What do you 14 regard as optical engineering? 15 A. The use of optical elements and 16 components, lenses and light sources, to either 17 transmit information, to make measurements, also 18 includes imaging. 19 MR. SCHULTZ: Do you need a break? 20 COURT REPORTER: No. 21 MR. SCHULTZ: I'll go another 15 minutes 22 and then take prelunch break.
Page 66 1 and then developed patches and other both 2 arm-based and chest-based and wrist-based sensors 3 in the various courses that I teach and the same 4 in the research that we did in the 5 microfabrication center, the polymer 6 microfabrication center. And then there's the 7 area of instrumentation and sensing is what I 8 further round out with the publications. 9 Q. I would just caution the witness to be 10 responsive to the questions asked. I asked about 11 the only ring you designed, and then you answered 12 about other things you designed. So when I do 13 ask a specific question, I would appreciate an 14 answer to that specific question. 15 The ring you designed did not have the 16 capability of taking a plethysmogram, did it? 17 A. We did not enable PPG. 18 Q. Have you ever designed a ring that had a 19 PPG sensor? 20 A. The ring that I developed did not have a 21 PPG sensor, but I've developed PPG sensors that 22 are not ring based, but worn in patches, as part	Page 68 1 THE WITNESS: That's okay. 2 Q. We talked about the Oura Ring. Are you 3 -- I guess this is kind of a general question, 4 but what's your awareness of the Oura Ring? Do 5 you know how it operates? 6 A. Well, I'm familiar with it. I've seen it 7 marketed. I've reviewed the patents. 8 Q. Have you studied it in your coursework? 9 A. We've not used that in coursework. 10 Q. Are you aware of how successful the Oura 11 Ring is commercially? 12 A. I did review the -- I think the patent 13 owner, some documents that you had submitted 14 that -- so I reviewed those documents as part of 15 my preparation for today. 16 Q. In your position as someone knowledgeable 17 about the medical device field, do you view the 18 Oura product as a commercial success? 19 A. I see people wear it. I think they've 20 done a great job marketing and creating an 21 ecosystem that supports use that is different 22 than the watch. So I don't know the -- I haven't

Page 69 1 followed the fiscal reports of Oura, but -- 2 Q. Do you have any belief or understanding 3 as to why the Oura Ring is a success? 4 A. Well, I mean, to make a successful 5 commercial product involves sort of a lot of 6 manufacturing innovation, it involves a lot of 7 good marketing and sales channels. You know, 8 being able to deliver what I presume are hundreds 9 of thousands of rings in a repeatable way takes a 10 lot of manufacturing innovation. 11 Q. Is there something unique about the 12 product compared to other wearables on the market 13 that you think contributed to its success? 14 A. Well, as I describe, I think the design 15 attributes at least that are in the patents are 16 preexisting technologies, but definitely give 17 Oura credit for figuring out the manufacturing 18 challenges to reduce variation and improve 19 quality to be able to make it in a low cost way 20 and having good marketing and sales to make a 21 good product. You can have a very successful 22 product without any invention.	Page 71 1 marketing? 2 A. I'm highlighting that to have a good 3 product, you can't just have a good design. You 4 need sort of good manufacturing; you need good 5 marketing; you need good sales. So I don't know 6 the details of Oura's marketing. 7 Q. So your reference to marketing wasn't 8 specific to Oura; it was just specific to 9 products in general? 10 A. Correct. 11 Q. And you also referred to sales. Is that 12 a similar answer that you're referring to a 13 successful -- any successful product needs to 14 have a good sales outlet? 15 A. Correct. And you asked if I understood 16 why, I forget the exact question, but if I 17 paraphrase, you're asking about if I understood 18 why Oura was a -- is a company. To be a company 19 you can't just have a design, you need to have 20 manufacturing, you need to have sales and 21 marketing. And you can have a very successful 22 product just building on top of good marketing
Page 70 1 Q. You mentioned the watch in your prior 2 answer. Do you have a belief as to why the ring 3 was successful, given the fact that there are 4 wearable watches on the market? 5 A. Well, I think many people, many consumers 6 have different preferences for the things that 7 they like to wear. 8 Q. So there's a -- so based on that answer, 9 are you saying that part of the success is due to 10 consumer preference for a wearable ring versus 11 other type of wearable? 12 A. I think you don't have a product if you 13 don't have customers buying it. But you don't 14 necessarily have to have patents to get customers 15 to buy your product. I think the claims that 16 were under issue today were in the art, but I 17 think Oura certainly has achieved sort of good 18 marketing and good sales to sort of get 19 penetration, consumers that want rings instead of 20 watches. 21 Q. You've mentioned marketing a few times. 22 What's your knowledge with respect to Oura's	Page 72 1 and good sales without having any invention. 2 Q. Do you know any of the inventors on these 3 patents? 4 A. No. 5 Q. Do you know anyone from Oura? 6 A. Not that I'm aware of. 7 MR. SCHULTZ: Why don't we take a quick 8 break, five-minute break before we get into a new 9 topic. 10 THE VIDEOGRAPHER: Time is one minute 11 after 11:00. We're off the record. 12 (Proceedings interrupted at 11:01 a.m. and 13 reconvened at 11:11 a.m.) 14 THE VIDEOGRAPHER: We're back on the 15 record. The time is 11 minutes after 11:00. 16 BY MR. SCHULTZ: 17 Q. Like to jump to paragraph 32 of your 18 declaration. There's a reference to "printed 19 circuit board" in this paragraph where you're 20 describing the challenged claims, and you 21 reference a Wikipedia article. 22 Do you see that?

Page 73 1 A. Yes. 2 MR. SCHULTZ: Let me have marked as 3 Deposition Exhibit Number 4 a Wikipedia article 4 entitled "Printed Circuit Board." 5 (Anthony Exhibit 4, Wikipedia article 6 "Printed circuit board," marked for 7 identification.) 8 Q. And my simple question is, you reference 9 this Exhibit Number 4 in your footnote on page 35 10 of your declaration; is that right? 11 A. Yes. 12 Q. Why did you reference this Wikipedia 13 page? 14 A. A PCB is a pretty standard technology, so 15 it was just a convenient encapsulation of the 16 description of PCB. 17 Q. So is the first sentence of this Wiki 18 page, in your mind, an accurate description of a 19 printed circuit board? 20 A. So the first sentence, "A printed circuit 21 board (PCB)" also called printed wiring board, 22 "is a laminated sandwich structure of conductive	Page 75 1 MR. SCHULTZ: Have marked as Deposition 2 Exhibit Number 5, U.S. Patent Number 11,868,178. 3 (Anthony Exhibit 5, U.S. Patent 4 11,868,178, marked for identification.) 5 Q. And the question posed, is the first 6 sentence of your -- the Wiki page you cited 7 consistent with how the printed circuit -- with 8 how the term "printed circuit board" is used in 9 the '178 patent? 10 A. So what's described in the '178, and it's 11 in the abstract, describes a semiflexible PCB, a 12 printed circuit board, approximately conforming 13 to the curved housing and having mounting 14 thereon. 15 So a printed circuit board and a flexible 16 printed circuit board, they're both circuit 17 boards with either rigid or flexible components 18 or substrates onto which there are insulating 19 layers, conductive traces and components. 20 Q. So is that -- is your answer they are 21 consistent, or are there any -- do any 22 inconsistencies come to mind with respect to how
Page 74 1 and insulating layers, each with a pattern of 2 traces, planes, and other features (similar to 3 wires on a flat surface) etched from one or more 4 sheets of copper laminated onto or between sheet 5 layers of nonconductive substrate." 6 And so your question again was? 7 Q. Is that a fair definition of printed 8 circuit board in your mind? 9 A. It's a fair description of the general 10 process for circuit boards, layers of conductive 11 traces. 12 Q. And is that first sentence consistent 13 with how the printed circuit board is used in the 14 '178 patent? 15 A. So I have the '178 patent. Did we 16 introduce the '178 as -- 17 Q. Not yet. Do you need to review the 18 patent to answer that question? 19 A. Well, I was just going to before I 20 answered look at the patent. 21 Q. I suppose we'll mark it sooner or later, 22 so that's fine.	Page 76 1 PCB is used in the Wiki article and how it's used 2 in the '178 patent? 3 And I'll limit my answer to that first 4 sentence. You don't need to read the whole -- 5 unless you need to read the whole Wiki article 6 to... 7 A. So I was just double-checking. So it is 8 described, for example, that on the second -- 9 well, page 3 of the Wiki, describes both rigid 10 and flexible PCBs incorporated in the different 11 devices. So just confirming that it also 12 describes flexible, and it indeed, it also 13 describes flexible PCBs as are used in the '178. 14 Q. Okay. Just circling back, so your answer 15 is that the '178's usage of PCB is consistent 16 with the Wiki article you cited? 17 A. It's consistent with both the Wiki and 18 all the other references that I cite as well with 19 how PCBs are constructed, both rigid and 20 flexible. 21 Q. Can you direct your attention to 22 paragraph 37, please? And my question is with

Page 77 1 respect to the last statement in that paragraph. 2 You say, However, this was well known in the art 3 as shown below. First of call, what do you mean 4 by "this"? 5 A. So as I describe in paragraph 37, the 6 examiner allowed the '178 patent because, quote 7 -- and this is the "this," The prior art does not 8 disclose nor suggest a finger worn ring device 9 with internal and external housing components, an 10 inner circumferential cavity with a battery 11 positioned and shaped to fit inside the cavity 12 and including a circuit board disposed within the 13 interior and exterior component and extending 14 through a portion of the cavity. 15 Exhibit 1004, however, this, meaning that 16 quote, was well known in the art as described in 17 the rest of my declaration. 18 Q. It's fair to say that you disagree with 19 the examiner, correct? 20 A. I do, yes. 21 Q. And just to be clear, when you say it's 22 well known in the art, are you aware of a single	Page 79 1 that it requires to be dependent upon full 2 disclosure in a single reference. 3 Q. Accepting that understanding, you don't 4 opine that there's any reference that anticipates 5 any of the patents at issue here, do you? 6 MR. KAPPOS: Object to form. 7 A. All of my arguments are based on 8 obviousness arguments. 9 Q. And based on your review of all of the 10 documents and art in this case, do you have any 11 unstated opinion as to whether there's a prior 12 art reference that discloses all the elements of 13 the patents at issue? 14 A. In forming my opinions, I used 15 obviousness arguments on different combinations. 16 I did not opine about in anticipation. 17 Q. Apart from your opinions in this case, 18 are you aware of a piece of prior art that 19 discloses all the elements of the claims of these 20 patents? 21 A. You know, in forming my opinions, I 22 relied on obviousness for these combinations. I
Page 78 1 reference that discloses what is quoted on 2 paragraph 37? 3 A. So in my declarations, I use both the 4 knowledge of POSITA and combinations of various 5 prior art to demonstrate what a POSITA would 6 understand that this art was, but I do not point 7 to a single reference to capture all of the 8 aspects that are purportedly inventions in the 9 '178. 10 Q. And you don't opine in any of your 11 declarations in this case that there's a prior 12 art reference that -- 13 MR. SCHULTZ: Well, strike that. 14 Q. Do you know what anticipation is in 15 patent law? 16 A. I believe I do describe it as my 17 understanding as explained to me by counsel. 18 Let's see. 19 Well, my -- I describe my understanding 20 of obviousness, which is the grounds that I use 21 in my declaration. Anticipation I did not 22 include in my declaration. My recollection is	Page 80 1 did not do an exhaustive search of all the 2 patents in the world. I think that the art that 3 I highlight does reveal that the art was known. 4 Q. Just to follow up on that last sentence, 5 I think the -- you say that "I think the art that 6 I highlight does reveal that the art was known," 7 do you mean that from an obviousness standpoint? 8 A. Correct. 9 Q. Going to move to paragraph 43. First of 10 all, you refer to a gentleman by the name of 11 Harry Asada. Do you know Mr. Asada? 12 A. I do. 13 Q. Have you talked to him about this case? 14 A. I have not. 15 Q. Have you talked to him about the Oura 16 Ring? 17 A. No. 18 Q. Have you talked to him about wearable 19 rings? 20 A. No. 21 Q. Have you ever talked to him? 22 A. Yes.

Page 81 1 Q. So you've never -- have you ever 2 discussed his research in the area of wearable 3 rings that you describe in your declaration? 4 A. I have not. 5 Q. Do you know what became of his research, 6 apart from what you describe in your declaration? 7 A. There were many publications. I believe 8 the students went on to other academic or 9 research endeavors. I do not believe he 10 continues this work, so... 11 Q. Other than the prototypes you describe 12 and, for example, on page 39, are you aware of 13 any other physical embodiments of a wearable ring 14 that he developed? 15 A. I think in the -- I think 39, or the 16 figure on 39 is one of the embodiments that is in 17 his papers. I think there are other embodiments 18 in the research that he has done. I'd have to go 19 back and look at his papers. 20 Q. Other prototypes? 21 A. I'm sorry? 22 Q. Other prototypes?	Page 83 1 Q. Right. 2 A. Rhee being a student of Professor Asada, 3 so circa 2000. And I believe many of that thesis 4 work and early papers are also further detailed 5 and described in the 2003 reference. 6 Q. Okay. So as you state here, Harry Asada 7 and his group at MIT developed a ring sensor by 8 2003. 9 As of 2003 would you regard Asada as the 10 world leader in this wearable ring technology? 11 MR. KAPPOS: Object to form. 12 Q. Do you understand the question, 13 Dr. Anthony? 14 A. I do. I do. 15 So you asked circa 2003 whether I would 16 consider Asada to be the or a world leader. So 17 he certainly was -- 18 Q. I think "the" or "a" is fine. 19 A. So I was going and looking at the 20 other -- the dates on the other references to see 21 where they were relative to 2003. 22 So at least amongst the dominant
Page 82 1 A. Other research devices that allowed them 2 to collect data and demonstrate function and form 3 and publish. 4 Q. And so any of these other research 5 devices are in the materials that you've cited to 6 in your report? 7 A. Yes, I believe so. 8 Q. Okay. 9 A. With all his -- I reference many of 10 his -- several of his papers. 11 Q. So at the time of Dr. -- I assume it's 12 Dr. Asada? 13 A. Yes. 14 Q. Dr. Asada developed this around the 2003 15 time period; is that right? That's what you 16 refer to here. And I'll just direct you to the 17 bottom of your paragraph 43 and you cite to Asada 18 2003. 19 A. Understood. 20 You asked if that was the -- so there are 21 other Asada references that are led with first 22 author Rhee, that were earlier.	Page 84 1 references that I cite here, 2003, but Asada is 2 one of the earlier dates. The Schröder, for 3 example, is after that. And so Asada was at 4 least one of the folks leading the way in rings 5 at the time. 6 Q. In the world, correct? 7 A. Correct. 8 Q. Paragraph -- I promise you I won't be 9 going backwards. But paragraph 42, the first 10 sentence you state, "Wearable electronic devices, 11 along with the various design challenges they 12 posed and the solutions proposed to address these 13 challenges were well known but to a POSITA by 14 2013." 15 Do you see that? 16 A. Yes. 17 Q. In your opinion, were those -- is this 18 statement also true as of 2003? 19 A. I didn't opine upon 2003. I understand 20 the priority date of the patent under issue is 21 2013, so I used 2013 as the date for my 22 consideration.

Page 85 1 Q. As an expert who's knowledgeable on this 2 technology and what you've opined about here, do 3 you know if these challenges in the first 4 sentence of paragraph 42 existed as of 2003? 5 A. Again, I didn't opine upon that in 6 forming my opinions here. It wasn't necessary in 7 forming my opinions with respect to 2013. 8 Q. I understand that. I'm asking you if you 9 have an opinion now. If you don't, that's fine. 10 A. I don't. I opined about the 2013 date. 11 Q. Were the -- well, you cite to -- part of 12 what you cite to is in paragraph 42 is Asada 13 dated 2003, another cite to Asada dated 2003, and 14 a cite to Mendelson in 2006. So given that, is 15 it fair to say that these design challenges were 16 well known before 2013? 17 A. Again, sort of the same question, I 18 opined about 2013 as the date to demonstrate what 19 the art was known. Certainly Asada was 20 publishing before that, but as I highlight in 21 using Asada's discussion of relevant technology, 22 background and the references were certainly	Page 87 1 A. That's when he published, yes. 2 Q. So looking at your paragraph 44 -- 3 A. I'm sorry. 44? 4 Q. Yes. 5 -- you cite to Asada with respect to 6 certain motivations for implementing a wearable 7 electronic device in the form of a ring; is that 8 right? 9 A. I'm in 44. Asada explains the 10 motivations for implementing a wearable 11 electronic device in the form of a ring, noting 12 that compactness, stability of signal, motion, 13 and other disturbance rejection, durability, data 14 storage, and transmission, and low power 15 consumption are major design considerations. 16 Q. So Asada was aware of compactness and 17 comfort, to name two of the features he mentions, 18 right? 19 A. Compactness, stability, data 20 transmission, low power consumption. He further 21 notes it is imperative they are simple to use and 22 comfortable to wear for a long period of time.
Page 86 1 known by 2013. 2 Q. And according to your citations here, it 3 was known as of 2003, too; isn't that right? 4 A. Well, these are dates when Asada 5 published, and my opinions are circa the 2013 6 date. It so happens that indeed Asada did 7 publish before that, but the date that I used for 8 my opinions is 2013. 9 Q. And a similar question for paragraph 43, 10 where you say "wearable electronic devices in the 11 form of a finger ring structure were also known 12 by 2013," were they also known before 2013? 13 A. Again, I think similar answer. Certainly 14 Asada was publishing between 2013, and I use 15 Asada in my discussion of technology background. 16 The date that I used for forming my opinions was 17 2013, and so how I'm also referencing the other 18 dominant references in forming my obviousness 19 opinions. 20 Q. Certainly Asada was aware of wearable 21 electronic devices in the form of a finger ring 22 structure as of 2003; isn't that right?	Page 88 1 He explains that since continuous monitoring 2 requires a device that must be noninvasive and 3 worn at all times, a ring configuration for the 4 sensor unit is a natural choice because of its 5 low weight, small size, and rings are generally 6 worn without removal more often than watches. 7 Q. So do you think what's described in the 8 '178 patent meets these motivations that you've 9 listed? 10 A. Again, I do not opine upon Asada meeting 11 all the limitations -- the limitations of '178. 12 I explain to Asada's technology background and 13 describe how the other references in the 14 knowledge of a POSITA would meet the limitations. 15 So I guess I... 16 Q. So the question was, does the '17 -- 17 what's disclosed in the '178 patent, and when I 18 say "'178 patent," I'm referring to all three 19 patents at issue here. Does it meet the 20 motivations that Asada was attempting to achieve 21 and that you list in paragraph 44? 22 A. Well, I don't see in at least the '178,

Page 89 1 recognizing that when you say '178 you're 2 referring to all three, but in the '178 there 3 is -- and what's claimed, there's nothing that 4 says something about its durability or its 5 comfort. That's not what's claimed in the '178 6 as it is described in the -- 7 Q. What do you mean "claimed"? 8 A. Well, in the claims of the '178. 9 Q. I'm not talking about the claims. I'm 10 talking about what the '178 patent describes in 11 its specification of the ring. I mean, you've 12 studied the patents, right? 13 A. I have. 14 Q. And the ring that's described in the 15 patents? 16 A. Yes. 17 Q. And you wrote down these design 18 considerations of Asada here in your declaration. 19 So my simple question is, did the '178 20 patent -- does the ring described in the '178 21 patent or any of the rings described in the '178 22 patent, does it meet these design considerations	Page 91 1 A. Again, I didn't opine upon sort of their 2 comfort. I opined upon whether the prior art met 3 the claims that are described in the '178. 4 Q. You're an expert in this art, right? 5 A. I am. 6 Q. And you understand the ring that's shown 7 in the '178 patent and described? 8 A. Yes. 9 Q. And you don't have a view as to whether 10 its comfortable or not, as Asada describes here? 11 A. I've never worn on Oura Ring, and in 12 forming my opinions, I was forming opinions about 13 whether the prior art met the claims, not whether 14 they met what Asada was motivating as the -- 15 Q. If your answer is I don't know, that's 16 fine. If you have an opinion, that's fine as 17 well. But I'd like either one of those answers. 18 Do you have an opinion as to whether the 19 '178 -- the ring described in the '178 patent 20 meets these design considerations or it doesn't? 21 MR. KAPPOS: Object to form. 22 Q. And if you don't know, that's fine, too.
Page 90 1 that are listed in paragraph 44 of your 2 declaration? 3 A. Well, I was opining not upon these design 4 considerations, but upon the claims and whether 5 or not the prior art met the claims. I was about 6 to Rhee-review the specification to see if in 7 that description it opines upon these various 8 factors. But I was not opining upon the -- for 9 example, the comfort that's not highlighted in 10 the claims nor is it what I've opined upon 11 whether or not the prior art meets the things 12 that are described in the claims. 13 Q. Okay. Do you know what Asada meant by 14 "comfort"? You wrote it down in your 15 declaration. 16 A. I quoted what he was describing here, I 17 believe. Let's see. He further notes that it is 18 imperative they are simple to use and comfortable 19 to wear for a long period of time. 20 Q. Is it your view that the rings described 21 in the '178 patent are simple to use and 22 comfortable to wear for long periods of time?	Page 92 1 A. In forming my opinion and my analysis, I 2 did not opine upon these considerations. I 3 opined upon the things that are claimed. 4 Q. But we wouldn't be at a deposition if 5 this deposition was limited to what's in your 6 declaration. So I'm entitled to explore your 7 knowledge on other aspects of what's described in 8 your declaration and what's described in the 9 patent. So, again, we're running into a 10 situation where you can't answer a question that 11 is a yes-or-no question. 12 MR. SCHULTZ: I'll mark that transcript 13 again, please. 14 Q. So if your answer is I don't know, that's 15 fine. If your answer is no, I don't think the 16 '178 patent meets these design considerations, 17 that an answer, too. If your answer is it does 18 meet these design considerations, that's a third 19 answer. There's only three possibilities. 20 A. There's another possibility. It may or 21 may not. I did not form an opinion about that -- 22 Q. That was my first possibility, it may or

Page 93 1 may not. If you don't have -- if you don't -- if 2 based on how you've studied this patent and these 3 Asada considerations you don't have an opinion, 4 then I'll accept that. 5 A. Again, so it may or may not. My opinions 6 here are whether or not the art met the claims of 7 the '178 family of patents. 8 Q. Okay. So the rings described -- I want 9 to get your testimony clear. The rings described 10 in the '178 patent may or may not meet these 11 designs considerations, that's your answer? 12 A. In forming my opinions about whether the 13 prior art was met, yes. 14 Q. I don't need a qualification, because 15 it's a clear question. I'm not asking you about 16 forming your opinions about whether the prior art 17 was met. 18 I'm asking does the '178 patent meet 19 these design considerations? 20 MR. KAPPOS: Object to form. 21 Q. Again, if your answer is it may or may 22 not, that's fine. But that should be your whole	Page 95 1 you can't answer that question, right? 2 A. As I said, it may or may not. That was 3 not what I was forming my opinions around. My 4 opinions were formed around -- 5 Q. I know. I'm asking if you can answer the 6 question. 7 A. And I did. It may or may not. 8 Q. Okay. Thank you. 9 Same question with respect to the 10 prototype shown on page 39, Asada's prototype. 11 Do you see that? 12 A. Yes. 13 Q. So in your expert opinion, and, again, 14 whether you formed one or not, I'm asking you 15 this question, does Asada's prototype on page 39 16 meet the design considerations that you list in 17 paragraph 44 of your declaration? 18 A. Again, I was not opining upon whether 19 Asada was a comforting device. Comfort is a 20 subjective thing. Depending on the user, comfort 21 would mean different things. And, again, Asada 22 may or may not for different users meet those --
Page 94 1 answer. 2 A. So as I've described in forming my 3 opinions, I was addressing the claims. It may or 4 may not address those, but in forming my 5 opinions, I was considering the claims. 6 Q. So sitting here today, do you -- giving 7 your expert knowledge considering these design 8 considerations, do you -- can you form an opinion 9 as to whether the '178 patent meets these design 10 considerations? 11 MR. KAPPOS: Object to form. 12 A. I'm happy to review and sort of take some 13 time to, you know, form some opinions about these 14 various factors, but that will take some time. 15 Q. Okay. Well, if your answer is I need to 16 take time to answer that question, then I'll 17 accept that. 18 A. Again, in forming my opinions, I was not 19 opining upon the comfort. I was opining upon 20 what is claimed and whether the art met those 21 claims. 22 Q. So without reviewing the patent further,	Page 96 1 meet that idea of comfort -- 2 Q. So your view is that that might be viewed 3 as comfortable, what's shown in Figure 9 on 4 page 39 of your declaration? 5 MR. KAPPOS: Object to form. 6 A. Again, comfort, there's no quantitative 7 measure of comfort. What's comfortable to you, 8 what's comfortable to me, what's comfortable to 9 different users is different. So comfort is a 10 very subjective thing. 11 So as the '178 may or may not be 12 comfortable, Asada may or may not be comfortable, 13 but I did not opine on comfort. 14 Q. What about the other considerations, 15 compactness, stability of signal, et cetera, et 16 cetera, does Asada meet those? 17 MR. KAPPOS: Object to form. 18 A. Again, in forming my opinions, I used 19 Asada as sort of context in technology background 20 and used other -- 21 THE VIDEOGRAPHER: Sorry. Your mic just 22 fell off.

Page 97 1 MR. SCHULTZ: Oh, sorry. 2 A. Can you re-ask the question? 3 Q. Yes. 4 Does the Asada prototype on page 39 of 5 your declaration meet the design considerations 6 listed in the first sentence of your paragraph 7 44? 8 MR. KAPPOS: Same objection. 9 A. Again, I was not opining upon Asada and 10 whether it met what it was -- what Asada was 11 describing as the motivations. Presumptively, 12 the authors felt that it met some of those 13 factors in some way, but in forming my opinions, 14 that's not what I was opining upon. 15 Q. So apart from what opinions you formed, 16 do you have any opinion? You're the expert. 17 A. So all these factors are design 18 considerations. In forming any kind of 19 instrument, any kind of sensor that is to be worn 20 and measure things, there are many design 21 trade-offs, many design factors such as 22 compactness, stability of signal, motion	Page 99 1 more or less compact. 2 Q. Is the ring described in the '178 patent 3 more compact than Asada's prototype? 4 MR. KAPPOS: Object to form. 5 A. Again, I was not opining upon the 6 compactness. 7 MR. SCHULTZ: What's the form objection? 8 You objected to form. I -- 9 MR. KAPPOS: I objected to form because I 10 wanted to put an objection on the record to form. 11 MR. SCHULTZ: Well, I can fix the 12 question. 13 MR. KAPPOS: The question is unclear. 14 MR. SCHULTZ: That's not how it works. 15 If you object to form, you have to explain your 16 objection, and I'll try and fix my question. 17 MR. KAPPOS: The question is unclear. 18 It's vague and ambiguous. 19 MR. SCHULTZ: It's not ambiguous. I'm 20 asking questions about what's exactly in his 21 declaration, so your objection is improper. 22 MR. KAPPOS: I'm not instructing him not
Page 98 1 disturbance, et cetera, design, battery life, 2 comfort, with various trade-offs along those 3 different axes for how you choose to design and 4 assemble. 5 So were those considerations? Did they 6 meet them in some way? I was not opining upon 7 that. But those are certainly the design 8 considerations that would be certainly in the 9 head of Asada when they're doing such a device 10 and similar design considerations as trade-offs 11 would be in anybody designing such a device. 12 Q. Okay. Let's just talk about compactness. 13 Do you view that Asada prototype as being 14 compact? 15 MR. KAPPOS: Object to form. 16 A. Yes or no. It could be bigger; it could 17 be smaller. So along some axis of compactness. 18 If it's someplace along an axis, could there be 19 trade-offs of compactness relative to other 20 factors, certainly, but there's some measure of 21 compactness where it could be made bigger and 22 smaller, arguably that bigger or smaller would be	Page 100 1 to answer. 2 MR. SCHULTZ: Your objection is improper. 3 Q. Can you answer the question? 4 A. Can you please re-ask it? 5 Q. Is the ring described in the '178 patent 6 more compact as the term "compact" you use in 7 your declaration than Asada's prototype that's 8 listed in your declaration? 9 MR. KAPPOS: Same objection. 10 A. So what I describe here in 44 is a quote 11 from Asada. And I was not forming an opinion 12 relative to the relative compactness of '178 13 relative to Asada. What I was opining upon is 14 whether what is described in the claims is met by 15 the art. 16 Q. So you can't -- you can't, sitting here 17 today, tell me whether the '178 -- the ring in 18 the '178 patent is more compact than Asada's 19 prototype? That's your testimony, right? 20 A. Again, it may or may not be, depending on 21 different design considerations in terms of the 22 size and how different rings are made. I was not

Page 101 1 opining upon the relative compactness. 2 Q. So in the Asada prototype shown on 3 page 39 of your declaration, he shows a CPU 4 mounted on top of the ring; is that right? 5 MR. SCHULTZ: Well, strike that. 6 Q. He shows a circuit board mounted on top 7 of the ring housing; is that right? 8 A. In Figure 9 it's pointing to a circuit 9 board that has a CPU and RF transmitter on the 10 ring. 11 Q. And where's the battery? 12 A. It's not shown in that figure. 13 Q. You don't know where it is? 14 A. It's not shown in that figure. 15 Q. I didn't ask whether it was shown in the 16 figure. I said, do you know where it is? 17 A. So as I describe in paragraph 84, 18 electronic parts housed within a structural 19 cavity in an electronic device could include, for 20 example, microcontrollers -- 21 (Interruption by reporter.) 22 THE WITNESS: I'll start over.	Page 103 1 reading from. 2 Q. Below the figure that's in your 3 declaration. 4 A. Oh, there we go. Thank you. 5 So it's not highlighted there. It's 6 presumptively in the structure of the ring or as 7 also described in Figure 1 is in the -- in the 8 ring at some location. I don't -- did not label 9 the location of the coin cell battery. 10 Q. So just looking at this figure, you don't 11 know where it is? 12 A. Again, depending on the size of the 13 battery, it could be in the thing that's seen on 14 the top of the finger, at some place in it. It 15 can also -- I think Asada opined upon putting it 16 in the ring body itself. But again, in forming 17 my opinions, just to be clear, I was not opining 18 upon the specific construction of Asada. 19 Q. In paragraph 45, you talk about Asada 20 implementing a double ring configuration. 21 Do you recall that? 22 A. So as you point out in my declaration in
Page 102 1 A. In paragraph 84, electronic parts housed 2 within a structural cavity in an electronic 3 device could include, for example, 4 microcontrollers, batteries, and RF communication 5 components. And for example, Rhee's thesis and 6 papers teach a ring sensor that included 7 optoelectronic components, a CPU, RF transmitter, 8 a battery, and a ring chassis, describes what the 9 optoelectronic components are doing. 10 In the schematic then on conceptual 11 diagram of the ring sensor on page 63, above 12 paragraph 85, highlights one possible arrangement 13 of the battery inside of the ring. 14 MR. SCHULTZ: I asked about Asada's 15 prototype, so that entire answer was 16 nonresponsive and I'll move to strike it. 17 Q. On page 39 it says the first prototype 18 ring sensor with an RF transmitter powered by a 19 coin size cell battery. 20 Where is the coin size cell battery in 21 this prototype? 22 A. First I was trying to see where were you	Page 104 1 paragraph 45, Asada explains obvious source of 2 signal corruption results from direct interaction 3 of the sensor wherein surrounding environments, 4 therefore, the body of the ring must separate the 5 sensor unit in order to decouple the sensor unit 6 from these interactions and, therefore, they 7 designed and implemented a double ring 8 configuration such that the disturbance force is 9 borne by the outer ring and not transmitted to 10 the inner ring holding the sensor unit, and the 11 outer ring serves as the optical shield for 12 protecting the sensor unit from ambient light. 13 Q. And do you remember what the double ring 14 configuration looks like? 15 A. So it's highlighted in, for example, 16 Figure 10 on page 39, there's a schematic that 17 shows the outer ring and the inner ring. 18 Q. Does the '178 patent use this double ring 19 configuration? 20 A. Again, I was not opining on Asada's 21 description of double ring to form my opinions. 22 I include it here as technology background and

Page 105 1 also point to the other references I cite. 2 What is described in the '178 is a finger 3 ring with an external housing component. It's 4 claim 1 of the '178 an external housing component 5 and internal housing component. I did not opine 6 on the equivalency necessarily of housing 7 components to that structure in forming my 8 opinions. 9 Q. So you don't know? 10 A. That's not what I said. 11 Q. So you're not answering my question then. 12 MR. KAPPOS: Object to form. 13 Q. If every time you answer my question by 14 saying, I was not opining on something, I'm going 15 to count them all and I'm going to move for 16 sanctions at the PTAB because you're being 17 nonresponsive. 18 MR. SCHULTZ: So that's a note for you, 19 too. 20 Q. Can you answer my question? 21 A. Please, can you repeat the question? 22 Q. Does the '178 patent use the double ring	Page 107 1 depositions. So we'll count that one, too. And 2 I'll give you a third opportunity to answer the 3 question, which has nothing to do with what 4 you've already opined on. 5 Does the patent teach the double ring 6 configuration you refer to in paragraph 45 of 7 your declaration? 8 MR. KAPPOS: Object to form. 9 A. So as, indeed, I do opine on page 54, 10 wearable devices have inner and outer surfaces 11 were known. So finger ring structures having 12 inner and outer surfaces with electronics housed 13 inside of a cavity were known. For example, Rhee 14 thesis and papers teach a finger ring sensor 15 having an inner and outer surface. Specifically 16 Rhee teaches, as shown in Figure 1 and Figure 3 17 that's on page 54, that an inner ring floats 18 inside the outer ring such that when a patient 19 wears the ring, both rings are put on the same 20 finger. And since the outer ring covers the 21 inner ring, the external force is borne by the 22 outer ring. It does not directly act on the
Page 106 1 configuration that you're talking about in 2 paragraph 45 of your declaration? 3 MR. KAPPOS: Object to form. 4 MR. SCHULTZ: What's wrong with the form? 5 MR. KAPPOS: Patents don't use. They 6 describe, they teach, they explain. 7 Q. Does the patent teach the double ring 8 configuration that you refer to in paragraph 45 9 of your declaration? 10 A. I did not opine upon whether or not the 11 Asada description of double rings was as 12 described in the '178. But in forming my 13 opinions, as I point to starting on page 111, you 14 know, when I point to Schröder, for example, and 15 Schröder in combination, I point to Asada as 16 relevant technology background. Didn't opine 17 upon any kind of equivalency between inner and 18 outer ring of Asada in the '178. 19 Q. That's yet another time you answered a 20 question about what you opined on. I didn't ask 21 you what you opined on. I asked a question. 22 You're supposed to answer questions at	Page 108 1 inner ring. 2 Q. Again, are you answering my question or 3 are you just reading something? 4 A. I'm answering your question. You asked 5 about Asada and '178, and I describe my analysis 6 of Asada here in the background on having inner 7 and outer surfaces, having cavities. And then 8 they further go on later in the detailed 9 explanation around patentability. But certainly 10 as I describe here, the Asada device having inner 11 and outer surfaces and inner and outer structural 12 cavities was known. 13 Q. I didn't ask you that. I asked you 14 whether the '178 patent used the double ring 15 configuration. 16 A. So I did not opine upon whether or not 17 the '178 described the -- would be the double 18 ring configuration, but certainly Figure 7 in the 19 Schröder reference talking about -- 20 Q. I didn't ask you about the Schröder 21 reference. 22 A. Talking about the -- how a POSITA would

Page 109 1 understand how to use an inner and outer 2 structure similar to what is -- or inner and 3 outer housing component is indeed taught. Asada 4 has structures that have some inner and outer 5 surface functionality. 6 But I was not using Asada in -- and in 7 the '178 is describing structures that are 8 internal housing component and an external 9 housing component. 10 Q. So you have no opinion about whether the 11 '178 patent uses the double ring configuration 12 that you describe in your declaration? 13 A. Well, what is described in the 14 specification of the '178, for example, is 15 described in inner and outer bands. And 16 certainly there's some relationship between inner 17 and outer bands, inner and outer structures of 18 what are the -- sorry -- inner and outer 19 components and inner and outer rings. But in 20 forming my opinions, I was not sort of mapping 21 '178 to Asada exclusively. I was using other 22 references. But certainly in column 20, for	Page 111 1 elastic fabric, an optical sensor unit and 2 batteries. 3 Q. And where does this come from? 4 A. This is, let's see, Rhee thesis, Rhee 5 2000, part 2 as shown in Figure 1 and Figure 3. 6 It's also Rhee 2001. 7 (Clarification by the reporter.) 8 A. Figure 1 comes from Rhee 2000, part 2; 9 and Figure 3 comes from Rhee 2001. 10 Q. Why is this in your declaration? 11 A. As I'm describing here in the background 12 technology section, wearable devices having inner 13 and outer surfaces were known, and so I'm 14 providing that as background technology. 15 Q. So it looks like Rhee, according to your 16 labels here, or Rhee's labels, there are circuit 17 boards and batteries mounted on top of the 18 outside of the ring; is that right? 19 A. As labeled in Figure 1, there are circuit 20 boards and outer rings and as shown in that 21 figure. 22 Q. And they're mounted on top of the ring,
Page 110 1 example, there's an inner and outer band 2 embodiment of rings? 3 Q. And to you that equates to the double 4 ring configuration referred to in your 5 declaration? 6 A. The inner and outer ring that's described 7 in Asada is described in Asada as being used for 8 particular ways, some of which are to isolate 9 different forces. The inner and outer band 10 description there in the '178 doesn't discuss. I 11 think it's silent on whether it's serving that 12 function. So I did not form an opinion about 13 whether it was mapping in that way, the way that 14 Asada is using inner and outer rings. 15 THE WITNESS: Maybe another 15 minutes we 16 can grab lunch? 17 MR. SCHULTZ: Sure. 18 Q. Turn to page 54 of your declaration. 19 What is shown in these, what you refer to as 20 Figure 1 here? 21 A. Figure 1 is highlighting the circuit 22 boards, the outer ring, aluminum inner ring,	Page 112 1 correct? 2 A. They are shown here as mounted on top of 3 the ring, correct. 4 Q. So who is Rhee? 5 A. Rhee was a, I believe a student and maybe 6 eventually a post-doc of Asada. 7 Q. Would you view this design of Rhee as 8 compact and comfortable? 9 MR. KAPPOS: Object to form. 10 A. So at least Asada and Rhee felt that it 11 was compact. They describe back in paragraph 47 12 on page 42 that the miniaturized sensor in the 13 ring configuration is a rational design choice. 14 So miniaturized along some axis of the 15 miniaturization and compactness. It's smaller 16 than some things, bigger than others, but... 17 Q. So your answer is Asada and Rhee felt it 18 was compact and comfortable, based on what you've 19 quoted here? 20 A. Again, as I described in designing such 21 devices, there are multiple trade-offs in terms 22 of size. It is smaller than some things, bigger

Page 113 1 than other things. So it's relatively compact. 2 Could be made smaller potentially and could be 3 made bigger potentially and still be comfortable 4 potentially. 5 Q. Would you wear what's shown on page 54 of 6 your declaration all day? 7 A. I might. I tend to wear a lot of rings. 8 Q. Your rings don't have circuit boards and 9 batteries on the top, do they? 10 A. They do not. 11 Q. Asada's prototype also had batteries 12 mounted in this fashion; is that right? 13 A. Well, this is Rhee and Asada, so they are 14 sort of -- you know, the batteries are mounted 15 like, at least in this figure in the structure, 16 and it's on the outer ring. 17 Q. So the '178 does not mount batteries and 18 circuit boards on top of the outer ring as shown 19 here, does it? 20 A. So it's described in claim number 1 of 21 the '178, "A battery positioned within a cavity 22 formed between the internal housing component and	Page 115 1 signal conditioning and the issues relative to 2 force and getting good signal. 3 I think they weren't necessarily focused 4 on making a consumer product but instead to 5 demonstrate the science of improving the signal 6 and potentially the comfort and putting the 7 batteries was not the -- location of the 8 batteries was not, presumptively, the dominant 9 consideration here. 10 Q. Well, they were focused on compactness 11 and comfort, according to what you've quoted, 12 right? 13 A. Certainly in making a ring that is more 14 compact than something that is elsewhere on the 15 body. 16 MR. SCHULTZ: Why don't we break for 17 lunch. 18 THE WITNESS: Okay. 19 THE VIDEOGRAPHER: Time is 12:23. We are 20 off the record. 21 (Proceedings interrupted at 12:23 p.m. and 22 reconvened at 1:19 p.m.)
Page 114 1 the external housing component wherein the 2 battery comprises a shape and size configured to 3 fit within the cavity between the outer 4 circumferential surface of the external housing 5 and the inner circumferential surface of the 6 internal housing component." 7 And then later on in my declaration I 8 describe how Schröder and others have similar 9 battery structures on the inside. 10 Q. But Asada didn't do that, did he? 11 A. At least, as was published here, 12 batteries are on that side. But I was not in 13 forming my opinions about obviousness. I was 14 pointing to Asada as background, relevant 15 background technology. 16 Q. So according to you, Asada was a world 17 leader in this technology, and he chose to put 18 batteries and circuit boards outside the ring; is 19 that correct? 20 A. Circa 2003, in the publications here, 21 2001, the batteries are on the outside in order 22 to have a prototype to presumptively evaluate the	Page 116 1 THE VIDEOGRAPHER: We are back on the 2 record. The time is 1:19. 3 BY MR. SCHULTZ: 4 Q. Dr. Anthony, we were talking about Rhee 5 and Asada and their development of a wearable 6 ring prior to lunch. Do you consider or would 7 you consider the '178 patent design an advance 8 over Rhee and Asada? 9 A. I mean, again, I was not considering the 10 '178 relative to advancements on Asada but 11 whether or not the prior art met the claims of 12 the '178 family. There are -- I think the 13 innovations that are reported in the '178 are 14 described in the art and Asada is on the history 15 of that art, but I point to Schröder and others 16 to highlight how the POSITA would see the art 17 when it existed. 18 Q. So that's not responsive to my question. 19 I didn't ask about Schröder. I asked whether you 20 considered what's taught by the '178 patent as an 21 advance over the research of Asada and Rhee and 22 the prototype they developed. And, again, if you

Page 117 1 don't have an opinion, that's fine, but I need an 2 answer to that question. 3 A. Well, certainly Schröder and Niwa and the 4 combinations are advancements that include 5 advancements over Asada, and those advancements 6 are the advancements that are also reported to 7 have been in the '178 family, but those 8 advancements are embodied in the art that I 9 highlight, but are -- some of which are 10 advancements over Asada, yes. 11 Q. When you answered that question, did you 12 have any specific advancements in mind? 13 A. No. 14 Q. Can you tell me what you meant when you 15 said "advancements"? 16 A. Well, certainly. So if you look, for 17 example, at things like Schröder and the 18 combinations that I propose that are the 19 combinations of Schröder's technology and Niwa 20 and, you know, that talk about different housing 21 components and different ways of arranging 22 structures to potentially include things	Page 119 1 A. Correct. 2 Q. Apart from the claims of the '178, does 3 the specification of the '178 and the rings 4 described therein describe an advancement over 5 the technology described in Schröder and Niwa? 6 A. Well, there's a specification of the 7 '178, and then there's the claims of the '178 and 8 '178 family. And what I describe in my 9 declaration is how those purported claims are met 10 by the art. 11 Q. So you didn't opine -- you don't have an 12 opinion as to whether the '178 specification 13 describes advancements over that technology? 14 A. I did not opine upon the full text of the 15 specification by itself. I'm opining upon the 16 claims of the various patents and whether or not 17 those claims were met in the art. 18 Q. Okay. Based on that answer, is it fair 19 to say that the '178 specification may or may not 20 included advancements over those references; is 21 that your testimony? 22 MR. KAPPOS: Object to form.
Page 118 1 completely inside the ring, those are 2 advancements that are embodied in the prior art, 3 and that are not advancements of the claims in 4 the '178 family. 5 Q. So just to be clear, your testimony is 6 that the '178 patent family does not represent an 7 advance over Schröder or Niwa? 8 A. Sorry. Could you repeat that question? 9 MR. SCHULTZ: Could you repeat the 10 question, please. 11 (Whereupon, the record was read as 12 follows: Question: "So just to be clear, your 13 testimony is that the '178 patent family does not 14 represent an advance over Schröder or Niwa?") 15 A. So the '178 family does not represent 16 enhancements over the grounds and the claims -- 17 the grounds that I put forth in my declaration, 18 which include Schröder in view of POSITA, 19 Schröder in various combinations, Niwa in various 20 combinations as well. 21 Q. You said "enhancements." Did you mean 22 advancements?	Page 120 1 A. My analysis was on the claims of the 2 various patents in the context of the 3 specifications, and so what is claimed as 4 invention, it's not the specification, is claimed 5 the -- it's claimed as the claims. And so I was 6 opining upon whether or not the claims are met in 7 the art. 8 Q. Again, if my question doesn't ask about 9 your opinion, then I'm asking a question about 10 the references in the art, not whether you formed 11 or opined on something. So that's the question 12 being asked. 13 Having read the '178 patent, are there 14 any advancements that come to mind over Schröder 15 and Niwa? 16 A. I did not opine upon them. 17 Q. I didn't ask whether you opined on them. 18 I'm asking whether you've read the reference, did 19 you see, oh, Figure 2, that's a good idea, that's 20 not in the claims, but that's an advancement? 21 So, again, trying to be responsive to 22 questions, are there any advancements you noted

Page 121 1 in the '178 patent where you are aware of in the 2 '178 patent over Schröder and Niwa? 3 A. Schröder, Niwa, and collectively the 4 various references that I cited. 5 Q. Yes. And, again, if your answer is I 6 don't know of any or I haven't considered it and, 7 therefore, I need to consider it, that's fine. 8 But do you have an answer? 9 A. I thought I had answered it in that way. 10 Q. No. Well, your answer was I haven't 11 opined on that. 12 A. Right. Which means I hadn't considered 13 it. 14 Q. Okay. 15 A. And whether or not there -- so what I 16 opined upon was whether the claims in the context 17 of the specification were met in the art, and 18 that's what I was opining upon. 19 Q. Okay. And now I'm asking you if you have 20 an opinion, if any, on whether the specification 21 of the '178 describes any advances over that 22 part?	Page 123 1 light from a detector, whether it be on the same 2 side or the opposite side. 3 Q. So are those still viable technologies in 4 terms of wearable devices, both reflectance and 5 transmission? 6 A. Yes. 7 Q. And if you were designing a ring, is that 8 a design choice you'd have to make as to which 9 one of those you were using? 10 A. So both geometries are used to measure 11 light through the tissue, and a POSITA would -- 12 could choose to use one or the other or some 13 combinations in creating a wearable device. 14 Q. And the choice of transmission or 15 reflectance, that influences how the ring as a 16 whole would be constructed, doesn't it? 17 A. So you want in -- as they described, 18 yeah, you want light to take a path through the 19 tissue, and so in reflectance and transmission 20 know that you design such that you are getting 21 light into the tissue and out of the tissue, so 22 different geometries. There are different
Page 122 1 A. Not at the moment, no. I don't have an 2 opinion on that. 3 Q. Paragraph 65 and others you refer to -- 4 A. Of my declaration? 5 Q. Yes. 6 -- reflectance and transmission, can you 7 just, for the record, tell me what those 8 technologies you're referring to there? 9 A. So back up to that section which is 10 section 5 on page 49 which talks about 11 transmission of lights compared to the reflection 12 of light and describe in paragraph 63 pulse 13 oximetry devices used to measure SP02 through 14 both transmission mode and reflection mode. 15 So in transmission mode, generally the 16 light emitter and detector are on opposite sides 17 of the tissue, and in the reflection mode, the 18 emitter and detector are generally on the same 19 side of the tissue, and I further describe that 20 in 64. 21 And so what I'm referring to in 65 are 22 reflectance and transmission mode of receiving	Page 124 1 geometries you may choose to use in creating 2 those different tissue pathways. 3 Q. And by "geometries," you're referring to 4 geometries of a ring? 5 A. Geometries of the arrangement of where 6 the emitters and the detectors are. 7 Q. The layout of emitters and detectors in 8 the ring, they influence how the ring is 9 constructed as a whole; is that fair? 10 A. I'm sorry. Can you repeat that? 11 Q. Sure. 12 The layout of the emitters and detectors 13 in the ring, they influence how the ring is 14 constructed as a whole? 15 A. So as I describe, indeed, in paragraph 63 16 in those various modes, there are physical 17 arrangements of emitters and detectors, the 18 methodology by which you measure the received 19 light and estimate either the volume change or by 20 using multiple lights. The variable volume 21 change to get things like SP02, you want to 22 ensure that you have light going through your

Page 125 1 tissue. And so you want to have the emitters and 2 transmitters arranged in a way that light is 3 going into the tissue from the transmitter and 4 back to the receiver. 5 Q. Again, this is touching on something we 6 talked about before lunch. We talked about the 7 double ring configuration that Asada and Rhee 8 proposed. Is that something you're familiar 9 with? 10 A. Uh-huh. 11 Q. And am I correct that that configuration 12 was chosen to in part avoid problems with respect 13 to noise that could occur; is that accurate? 14 A. Did -- sorry. Can you repeat the 15 question? 16 Q. Well, let me ask you, you're the expert: 17 Why did they choose the double ring 18 configuration? 19 A. So as is described, it's here they were 20 attempting to decouple the force applied to one 21 surface and have it be applied to the other to 22 increase the signal quality.	Page 127 1 objects other than the ring. 2 Q. And paragraph 72 of your declaration, you 3 talk about the formation of cavities in a 4 wearable ring device. 5 Do you see that? 6 A. Yes. 7 Q. And about halfway down you say, "This is 8 crucial in the manufacturing of electromechanical 9 devices," et cetera, et cetera. 10 Do you see that? 11 A. Yes. 12 Q. Do manufacturing considerations play into 13 the design of a wearable ring device, in your 14 opinion? 15 A. So you want to be able to -- if you're 16 trying to make a product, being able to 17 manufacture that product is a consideration, 18 certainly. 19 Q. It's not very useful if it can't be 20 manufactured efficiently, right? 21 A. Depends on the number of units that you 22 want to -- depends on the target use and sort
Page 126 1 Q. So they were trying to avoid force being 2 applied to the section of the ring that the 3 sensors were located? 4 A. So as I describe what Asada describes, I 5 describe that in paragraph 45, so to have -- to 6 decouple the signal corruption resulting from 7 interaction of the sensor unit with the 8 environment so the body ring must separate the 9 sensor unit in order to decouple the sensor unit 10 from those interactions. 11 Q. Okay. So that design was intended to, as 12 you say, improve signal quality? 13 A. Signal quality, and as is described in 14 Asada, to improve motion artifact resistance and 15 accuracy. 16 Q. Was that design successful in 17 accomplishing those goals? 18 A. So it would be demonstrated an 19 improvement, successful along some axis, but they 20 demonstrated that design could beneficially 21 mitigate -- one way to mitigate some of the 22 variability that comes from the interaction with	Page 128 1 of -- but you need to be able to make it in some 2 way -- manufacture it in some way. 3 Q. In paragraph 77 you talk about there are 4 many examples in the art of ways that electronics 5 could have been assembled within a wearable 6 electronic device by 2013. 7 Do you see that? 8 A. Yes. Yes, sir. 9 Q. And is that statement true of the 10 electronics that are described in the '178 11 patent? 12 A. So I guess I'm -- so I describe the way 13 arts -- in that paragraph, examples of the ways 14 the electronics could have been assembled, 15 including substrates, using sequential layers of 16 surgical tape, vinyl filters constructed of 17 dimensions that conform to the low aspect ratio 18 to a flexible adhesive strip. I guess I didn't 19 completely understand your question then. 20 Q. I'm just referring to that first sentence 21 where you say "there's many examples." 22 First of all, do you have any -- did you

Page 129 1 have a number in mind of how many examples exist? 2 A. In that paragraph, that's the 3 introductory sentence to describing at least 4 those ways of sequential layers of surgical tape, 5 flexible adhesive tape, and then I go on in the 6 further paragraphs to describe further details. 7 Q. Are there hundreds of ways to assemble 8 electronics? Are there thousands? 9 MR. KAPPOS: Object to form. 10 A. So are there -- well, there are many ways 11 to assemble electronics. 12 Q. Right. 13 A. Yeah, right. 14 Q. That's what I'm getting at here. Are we 15 talking about -- when you say there are many 16 examples in the art, are we talking about 17 hundreds, thousands, hundreds of thousands, ad 18 infinitem? 19 A. There are a finite number of ways with 20 variants of a way you would assemble structures 21 in a wearable device. And I describe how to 22 house those components with wearable devices,	Page 131 1 mechanical parts. 2 Q. And how long have these techniques you've 3 been describing in paragraph 74, how long have 4 they been around? 5 A. These techniques have been around for I 6 think a long time. I don't know if I highlight 7 here. Yeah, I may describe. Let's see. 8 So for example, at least in paragraph 97, 9 I describe a little bit of the background of 10 machinability of materials. Materials such as 11 metals including titanium were known to be 12 machinable in 2013. Highlight a reference, 13 Olofson's, talking about machining techniques, 14 and that's circa 1965. And all these techniques 15 certainly exist prior to the 2013 date. 16 Q. So the section beginning on page 55, 17 "Various ways to assemble electronic parts within 18 structural cavities were known." 19 Do you see that heading? 20 A. Yes. 21 Q. So you mentioned with respect to I think 22 paragraph 74, these techniques have been around a
Page 130 1 structures like cavities, shells. I did not 2 enumerate the infinite number of ways but 3 highlight several that would be ways to 4 manufacture a device. 5 Q. And that statement applies to wearable 6 ring devices, correct? 7 A. "That statement"? Which statement? 8 Q. The first sentence. 9 A. There are many examples in the art of 10 ways that electronics could have been assembled 11 within a wearable electronic device. 12 Q. In paragraph 74 you're talking about 13 manufacturing techniques; is that accurate? 14 A. So in 74, I describe creating a 15 mechanical part from raw materials, including 16 bulk material removal, formation of cavities or 17 holes. Techniques to do that could include 18 milling or drilling or EDM, electronic discharge 19 machining milling. 20 There is other processes such as electric 21 discharge machining, laser beam, et cetera, to 22 create cavities and holes and structures in	Page 132 1 long time. Have the techniques in paragraph 72 2 been around a long time? 3 A. As I describe here, formation of cavities 4 and creating cavities to assemble electronic 5 parts, they were all around a long time for 6 devices ranging from cars to computers to toys to 7 watches, medical devices. You know, the 8 complexity and assembly approaches vary based on 9 the tooling sizes, costs, and complexities of 10 what you're trying to manufacture. 11 Q. So fair to say "a long time" means 12 pre-2000? 13 A. Correct. 14 Q. And the notion in paragraph 73, that 15 concept is also a pre-2000 concept? 16 A. Yes. 17 Q. And same question for 74, is it pre-2000 18 concepts? 19 A. Yes. 20 Q. And 75? 21 A. These are techniques such as milling, 22 drilling, EDM, other manufacturing, molding,

Page 133 1 thermoforming, yes. 2 Q. Long before 2000, correct? 3 A. Certainly before the 2013, yes. 4 Q. And paragraph 76 also pre-2000 list of 5 techniques? 6 A. Common techniques included machining, 7 formation for plastics, chip and PCB packaging 8 techniques. 9 Q. And, again, that's a pre-2000 -- list of 10 pre-2000 techniques and technology? 11 A. Certainly techniques that would be 12 available to circa 2013. 13 Q. And what about paragraph 78, is that also 14 describing long known techniques? 15 A. So as I start in paragraph 78 describing 16 techniques to house electronics within wearable 17 devices, there must be an internal space like a 18 cavity contained within the mechanical or 19 structural elements and describe through a 20 manufacturing and assembly perspective various 21 ways to make and assemble electronics which, 22 including cavity, can be premade with electronic	Page 135 1 process. 2 How does an electronic component define a 3 cavity during a molding process? 4 A. Well, generally what I'm describing there 5 is, you know, if you have an electronic component 6 and you mold around it and then you were to -- if 7 you were to be able to remove that, there would 8 be a place, a cavity, where the device sits or 9 where the component sits. 10 Q. So if you used a Star Trek transporter 11 and transported the device out of the injection 12 molded area, that's the cavity you're referring 13 to? 14 A. Well, I was not envisioning any kind of 15 25th century technology, but describing here that 16 from a manufacturing and assembly perspective a 17 cavity can be either premade with electronic 18 components then assembled and attached or 19 electronic components can be used to themselves 20 define the space in which they sit during a 21 molding process. And either approach would 22 provide integration of the electronics into a
Page 134 1 components subsequently assembled and attached or 2 electronic components can be used to define the 3 cavity during a molding process. These 4 approaches ensure efficient integration of 5 electronics into wearable devices. 6 Then I go on to describe Wissmar, 7 W-i-s-s-m-a-r, and Hunter and Simms, Mestas as 8 examples of assembling electronic components in 9 an internal space like a cavity. 10 Q. And that concept of -- at the beginning 11 of paragraph 48 of housing electronic components 12 within an internal space, that concept has been 13 around a long time as well? 14 A. Certainly by the highlight year, by 2013. 15 Q. And probably before the year 2000 as 16 well? 17 A. Certainly. Yeah, certainly. Certainly 18 prior to 2013. 19 Q. You have a statement that says in the 20 middle of paragraph -- well, upper middle of 21 paragraph 78, electronic components themselves 22 can be used to define cavity during a molding	Page 136 1 structure. 2 Q. So during the molding process the space 3 occupied by the component is the same as the 4 cavity? 5 A. Depending on the molding process that you 6 used, you could certainly use the component 7 itself to define the cavity. You could use molds 8 to help further define the cavity depending on 9 how you wanted to do your -- your construction, 10 but certainly a component could be used to help 11 define the cavity that is surrounded by the 12 molding material. 13 Q. Moving on to paragraph 81, you're 14 describing the Mestas reference, and you state at 15 the end of that paragraph, "It was well known to 16 have compartments or voids inside a wearable 17 electronic device in order to house specific 18 electronic components." 19 Again, is that a concept that has been 20 known for a long time, in your view? 21 A. Yes. As I describe in the prior -- I 22 guess I would also highlight here, I don't call

Page 137 1 out on -- so I've labeled these components 59 and 2 as purple. I think one of the corrections that I 3 do point to later or in the correction sheet is 4 the purpling that I use later to refer to the 5 battery cavity is actually, as I describe, 50 and 6 52 as opposed to what I point there as 59. 7 Q. So you're saying you colored the wrong 8 item on this figure? 9 A. That's one of the lists -- one of the 10 items on the correction list that we didn't get 11 to. 12 Q. Okay. But that's the problem? 13 A. Uh-huh. 14 Q. You didn't color the correct item? 15 A. Correct. 16 Q. And paragraph 82 you state that 17 encapsulating electronics within a cavity of a 18 structural element by, for example, injection 19 molding was well known by 2013. 20 Was that -- is that technology also -- 21 MR. SCHULTZ: Strike that. 22 Q. Has that technology also been known for a	Page 139 1 were used to detect blood volume waveforms. 2 Further describe aspect of Rhee including getting 3 down to the end where I highlight Figure 1 from 4 Rhee 2001. 5 Q. And there's a -- I think you referred to 6 this earlier, there's a conceptual diagram that 7 you show denoted as Figure 1? 8 A. That's Figure 1 from Rhee 2001. 9 Q. As a researcher, what do you -- what is 10 typically meant by a conceptual diagram? 11 A. Conveying a concept, diagram that conveys 12 a concept. 13 Q. So conveying a concept doesn't 14 necessarily show a detailed construction of a 15 device, does it? 16 A. Well, depending on the level of detail in 17 the concept, they could include things like 18 dimensions. Here the concept is showing how an 19 RF transmitter, battery and CPU and photodiodes, 20 LEDs would be integrated as part of a ring 21 sensor. 22 Q. Does this conceptual diagram cover the
Page 138 1 long time prior to 2013? 2 A. Certainly was well known by 2013. 3 Q. Known before the year 2000 as well? 4 A. Certainly the ability to encapsulate 5 elements and machine elements, you know, 6 manufacturing techniques to embed electronics 7 into devices was known prior to 2013 and earlier. 8 Q. Okay. And same question with respect to 9 paragraph 83, housing -- you say, housing 10 electronic parts within one component or between 11 two components was known. 12 Was that also -- has that also been known 13 for a long time? 14 A. At least was well known by 2013 and 15 prior. 16 Q. So you are in paragraph 84, you're 17 discussing the Rhee's research and papers; is 18 that right? 19 A. Let's see. For example, in paragraph 84 20 I point to Rhee's thesis and papers teaching a 21 ring sensor that included components, optical 22 electronic components, CPU wherein the components	Page 140 1 prototypes that we've seen in the Rhee and Asada 2 papers? 3 A. Well, this concept or diagram is showing 4 one particular way of arranging these components 5 and the physical instantiation of the other 6 figures has some similarities and has some 7 differences. 8 Q. So earlier, just above that figure 9 there's a quote that says the main circuit board 10 and batteries, which are heavy and bulky in 11 comparison to the sensor unit, sit on the outer 12 ring. 13 Do you see that? 14 A. Yes. That's what's described there 15 relative to Exhibit 1033 of the Rhee reference. 16 Q. And is that description consistent -- 17 well, is that description the description of an 18 embodiment consistent with this conceptual 19 diagram? 20 A. So it's described here the microprocessor 21 coordinates the operation, main circuit board and 22 batteries, which are heavy and bulky in

Page 141 1 comparison to the sensor unit, sit on the outside 2 of the ring. 3 So you know, there's a Figure 1 that has 4 the battery and CPU on the top side of the ring 5 in a cutaway, photodiodes and LEDs on the inside. 6 Q. That's not -- 7 A. Repeat the question then. 8 Q. I said is what's described here just 9 above the conceptual diagram, is that consistent 10 with the -- is that description consistent with 11 the conceptual diagram of Figure 1? 12 A. I believe that is the description of the 13 quote here that is coming from the same exhibit, 14 Rhee 2001, that I'm pointing to for that 15 conceptual diagram, so yes. 16 MR. SCHULTZ: Let's take five minutes or 17 however long we need to fix electronic problems. 18 THE VIDEOGRAPHER: Time is 2:03. We're 19 off the record. 20 (Proceedings interrupted at 2:03 p.m. and 21 reconvened at 2:19 p.m.) 22 THE VIDEOGRAPHER: Back on the record.	Page 143 1 Q. Figure 2 that you show in paragraph 88? 2 A. Below 88, yes. 3 Q. That's from Rhee, though, isn't it, not 4 Asada? 5 A. Rhee and Asada. We've been collecting 6 Rhee and Asada, those are -- Rhee was Asada's 7 student, so those are also Asada. 8 Q. Were the prototypes described in Rhee's 9 literature the same as the prototypes described 10 in Asada's? 11 A. So Rhee and Asada were coauthors I think 12 on most, if not all, of the references here, of 13 the Rhee Asada, because Asada was the advisor of 14 Rhee. 15 Q. Regarding that Figure 2, what is shown in 16 Figure 2 of your paragraph 88? 17 A. That's Figure 2 from -- okay. Figure 2 18 is from Rhee's thesis. And Figure 2 is showing 19 an arrangement of the dislocation of ring sensors 20 due to external force showing traditional body 21 design in, A, under external force versus a new 22 isolating ring sensor under external force on NB.
Page 142 1 The time is 2:19. 2 BY MR. SCHULTZ: 3 Q. We were talking about Asada and Rhee and 4 their research and their prototype. They chose a 5 transmittal-type design rather than a 6 reflectance-type design for the sensors; isn't 7 that right? 8 If you're not sure without looking at the 9 reference, then we can move on. 10 A. Well, I mean, it has the photodetector 11 and transmitter on the same side. I was 12 reviewing -- which would suggest a reflectance 13 mode. But I was Rhee-reading to make sure that 14 they were not discussing other configurations. 15 So as described in at least paragraph 87, 16 talks about transmittal PPG configurations don't 17 have a short circuit problem of reflectance PPGs 18 with the LEDs and photodetectors on opposite 19 sides of the fingers. But at least in the 20 embodiment that's in Figure 2 with the 21 photodetector and the LED, that suggests that 22 it's a reflectance mode.	Page 144 1 Q. Do you know what it means by traditional 2 single body design? 3 A. What they're describing is the benefit of 4 the potential to minimize motion artifacts with 5 having double ring design. So I think here 6 they're highlighting the force variation that can 7 come from an induced signal variation in the 8 single ring versus having this inner and outer 9 ring construction that they explore. 10 Q. So I guess my question was more focused 11 on what does he mean by "traditional" when he's 12 referring to a ring design there in 2A? 13 A. Well, it's describing a traditional 14 single body design versus B, new isolating ring 15 sensor, which is their proposed outer and inner 16 ring. 17 Q. So by "traditional," is he meaning 18 existing? 19 A. So in paragraph 88, I believe in Rhee's 20 thesis they envisioned -- they explored two 21 different types, both what they refer to as 22 traditional or single versus a modified version

Page 145 1 having two. So in Rhee Asada's work, they 2 explored what they referred to as their first and 3 then their second, traditional versus the new 4 isolating ring sensor. 5 Q. I see. 6 So they chose the design shown in 7 Figure 2B as their, I guess, model for their 8 prototype? 9 A. No. I believe they prototyped both and 10 compared the performance of the one versus the 11 other in the -- in that work. So they highlight, 12 for example, midway through paragraph 88, to 13 resolve these problems of the original ring 14 design, a new design was developed called the 15 isolating ring configuration, which separates the 16 sensor unit from the rest of the ring body. 17 Q. I see. 18 So the ring shown in 2B is meant to solve 19 certain problems with the ring in 2A; is that 20 fair? 21 A. To attempt to solve and address some of 22 the issues that they found with the first one in	Page 147 1 paragraph. 2 Q. What's the priority date of the patent 3 that you've used to determine whether something's 4 prior art? 5 A. So back on page 36, I describe the 6 prosecution history of the '178. And then in 7 paragraph 36, I understand that the earliest 8 alleged priority date for the '178 patent is 9 November 29th, 2013. And so I understand, 10 assuming this earliest date, All prior art 11 references asserted in this petition as 12 invalidating references are prior art. 13 Q. Okay. Sun is not a reference you've 14 asserted as invalidating prior art, is it? 15 A. It's providing -- it's background 16 technology they reference in those paragraphs. 17 Q. So it's background -- you refer to it as 18 background technology. Does it predate the 19 priority date? 20 MR. SCHULTZ: And let's have marked as 21 Deposition Exhibit Number 6 Petitioner 22 Exhibit 1053.
Page 146 1 A. 2 Q. In paragraph 90, you have a statement 3 that -- to address the second sentence, "To 4 address such constraints, the electronics can be 5 placed on a flexible printed circuit board, which 6 were well known by 2013." 7 Again, a question I've asked several 8 times is were these flexible printed circuit 9 boards you're referring to here well known long 10 before 2013? 11 A. Certainly before 2013 and prior. 12 Q. Okay. Paragraph 94 refers to a -- I 13 guess it's a textbook, Sun's Wireless Power 14 Transfer. 15 Do you see that? 16 A. Yes. 17 Q. Is this textbook you're discussing in 18 paragraph 94, is that prior art to the '178 19 patents? 20 A. So looking back at my exhibit list, 21 Petitioner Exhibit 1053 to Sun, the date is 2013, 22 and I describe -- it's described in Sun in that	Page 148 1 (Anthony Exhibit 6, Wireless Power 2 Transfer for Medical Microsystems, Sun reference, 3 marked for identification.) 4 Q. So do you have any evidence that 5 Exhibit 6 predates the priority date of the '178 6 patents? 7 A. So on the page 4, the copyright date is 8 2013. 9 Q. That's your evidence? 10 A. That's when it was published. 11 Q. Doesn't say when in 2013, does it? 12 A. Well, it does talk about the technology 13 having been invented a hundred years prior in 14 some of the things I referenced there, but that 15 is the date that I used for them. 16 Q. The date you used for the reference is 17 just the year 2013? 18 A. Well, even if you were to opine that it 19 was later than November, it talks about the 20 technology having existed as noted in Sun's 21 wireless power transfer medical systems. 22 Wireless power transfer was invented over a

Page 149 1 hundred years ago. 2 Q. Okay. So you're relying on it as 3 background information as to the statements that 4 are made here? 5 A. Correct. And further, I use other 6 references as well. In paragraph 96, pointing to 7 the patent publication by Principe and then also 8 Mestas as other. 9 Q. I'm just trying to determine whether you 10 have any independent evidence other than the 11 copyright date that this was published before 12 November of 2013. 13 A. Well, for example, just going to my first 14 statement, by 2013, wireless power transfer was 15 either for real-time energy or to charge 16 batteries in biomedical devices, which I refer to 17 on page 140 of -- top page, which is 147 in the 18 PDF, I guess, which then also cites references 23 19 and 24, which go further back, and those are 20 2007, for example, and 2003. So I do rely on the 21 copyright date of 2013. But, indeed, Sun even 22 goes further back in the literature that it cites	Page 151 1 A. Example of -- 2 Q. How you would use this device described 3 here? 4 A. Well, one example, just going, for 5 example, to column 25 of Schröder, describes 6 using it as a security access to authenticate the 7 use of a vehicle. 8 Q. Okay. Schröder doesn't disclose 9 monitoring health parameters, does it? 10 A. Well, for example, in paragraph 138 of 11 when describing Schröder, the finger ring has a 12 biometric sensor, such as an infrared diode, to 13 capture at least a partial vein image in the 14 finger while finger ring 2 is being pushed over a 15 finger. 16 So a POSITA reading that understands that 17 a vein is a part of the biology of a person and 18 is one way to authenticate a person. 19 As I describe, there are other reasons 20 that a POSITA looking at Schröder would be 21 motivated to combine other teachings relative to 22 biometric sensors, including such things as PPG
Page 150 1 in supporting what it describes in the paragraphs 2 that I cite. 3 Q. Yeah. I wasn't really asking about the 4 literature cited by Sun. I'm asking do you know 5 what time of the year in 2013 Sun was published? 6 A. I do not know that at the moment. 7 Q. Okay. Thank you. 8 If you could take a look at Schröder 9 Exhibit 2. Do you have Schröder? 10 A. Yes. I think we already have it in -- 11 Q. It's marked as an exhibit. 12 The intended use of Schröder and the 13 device described therein is as a security device; 14 is that right? 15 A. So Schröder is described as a method for 16 operating external security unit comprising 17 memory and storing data, et cetera. And it also 18 teaches, as I highlight, how to use and 19 appropriately use biometric sensing to 20 authenticate the user as part of that security. 21 Q. So can you give me an example of how one 22 would use the external security unit of Schröder?	Page 152 1 and heart rate. So, for example, you could both 2 validate that the person has a vein and that the 3 person is alive. 4 All right. But that's not described 5 here, but a POSITA wanting to authenticate that a 6 person is a person that has the authority to do 7 the thing that is being authenticated for, it 8 teaches biometric sensors. 9 Q. Okay. So it teaches detecting a vein 10 pattern of the wearer, correct? 11 A. It teaches using an infrared diode to at 12 least capture a partial vein image in the finger 13 while the finger is being pushed over a finger. 14 Q. And for security purposes, it compares 15 that vein pattern to a stored pattern to see if 16 there's a match; isn't that right? 17 I'll refer you to column 10 of Schröder, 18 line 15. 19 A. So what's described there is a finger 20 ring that's used as an authentication of user 21 using captured biometric data. And as I 22 described, you know, that biometric data comes

Page 153 1 from a vein. 2 And there are additional ways that a 3 POSITA reading this would be motivated, as I 4 describe in some of the combinations, to further 5 authenticate. But indeed, what's described there 6 is a finger vein. 7 Q. Yeah. I'm not asking you about what your 8 interpretation is of what a POSITA would be 9 motivated to do. I'm asking you what Schröder 10 discloses. And he's disclosing authentication by 11 matching vein patterns; isn't that right? 12 A. As I described, yes, that is using that 13 vein pattern as a biometric validation of the 14 person. 15 Q. Okay. So is it your testimony that 16 authentication using a vein pattern is related to 17 gathering health information about a user? 18 Sir, I'm not asking you to read your 19 report. I asked you a question that really is 20 about the reference that we're talking about. 21 A. And I'm reviewing where in my declaration 22 I discuss to refresh my memory and familiarity	Page 155 1 main image, is one way to do that, which is 2 described in Schröder. 3 Q. And does Schröder disclose using -- you 4 mentioned you can ascertain the age of the vein. 5 Does Schröder disclose that? 6 A. Schröder does not disclose that, but the 7 knowledge of a POSITA, when viewing Schröder, 8 would understand that there are other ways to get 9 biometric data, which would include things like 10 when looking at the pulsatile nature of the vein, 11 the stiffness and the age of the vein. It could 12 also give you information about confirming that 13 the person is alive or dead as a -- 14 Q. And does Schröder disclose that, 15 determine that his invention is used to determine 16 whether a person is alive or dead? 17 A. So what I was describing is Schröder in 18 the view of the knowledge of a POSITA. Schröder 19 is describing, using a vein as a biometric 20 sensor. And I'm adding what the knowledge of a 21 POSITA would bring in understanding how to use 22 the teachings of Schröder.
Page 154 1 with the reference. 2 Q. So you can't answer that question without 3 reviewing your report; is that right? 4 A. I want to make sure I give you a good 5 answer, so I'm reviewing to make sure that I do 6 so. 7 Q. Okay. So you can't answer that question 8 without reviewing your report further to give me 9 a, quote, good answer; is that right? 10 A. Now I've forgotten the question. 11 Q. That's because the question was very 12 simple. 13 Your testimony -- is it your testimony 14 that authentication using a vein pattern is 15 related to gathering health information about a 16 user? 17 A. It's related, as I described, to 18 collecting biometric data on a vein. And a 19 POSITA would understand that, for example, you 20 could also get the age of the vein and other 21 properties of the vein. But what's described 22 there is a biometric sensor, and the vein, as a	Page 156 1 Q. So a person of ordinary skill in the art 2 would read Schröder and the authentication method 3 disclosed therein and use Schröder to determine 4 if someone is dead or alive? That's your 5 testimony, right? 6 A. The knowledge of a POSITA, for example, 7 when coupled with what Schröder describes, 8 another reason that Schröder is relevant to 9 biometric sensing and security would be there are 10 POSITA in reading the, getting biometric 11 information, knows that there's other biometric 12 information that would be beneficially gathered 13 from a vein directly or with additions to the 14 vein or additions to other properties coming from 15 the vein. What Schröder is describing is using a 16 vein. 17 Q. Okay. Other than authentication, does 18 Schröder disclose using any other information 19 from the vein for any purpose? 20 You've read Schröder multiple times, 21 haven't you, Doctor? 22 A. Yes, I have.

Page 157 1 Q. And you can't answer a simple question 2 about it? 3 A. I'm refamiliarizing with my deposition so 4 that I can give you the full answer that I'd like 5 to give you with respect to Schröder and how a 6 POSITA would view Schröder. 7 Q. I'm not asking you how a POSITA would 8 view Schröder. I'm asking what Schröder 9 expressly states. Maybe that will make the 10 answer easier for you. 11 A. Well, my analysis was never in Schröder 12 as Schröder in view of the knowledge of a POSITA, 13 and Schröder in view of Niwa, Schröder in view of 14 Mestas and Schröder in view of Yuen. So I rely 15 on Schröder with the knowledge -- 16 Q. And you don't think I'm entitled to ask 17 you questions about what Schröder discloses? 18 A. And I'm entitled to describe what my 19 analysis was, which was Schröder with knowledge 20 of a POSITA and also the other references. 21 Q. No. I'm not asking about your analysis. 22 I'm asking you what the reference discloses. So	Page 159 1 answers to questions I didn't want to ask, and 2 that's why to conduct this deposition efficiently 3 and actually end on the day we want to end, we 4 need to answer questions that are asked, not 5 questions that are not asked. 6 Q. I'm not asking you about your 7 interpretation of Schröder in view of the person 8 of the skill in the art. I'm asking you what 9 Schröder discloses, and you just gave me an 10 answer, so we'll move on to the next question. 11 A. You interrupted my answer, so I was 12 unable to give the full answer. 13 Q. That's your view, not mine. And the 14 record shows what your answer was. 15 MR. KAPPOS: And the record also shows 16 that counsel interrupted the witness before he 17 could complete his answer. 18 Q. Do you know what the power requirements 19 of Schröder's ring are? 20 A. For example, Schröder discusses in column 21 7, line 13, the energy supply is affected via an 22 electromagnetic field of a reader and in whose
Page 158 1 you're being evasive. 2 MR. SCHULTZ: And we'll mark another 3 section of this deposition as nonresponsive. 4 Q. Does Schröder disclose doing anything 5 with vein patterns other than authentication 6 explicitly? 7 A. So Schröder describes using a vein image 8 for authentication, and in my analysis I bring to 9 bear -- 10 Q. You can stop there because, excuse me, 11 the rest is nonresponsive. 12 MR. KAPPOS: I object to counsel talking 13 over the witness. 14 MR. SCHULTZ: The rest is nonresponsive 15 because you just gave me the answer. 16 MR. KAPPOS: The witness can complete his 17 answer. 18 MR. SCHULTZ: Not if it's not responsive. 19 MR. KAPPOS: Go ahead, Dr. Anthony. 20 A. So my analysis of Schröder is in 21 conjunction with the knowledge of a POSITA -- 22 MR. SCHULTZ: Well, I'm not asking for	Page 160 1 field the external security unit is located. It 2 also further describes in column 11, for example, 3 using an energy storage device, an accumulator or 4 a battery connected to the chip module, et 5 cetera. 6 In the bottom of the that column, line 7 63, the energy storage device can, for charging, 8 be connected directly to an antenna coil via -- 9 (Interruption by the reporter.) 10 A. The energy storage device can, for 11 charging, be connected directly to the antenna 12 coil via a rectifier circuit with chip module 10 13 connecting the energy storage device to the 14 antenna. 15 So it's silent on the -- for the various 16 embodiments, the energy requirements, but 17 envisions both a wireless near-field 18 communication charging and also charging a -- or 19 use and then also using a battery to store energy 20 to power the device. 21 Q. And it talks about RFID as well, correct? 22 A. It does, yes.

Page 161 1 Q. RFID and NFC can be passive devices that 2 don't use a battery, correct? 3 A. Well, they use a temporary energy storage 4 mechanism off the capacitor to charge and use. 5 They can be read just by the modulation of the 6 antenna and then also embodiments here also 7 envision using a battery. 8 Q. So the term "passive device" refers to, 9 for example, the credit card where you hold the 10 credit card up to the reader and it conveys 11 information; is that fair? 12 A. That would be one example, yes. 13 Q. So the credit card doesn't have a battery 14 in it to operate an NFC? 15 A. There is a storage mechanism in many of 16 the near-field and RFID, and in some there are 17 not. And in what's described fully is in 18 situations where there are passive uses and uses 19 where there is a battery. 20 Q. So Schröder doesn't talk about -- and I 21 think you just cited this. He doesn't talk about 22 an energy storage device until column 11, line	Page 163 1 charge and function in those active situations. 2 And furthermore, the energy storage 3 device can be employed for operating electronic 4 components such as display units or display 5 elements and supplying them with energy. The 6 energy storage device further enables 7 uninterrupted operation of processor after 8 leaving the reader's field. 9 So you start talking about these further 10 embodiments that are taught, power requirements 11 build up. 12 Q. Can you draw any conclusions about how 13 much power is required to perform the vein 14 pattern authentication? 15 A. So it would depend on the power 16 requirements of the emitting sensor, the 17 resolution for a particular -- the resolution of 18 the vein image that was required for the 19 particular level for the security device. 20 For example, for security, if you used 21 security just to turn on a car, that might be 22 more or less secure than security to access a
Page 162 1 46, and that's in a further embodiment example. 2 So am I correct that in Schröder the use of a 3 battery is optional? 4 A. What is taught by Schröder includes an 5 example that is an energy storage device such as 6 a battery or a capacitor, for example; other 7 embodiments do not. 8 Q. Okay. So reading Schröder, can you draw 9 any conclusion about what size battery and 10 capacity battery you would need to accomplish the 11 functions disclosed therein? 12 A. I'm sorry. Please, can you repeat the 13 question? 14 Q. Reading Schröder, can you draw any 15 conclusion about what size battery -- I'll say 16 what size and capacity of battery you would need 17 to accomplish the functions described in 18 Schröder? 19 A. Well, again, it's silent on the 20 particular capacity. But in an embodiment, for 21 example, that uses a battery, it would depend on 22 how long you wanted that device to maintain	Page 164 1 bank vault. And the secureness of the biometric 2 sensor would depend on the imaging resolution, 3 the grain -- the spatial resolution with which 4 you acquire that image, which would have impacts 5 on the power used and so would merit potentially 6 an active device, different design trails. 7 Q. And it would also depend on how often the 8 authentication is performed in terms of how much 9 power you would need; is that right? 10 A. Certainly. Design trade-offs would 11 include how often it's used, how often it's 12 checked, and the requirements on the level of 13 security by which the vein image is used to 14 access different levels of secure function. 15 Q. And going back to Asada's device, which 16 performs -- which has a PPG sensor, the intent of 17 the wearable device in Asada is a constant 18 measurement of using the PPG sensor; is that 19 accurate? 20 A. It's talking about measuring PPG, the 21 level of constancy, again, will depend on how 22 frequently you want that measurement, so the time

Page 165 1 resolution with which you would want that 2 measurement, again, would be a design 3 consideration. 4 Q. In terms of operation, if you're -- for 5 example, the Oura Ring, does the Oura Ring 6 perform constant measurements of heart rate and 7 other parameters? 8 A. I do not know how they define constant in 9 the use of the ring. There's a time scale. It's 10 a device that like any sampling system, there's a 11 time resolution during, over which it makes 12 measurements. 13 Q. Is it constantly sampling over some rate 14 presumably? 15 A. It's sampling at some time interval, 16 making estimates at some time interval. 17 Q. Doing that around the clock is a power 18 intensive operation, isn't it? 19 MR. KAPPOS: Object to form. 20 A. To make measurements to be an active 21 device, you need power. 22 Q. So you would need more power to take	Page 167 1 What about just the measurement aspect, 2 the constant measurement of heart rate, wouldn't 3 that use more power than a discrete measurement 4 of vein pattern matching? 5 A. In this hypothetical sort of very narrow, 6 rare, if I just want to compare what it would 7 take to get a single vein image once and 8 constantly at 100 megahertz being measuring 9 non-stop continuous, certainly that is going to 10 require more power to do that excessive high 11 sampling versus something that is sampled once. 12 But that's an unfair comparison in 13 general because I think there are other 14 trade-offs in use of a device that dramatically 15 impact the power use, the battery storage 16 required. 17 Q. So your testimony is that Schröder 18 discloses a battery, correct? 19 A. Indeed, it does disclose a battery, just 20 highlighting in column 11 there. 21 Q. So the energy storage device or battery 22 highlighted in column 11, that's not shown in any
Page 166 1 constant 24 hours of heart rate measurements 2 versus authenticating once a day using Schröder's 3 device, wouldn't you? 4 A. I'm sorry. Repeat that again. 5 Q. I'm contrasting taking constant heart 6 rate measurements over a day versus a single 7 authentication using the Schröder vein pattern 8 method. The constant heart rate measurement 9 would require more power; isn't that generally 10 true? 11 A. I think it certainly depends because also 12 as is envisioned in Schröder there are 13 embodiments that include very power hungry things 14 like display units. And so it's a function of 15 both how frequently a measurement is made and how 16 frequently information is displayed, how 17 frequently the person interacts with the device, 18 how frequently they're accessing something that 19 needs to be securely validated. 20 Q. Okay. I believe it talks about 21 Bluetooth, too. Bluetooth is a power hungry 22 application as well.	Page 168 1 of the figures, is it, of Schröder? 2 A. So it's described -- for example, in 3 column 12, it describes the embodiments where 4 both the chip module and other electronics are 5 embedded on -- contained and embedded on an inlay 6 12 and inserted into the recess of the ring. So 7 the chip module 10 further electronic components 8 can be located on the carrier which a POSITA 9 would understand to also include battery, other 10 antenna coils, display units. 11 Q. Okay. So if I look at Figure 3, where 12 would the battery be in this figure? 13 A. Well, what I was describing was the 14 embodiments that include Figures 6 through 10 or 15 specifically Figure 7 that has the inlay, where 16 the battery would be on there. The battery could 17 be in the Figure 3 embodiment, other locations, 18 including in the chip module. But what I was 19 highlighting is the other embodiments that 20 include all that functionality being on inlay 12 21 that are inserted in the recess. 22 Q. So what about Figure 4, where would the

Page 169 1 battery be in Figure 4? 2 A. Well, it would be, as I described in 3 Figure 4, 4 prime, it would be on the inlay in 4 12, for example. 5 Q. So it's not shown in this figure 6 expressly? 7 A. Well, what is shown expressly is 12, and 8 12 is described is the inlay is inserted into the 9 recess that has all these functional components, 10 including the chip module and other electronic 11 components, display units. And then I do 12 describe showing later figures, for example, 13 where the battery would sit in the modified 14 versions of Figure 5. 15 Q. So if I gave you Figure 4, could you draw 16 a picture of where the battery would be? 17 A. Again, it's on the -- it would be, as I 18 describe here, on the inlay inside that. And a 19 POSITA would have various options of how to place 20 that battery inside of -- on the inlay. 21 Q. Could you indicate that where the battery 22 would be on this figure for me?	Page 171 1 the ring in a narrow band around. So a POSITA 2 would consider different design trade-offs in 3 figuring out where and how to arrange the battery 4 on the inlay. 5 Q. So if you were to draw the battery on 6 Figure 4, how would you do it? Would you just 7 fill in that inlay? 8 A. No. I described various ways where it 9 could exist in a -- 10 Q. You're pointing to Figure 5. I asked 11 about Figure 4. 12 A. Well, Figure 4 and Figure 5, as we've 13 described before, go together, in particular with 14 the correction my Figure 7, which is, you know, 15 this line doesn't exist, and there's a line 16 across there. (Indicating) and the Figure 4 17 would be a 4 prime that is consistent with that 18 coming from my Figure 7. 19 But a battery could exist in part of the 20 cavity going partially circumferentially around 21 and following the cavity, following the 22 structure. It could exist as a narrow band all
Page 170 1 A. In the inlay of 12. 2 Q. Can you mark this exhibit for me where it 3 would be? 4 A. There are many examples of where it could 5 go on the inlay. 6 MR. SCHULTZ: Let's mark as Exhibit 7 7 figure sheet 4 of 5 on U.S. patent 303,867. 8 (Anthony Exhibit 7, U.S. Patent Sheet 4 9 of 5, U.S. 10,303,867, Figure a4 and 5, marked 10 for identification.) 11 Q. So if you could show me one of the 12 examples of how the battery would reside in 13 Figure 4, Doctor, using -- do you have a marker? 14 A. I have a pen. 15 Q. That works. 16 A. So again, a POSITA would have a lot of 17 design flexibility in terms of how to locate 18 functionality into that cavity so as to not yet 19 clutter it up, but you could have battery in a 20 subregion that is around a partial region of the 21 inlay. You could have it fully in a region over 22 a partial inlay. You could have it fully around	Page 172 1 the way around. There's design flexibility in 2 how you would locate any component to accomplish 3 the design trade-offs with the amount of battery 4 capacity needed relative to the other components 5 that also need to be assembled on the inlay. 6 Q. So it would have to be curved? 7 A. It would -- could be curved for a small 8 enough battery. It potentially could be a flat 9 structure or a small battery, but presumptively a 10 design trade-off would point to whether you 11 needed a curved battery and/or a flat battery. 12 Q. Can you just outline for me where an 13 example of the battery would be on a Figure 4? 14 A. I was trying to highlight a number of 15 places. So if I draw just the inlay, so this is 16 just 12, and I want to draw the cross section of 17 Figure 5 as well. So, for example, one 18 possibility would be to exist in part of -- let's 19 draw it at the top, so it shows up down here. It 20 could exist in this region partially. It could 21 exist in that region fully. It could exist 22 around, so that it shows up in both the bottom --

Page 173 1 both the bottom and the top. There's flexibility 2 in how that battery would be inserted. 3 Q. So Schröder never says that the battery 4 is in the inlay, does he? 5 A. Well, it's described, let's see -- so as 6 I highlight in paragraph 162, which is in the 7 section of Brown I, which is Schröder in view of 8 the knowledge of a POSITA, I highlight that the 9 Schröder finger ring has a battery positioned 10 within the cavity between the internal and 11 external housing components. 12 Schröder describes the inlay with the 13 components embedded on it certainly in column 12, 14 so a POSITA reading Schröder would understand 15 that the battery is on that inlay that sits 16 inside the cavity. 17 Q. Well, in column 11 it says the battery is 18 connected to the chip module 10, correct? 19 A. I'm sorry. Where are you pointing? 20 Q. Column 11, line 49. 21 A. The energy storage device is connected to 22 the chip module 10 in order to supply the chip	Page 175 1 on the inlay. 2 Q. Okay. So the chip module 10 of Figure 3 3 is also on the inlay 12 and other figures? 4 A. Correct. Chip module 10 is described 5 as -- the chip module 10 sits on the inlay as 6 described in column 12. 7 Q. And it's the same chip module described, 8 correct? 9 A. It's chip module 10. 10 Q. Right. And given the shape of the chip 11 module in Figure 3, it would protrude out of the 12 inlay 12 in any of the figures, wouldn't it? 13 A. Well, I don't believe a specific 14 dimension of chip module 10 is dimensioned 15 anyplace, but was described as could there be 16 different sizes of chip modules, absolutely 17 depending on the functioning needed in that chip 18 module, and the chip module could also be placed 19 on the inlay as described in column 12. 20 Q. But Schröder doesn't disclose different 21 size chip modules, does he? He just discloses 22 chip module 10.
Page 174 1 module 10 with energy outside electromagnetic 2 field of reader. And then in column 12, the chip 3 module 10 is described as existing on the inlay 4 in that embodiment, which would -- POSITA reading 5 this would also understand, require the battery 6 to be connected on that inlay. 7 Q. So where would the chip module be on the 8 figure you just drew? 9 A. It would also be on the inlay in some 10 space that's not being occupied by the battery. 11 Q. Okay. Would it look like the chip module 12 in Figure 3? 13 A. So that chip module is shown on the top 14 of the ring. What's described in the other 15 embodiments is the chip module being on the 16 inlay. 17 Q. Okay. It's the same chip module 18 described in the specification, isn't it? They 19 consistently use reference character 10 to 20 describe the chip module throughout Schröder, 21 don't they? 22 A. Yes. And they also describe it existing	Page 176 1 A. Chip module 10 exists on the inlay or 2 exists in other places, for example, as you 3 described in Figure 3. 4 Q. Okay. And in column 14 he says -- line 9 5 he says, ideally ring blank has a uniform 6 thickness over its total length in order to avoid 7 later steps or shoulders. Should steps or 8 shoulders never -- 9 A. I'm sorry. I just want to interrupt. 10 Where were you reading? 11 Q. Starting at column 9 -- column 14, line 12 9. Should steps or shoulders nevertheless arise, 13 for example, through the chip module 10, said 14 steps or shoulders can be compensated by applying 15 a paste which is, for example, thermally or UV 16 curing. 17 So that says, does it not, that, as I 18 mentioned earlier, the chip module can protrude 19 out of the inlay, and in this case he talks about 20 compensating for that protrusion with forming 21 steps or shoulders. Is that true? 22 A. What's described there is -- should steps

Page 177 1 or shoulders nevertheless arise, there are other 2 things you can do, but it doesn't say that you 3 have to have steps or shoulders. But a chip 4 module can exist on a carrier frame -- on the 5 inlay 12. 6 Q. And you would have steps -- you would 7 need steps or shoulders given the scale to which 8 the chip module is drawn in Figure 3; isn't that 9 true? 10 A. Well, no physical dimensions are 11 described. And that's a representative location, 12 a representative size. What's described is 13 there's an instance where the chip modules 14 located where it is on Figure 3 and it also 15 exists in the other embodiments on the inlay in 16 12. 17 Q. And the relative size of the chip module 18 compared to the inlay 12, the inlay -- the chip 19 module is much wider than the inlay; isn't that 20 right? 21 A. Well, I think the dimensions and how it's 22 oriented in one configuration or the other could	Page 179 1 rings. 2 Q. Well, he also says if the chip module is 3 too big, then you create steps or shoulders to 4 accommodate it, doesn't he? And in that case, it 5 wouldn't be in the inlay, would it, in its 6 entirety? 7 MR. KAPPOS: Object to form. 8 A. So what's described there in figure -- 9 sorry -- in column 14, line 9 where you were 10 pointing previously, ideally a ring blank has a 11 uniform thickness over its total length in order 12 to avoid later steps or shoulders. 13 So what is being described there is in a 14 situation where you have an inlay that has a 15 width, a length that corresponds to going around 16 the circumference. In the thickness of that, it 17 would be good to keep the components that are on 18 within that thickness. In a situation where 19 they're beyond that thickness a protrusion of 20 beyond the thickness you can further protect them 21 with paste that is thermally or UV curing but 22 then you'd have the inlay with bump that in
Page 178 1 certainly be different, but the chip module is 2 described as having an embodiment where it exists 3 on the inlay 12. 4 Q. Well, on Figure 3 it's on the inlay 12 as 5 well, isn't it? 6 A. So in Figure 3 the inlay is presumptively 7 smaller because it's not containing the chip 8 module in its entirety as described as the inlay 9 12 serves as the carrier for at least the antenna 10 coil, and then in figure or column 12 it 11 describes the chip module being contained on the 12 inlay 12 as embodied in the examples of Figure 7 13 and -- okay. Finish that. 14 Q. So your testimony is that the inlay in 15 Figure 3 is presumptively smaller than the inlay 16 in the other figures? Schröder doesn't say that, 17 does he? 18 A. So Schröder describes the inlay being 19 inserted in column 12 into the ring and the -- it 20 describes mounting the inlay and other components 21 onto that carrier, onto that inlay that goes into 22 the recess between 16 and 18, the inner and outer	Page 180 1 aggregate would still fit inside the cavity 2 defined by the internal housing component and the 3 external housing component 18. 4 Q. An example of that bump he provides is 5 the chip module 10, right? 6 A. As one example, e.g., through the chip 7 module 10. 8 Q. You said it would still fit in the 9 cavity. Why is he applying a paste to create -- 10 A. So in a situation -- sorry. 11 Q. -- steps and shoulders? 12 A. So in a situation where, for example, 13 this is the 12, the inlay, it would be in a 14 circle and inserted into a recess. Now we put a 15 chip module here that is thicker than the -- so 16 we coat it so that it's protected. We prefer to 17 keep it within the thickness, but if it protrudes 18 beyond, coat it so that it can then be wrapped 19 up, and all the thickness sit within the ring 20 that goes into the inlay or into the cavity 21 defined by 16 and 18. 22 Q. But in that case, it would be covered

Page 181 1 by -- what do they say? -- a paste, right? 2 A. There would be -- what's described there 3 is it can be compensated by applying a paste. 4 Q. And in that case, paste would be covering 5 the chip module, not the inlay? 6 A. Well, the inlay is the carrier for the 7 components, the chip module, the antenna, and if 8 it -- in the situation where the module 10, as an 9 example, is beyond the thickness, providing a 10 paste thermally or UV curing paste to protect 11 that bump, which is described as a step or a 12 shoulder. 13 And that chip module still exists on the 14 aggregate inlay and with the possibility of this 15 guy being protected with a little bit of epoxy or 16 paste and then inserted into the ring, the outer 17 ring, and the inner ring, the recess cavity 18 defined by 18 and 16. 19 MR. SCHULTZ: Why don't we take a break. 20 THE VIDEOGRAPHER: Time is 3:39. We're 21 off the record. 22 (Proceedings interrupted at 3:39 p.m. and	Page 183 1 flexible circuit board. 2 Q. Okay. Why does Schröder call it an inlay 3 and not a circuit board? 4 A. I didn't opine upon why Schröder chose to 5 use "inlay," but I would think, sitting here now, 6 likely be because it is inlaid and in between -- 7 it's between a sort of inner component and outer 8 component, but what's described there a POSITA 9 would understand that to be describing a flexible 10 circuit board. 11 Q. Are you aware of other examples in your 12 work or studies where you've seen an inlay or a 13 circuit -- a printed circuit board called an 14 inlay? 15 A. So, again, a POSITA reading that would 16 understand that to be describing a printed 17 circuit board having electronics on a flexible 18 substrate. 19 Q. That's not what I asked you. 20 I said, are there any other examples of 21 someone calling a printed circuit board an inlay 22 that you can convey to me?
Page 182 1 reconvened at 3:56 p.m.) 2 THE VIDEOGRAPHER: We are back on the 3 record. The time is 3:56. 4 BY MR. SCHULTZ: 5 Q. It's your testimony that inlay 12 is a 6 printed circuit board in Schröder; is that fair? 7 A. So the inlay is described as being 8 composed, for example, of PET or Kapton in 9 materials that a POSITA understands would be made 10 by a flexible circuit -- consist -- comprised of 11 a flexible circuit board. 12 Q. So your understanding is based on the 13 fact that the inlay is stated to be comprised of 14 materials that also are known to be used to 15 construct circuit boards? 16 A. So as described, inlay 12 itself consists 17 of a preferably flexible carrier material, e.g. 18 PET, Kapton, et cetera. On the carrier material 19 there's a range, at least one antenna coil -- 20 sorry, I'll slow down -- and at least one chip 21 module with the antenna coil being connected to 22 the chip module. So indeed that is describing a	Page 184 1 A. I would imagine that there are other 2 examples, but, again, a POSITA reading that would 3 understand that to be conveying a printed circuit 4 board. 5 Q. This is the only example that comes to 6 mind, Schröder? 7 A. Let's see. 8 So, again, you know, what's described in 9 Schröder is that inlay, and as they describe in 10 paragraph 170 in terms of what a POSITA would 11 understand are the teachings of Schröder, that 12 inlay is the printed circuit board. 13 Are there other references that talk 14 about a flexible circuit board going into a 15 recess that would be described as inlay? There 16 may be. But I didn't need to opine upon that to 17 understand that what's described there is indeed 18 a printed circuit board. 19 Q. Okay. When Schröder referred to -- 20 refers to a printed circuit board, he knew how to 21 use that phrase, didn't he? 22 MR. KAPPOS: Object to form.

Page 185 1 Q. I'll direct you to column 22, line 49. 2 A. Did you say column 22? 3 Q. Column 22, line 49. 4 And my question is, when Schröder was 5 referring to a circuit board, he knew how to use 6 that phrase, didn't he? 7 A. So Schröder there is describing an 8 external secure unit in the form of an M to M 9 module for a vehicle and describing components of 10 how it integrates to a vehicle. So Schröder does 11 use the word in line -- the NFC antenna can be 12 realized, for example, as part of a circuit on a 13 circuit board. 14 But that does not change my opinion about 15 what a POSITA would understand the inlay made of 16 flexible material would be understood by a POSITA 17 as a flexible circuit board. 18 Q. Conventionally an inlay refers to a 19 connection disposed on a circuit board; isn't 20 that right? 21 A. Well, what's described here in the 22 context of the -- with the patent is a inlay	Page 187 1 plain and ordinary meaning of the term "inlay" as 2 used with a circuit board, and you're not 3 answering my question, which is, is an inlay a 4 term used to describe a connection on a circuit 5 board? 6 A. So I didn't find it necessary to construe 7 any terms in forming my opinion. An inlay has 8 multiple definitions in the broad context. In 9 the context of this, the inlay would be 10 understood as a printed flexible circuit board. 11 Q. Okay. Again, that's another 12 nonresponsive answer. 13 So I take it you cannot answer my 14 question? 15 MR. KAPPOS: Object to form. 16 A. So as I did not find necessary to 17 construe any terms in forming my opinions. Inlay 18 can have multiple definitions. 19 Q. I didn't ask you to construe terms. I 20 asked you a question, and you're supposed to 21 answer my questions, but if you're saying you 22 can't answer that question, we can accept that
Page 186 1 going into that cavity that is a printed circuit 2 board -- flexible printed circuit board. 3 Q. Do you agree or disagree with my 4 question? 5 A. I'm sorry. Can you ask the question 6 again? 7 Q. I said, conventionally an inlay refers to 8 a connection disposed on a circuit board; isn't 9 that true? 10 A. I think there are multiple definitions of 11 inlay. Again, what I'm describing here is sort 12 of how a POSITA would understand that inlay in 13 the context of the Schröder patent. 14 Q. And I'm just asking generally with 15 respect to circuit boards. An inlay is a term 16 used to refer to a metallic connection on a 17 circuit board, isn't it? 18 A. Again, I'm not opining upon the 19 definition of inlay. In the context of the 20 Schröder reference, a POSITA reading that would 21 understand that to be a flexible circuit board. 22 Q. Okay. That's not -- I'm asking for the	Page 188 1 and move on. 2 A. I didn't construe the definition of an 3 inlay. In the context of the Schröder patent, a 4 person of skill in the art reading it would 5 understand the inlay as described as sitting in 6 the cavity containing the chip module and other 7 functionality to be a flexible circuit board. 8 Q. And I asked you generally outside of the 9 shorter patent -- 10 A. Generally, "inlay" can mean other things. 11 Q. And one thing it can mean is connection 12 on a circuit board; isn't that true? 13 A. In isolation it can mean that. What was 14 described here a person of skill in the art 15 reading this would understand it to mean a 16 flexible circuit board. 17 Q. So that's a perfectly fine answer and 18 that's responsive to my question. So I think we 19 could go a lot faster if you listen to the 20 question and gave answers responsive to the 21 questions rather than trying to keep telling me 22 what you did opine on versus what the answer to

Page 189 1 the question is, but that's just an aside. 2 Can we go to paragraph 158 of your 3 declaration? So this is part of your analysis of 4 ground one, correct? 5 A. Correct. Ground one, which is Schröder 6 in view of knowledge of a POSITA. 7 Q. That certain claims are obvious in view 8 of Schröder, in view of the knowledge of a 9 POSITA? 10 A. Correct. 11 Q. And in this paragraph 158, you are 12 referring to a patent to Asada; is that right? 13 A. Patent 6,699,199 to Asada, yes. 14 Q. So in this ground of Schröder in view of 15 the knowledge of a POSITA, why are you referring 16 to Asada in this paragraph? 17 A. So as I'm describing starting on 18 paragraph -- sorry -- page 114, it's my opinion 19 that Schröder teaches element 1(b)(1) in 20 describing in paragraph 156 and 157 and further 21 expanding in 158 the further knowledge of a 22 POSITA in teaching element 1(b)(1) -- 1(b)(i).	Page 191 1 Is that -- are you making a general 2 statement you believe to be true of all wearable 3 devices? 4 A. Well, that sentence is describing my 5 analysis of Schröder, that electronic components 6 housed inside of the Schröder device are in a 7 cavity within the external and internal housing 8 components 18 and 16. 9 Q. Yeah. My question was whether this is 10 intended as limited to Schröder, or is this a 11 broader statement as to in general in the 12 wearable device art this is true? 13 A. So this is certainly relevant to my 14 description of Schröder. In general, that 15 sentence in isolation is my opinion, electronic 16 components housed inside a device are necessarily 17 in a cavity within a device. Yeah, it's 18 certainly describing how there's a cavity within 19 the Schröder device into which the electronic 20 components are housed. 21 Are the situations hypothetical 22 situations where an electronic component can be
Page 190 1 Q. So you thought the disclosure of Asada 2 was relevant to your analysis of whether the 3 claimed invention is obvious in view of Schröder; 4 is that fair? 5 A. So in this analysis, opining about 6 Schröder in view of the knowledge of a POSITA, 7 and that's what I described in 156, 157, and 158. 8 Q. I'm not clear whether you agreed with me 9 on not or that answer. 10 The question was, in writing this you 11 thought the disclosure of Asada was relevant to 12 your analysis of whether the claim invention is 13 obvious in view of Schröder. 14 A. And the knowledge of a POSITA. 15 Q. And the knowledge of a POSITA? 16 A. Correct. 17 Q. Correct. Okay. 18 And jumping to paragraph 162, you have a 19 statement close to the bottom of page 118, you 20 say, moreover, it is my opinion that the -- or 21 that electronic components housed inside a device 22 are necessarily in a cavity within the device.	Page 192 1 inside a device and not in a cavity? There may 2 be, there may be some, but here I'm talking about 3 Schröder and how a POSITA understands Schröder. 4 Q. In paragraph -- also in paragraph 162 you 5 quote a portion of Schröder at the top of the 6 page 119, column 8, 58 through 60. 7 Do you see that? 8 A. Yes. 9 Q. And the quote is, chip module 10 is 10 inserted into a recess of the finger ring. 11 Do you see that? 12 A. Were you reading at the top of 119 or the 13 bottom of 118? Sorry. 14 Q. The top of page 119. 15 A. Inlay 12 has a chip module 10 with at 16 least one antenna coil, eight with at least one 17 further electronic device. 18 Q. And then you cite column 8, line 58 19 through 60. 20 A. And 12, 61 through 65. 21 Q. Right. 22 My question is with respect to the second

Page 193 1 citation in column 8. 2 A. So what's the question? 3 Q. The question is, that citation is 4 describing Figure 3, is it not, of Schröder? 5 A. It is describing column 8, 58, 60 is with 6 respect to Figure 3. 7 Q. And you're not relying on -- you've 8 stated that you're not relying on Figure 3? 9 A. I'm not. That's a mistake because what 10 I'm highlighting is the description 12 where the 11 inlay is inserted in the cavity between 16 and 12 18. 13 Q. So that's another mistake in your report? 14 A. That is. 15 Q. So the -- in the portion you quote, what 16 is the recess referred to here in -- that's 17 described in Figure 3? It's the recess that the 18 chip is dropped into in Figure 3, isn't it? 19 A. So what I should have been referring to 20 is where the inlay is inserted into the recess 21 defined by the chip or the external housing 22 component and internal housing company of, for	Page 195 1 A. In Figure 3 what is described there is 2 it's that outer piece, so that is -- I'm pointing 3 to the wrong embodiment. And so what I'm 4 pointing to correctly is the chip module on the 5 inlay that's inserted into the cavity between the 6 inner and outer housing components. 7 Q. No. I understand that. 8 But I was asking you, there is a 9 reference to a recess in Figure 3, right? 10 A. Correct. 11 Q. And the recess is in the outer -- the 12 chip module is located in a recess in the outer 13 ring half? 14 A. That is correct as you described it, 15 based on the mistake in my declaration, but it 16 does not change my opinion and my analysis of the 17 chip module being on the inlay and inserted into 18 the recessed cavity. 19 Q. And in paragraph 165, this is a similar 20 question I asked you earlier when you referenced 21 Asada. Am I correct that your reference to Rhee 22 here is because Rhee is evidence of the knowledge
Page 194 1 example, Figure 7. But what's described there is 2 with respect to Figure 3. 3 Q. Okay. 4 A. It does not change my analysis because 5 I'm referring correctly to the description of the 6 inlay being inserted into the recess in, for 7 example, column 12. 8 Q. So do you know what recess Schröder is 9 talking about with respect to Figure 3 there? It 10 would be a recess in the outer ring half, 11 wouldn't it? 12 A. So in that Figure 3 embodiment, the 13 inlay -- sorry -- the chip module 10 is in the 14 position as shown in Figure 3, which would be the 15 recession to which it is inserted there as 16 opposed to the correct use, which I highlight, of 17 the inserted into the cavity defined by the 18 external housing component 18 and the internal 19 housing component 16. 20 Q. And the recess to which it is inserted, 21 using your words, is a recess in the outer ring 22 half in Figure 3, right?	Page 196 1 of a POSITA? 2 A. Correct. This is in the section 3 describing my analysis of how Schröder and the 4 knowledge of a POSITA would meet the limitations 5 here. So I explain -- highlight as I explain in 6 the Background section Rhee's thesis paper 7 teaching a finger ring sensor having inner and 8 outer surfaces, and then I go on to describe 9 further what he teaches. 10 Q. In paragraph 166 you make a statement 11 that in order to fit -- in the second sentence -- 12 in order to fit inside the finger ring, the 13 battery must be configured in size and shape to 14 fit within the cavity. 15 Do you see that? 16 A. Yes. 17 Q. Does Schröder say anywhere in his 18 disclosure that the battery must fit within the 19 cavity? 20 A. Well, what's described -- 21 Q. And if so, where does he say it? 22 A. So my analysis is Schröder in the view of

Page 197 1 knowledge of a POSITA, Schröder describes the 2 carrier containing electronic components, which 3 could include in a battery, which would be in the 4 cavity defined by 16 and 18. And as I describe 5 there, a POSITA would have understood Schröder's 6 Figures 6 through 8. And showing a cavity that's 7 between the outer circumferential surface and the 8 inner circumferential surface, the battery will 9 be arranged within the cavity between those 10 internal and external housing components. 11 Q. So you just said the electronic 12 components could include a battery. But your 13 statement here is that the battery must be 14 configured in size and shape to fit within the 15 cavity. Schröder doesn't expressly say that 16 anywhere, does he? 17 A. Schröder's teachings in the view of 18 knowledge of a POSITA reading it would understand 19 in the embodiments that have a battery that is -- 20 when in the inlay as described, fitting in the 21 cavity defined by 16 and 18 would be within that 22 cavity.	Page 199 1 internal and external housing components for the 2 embodiments of Figure 7, for example. Otherwise, 3 if the battery is not configured to fit within 4 the finger ring, the finger ring either has a 5 battery that sticks out or is exposed to the 6 environment, which is contrary to the teaching of 7 having, in this case, a portable wearable device 8 envisioned of the form of Figure 7. 9 Q. So in column 13, line 23, it states that 10 the chip module 10, and at least one antenna 11 coil, are an optionally further electronic 12 devices -- 13 I'm sorry, let me read the whole 14 sentence. It says, They're applied to a carrier 15 foil at least one chip module 10 and at least one 16 antenna coil 8 and optionally further electronic 17 devices. Are you relying on that statement? 18 A. Where do I cite that piece in my 19 declaration? I point to 12 where it's is 20 describing the inlay or the chip module on the 21 inlay. There's a carrier foil described as the 22 sequence of being other manufacturing issues,
Page 198 1 Q. Well, the battery could be located out of 2 the -- outside the inlay just as in -- just as 3 the chip module 10 in Figure 3, right? 4 A. I'm sorry. Can you ask that again? 5 Q. Well, Figure 3 shows a chip module 6 outside of the inlay, correct? 7 A. It shows the chip module on the top, yes, 8 in Figure 3. But, again, I'm referring to not 9 that embodiment in my analysis. 10 Q. Okay. So a battery could be similarly 11 located as chip module 10 in Figure 3, correct? 12 A. So Schröder teaches multiple embodiments, 13 which include those in Figure 3 and also in 14 Figure 7, where the inlay is on the inlay -- 15 where the battery is on the inlay along with 16 other electronic components that would fit within 17 that cavity. 18 Q. So your testimony is that, in the 19 embodiments you're relying on, the battery must 20 be contained in the inlay; is that fair? 21 A. Correct. As I say here, the battery must 22 be arranged within the cavity between the	Page 200 1 but... 2 Q. I guess I'm asking what's your -- what 3 part of Schröder are you relying on in support of 4 this statement that the battery must be in the 5 cavity, because in paragraph 166 you don't have 6 any citation to -- 7 A. I'm sorry. Paragraph 166? 8 Q. Of your declaration. 9 A. I'm sorry. 10 Q. Where you say that you don't cite to 11 anything in Schröder. 12 A. So what I should have pointed to is back 13 to the references that I made in column 12 to be 14 consistent with my discussion under 1, which is 15 the battery positioned within a cavity formed 16 between the internal housing component and the 17 external housing component. And so when the 18 inlay is in 12, as described in column 12, is 19 inserted into that cavity defined by 16 and 18, 20 so it would be configured in size and shape. A 21 POSITA reading this would understand -- reading 22 Schröder would understand it would be of the size

Page 201 1 and shape to fit within that cavity. 2 Q. So column 12 states that line 61, 62, 63, 3 the inlay 12 can have at least one chip module 10 4 with at least one antenna coil, with at least one 5 further electronic device. Is that what you're 6 relying on? 7 A. So the -- for example, in column 12, the 8 inlay -- I'm sorry -- column 12 at line 25, the 9 component 16 and 18 are so connected that the 10 connection -- sorry. Yeah. To insert a further 11 inlay in 12 or to exchange inlay because it is 12 defective the inlay 12 inserted to at least one 13 recess provided, therefore, with at least one 14 component 14 and 16. The inlay 12 consists of 15 the flexible carrier material. So it sits in 16 that cavity 12 defined by 16 and 18. 17 Q. That doesn't say anything about the 18 battery? 19 A. That's a POSITA understanding with the 20 situation where there's a battery included in the 21 embodiment. That battery would sit on the inlay 22 and sit inside of that cavity as described there.	Page 203 1 embodiments, when a battery is included, it would 2 be a further electronic device that would be 3 included on the inlay that goes into the cavity. 4 Q. But would a POSITA think that the battery 5 is not mentioned here specifically? 6 A. A POSITA reading that would understand 7 that it includes further electronic devices, 8 e.g., a display. A POSITA would understand there 9 are other examples, including a battery of 10 electronic devices, which in the embodiment that 11 includes a battery, and certainly a display 12 would, in most instances, require a battery, 13 would be also on the inlay, and inserted into the 14 cavity designed by 16 and 18. 15 Q. But even this doesn't say that the 16 further electronic devices must be in the inlay, 17 does it? 18 A. POSITA reading this would understand that 19 it could be and is taught, and there are other 20 options, but certainly in the embodiment, when 21 there's a battery and it's existing in the 22 embodiment of Figure 7, that it would exist
Page 202 1 Q. Okay. On paragraph 162, you cite column 2 12, line 61 through 65 on page 119. 3 Do you see that? 4 A. Yes. And that's consistent as well. The 5 inlay 12 can have at least one chip module, at 6 least one antenna coil with at least one 7 electronic device, e.g., a display. The POSITA 8 understands that the battery is also an 9 electronic device being arranged on inlay 12, so 10 that is also appropriately consistent with, as I 11 describe, what a POSITA would understand in how 12 Schröder meets the -- 13 Q. So he doesn't refer to a battery when he 14 refers to a further electronic device, does he? 15 He says, e.g., a display. 16 A. E.g. is an example of and a battery 17 POSITA understands is also an example of an 18 electronic device. 19 Q. Okay. And the column 11, he specifically 20 describes a battery, but he doesn't mention the 21 battery in this section here. 22 A. Again, a POSITA understands that the	Page 204 1 inside of the cavity defined by 16 and 18. 2 Q. Wouldn't a POSITA -- you've cited Rhee 3 and Asada in your analysis of Schröder. Wouldn't 4 a POSITA also be aware of the teachings of Rhee 5 and Asada that show the battery mounted on top of 6 the ring? 7 A. Yes. That is one embodiment, and 8 Schröder also teaches an embodiment with 9 everything inside the ring as I described with 10 the knowledge of a POSITA would be how they would 11 understand it in my analysis. 12 Q. On column 13, Schröder provides more 13 examples of electronic devices on line 25 that 14 can be mounted in the inlay. And he says 15 electronic devices, e.g., a further antenna coil 16 or a display. That looks to me like it's 17 intended to be an exhaustive list of what 18 electronic devices he's considering here, doesn't 19 it? 20 A. I do not think so, otherwise I think 21 would have used i.e. instead of e.g. using 22 examples including a further antenna or a display

Page 205 1 is further addition on top of the embodiments 2 that are described using a battery. So I think 3 it's a list of examples of additional -- and a 4 POSITA reading this would understand it could 5 also be a battery. 6 Q. But again, he doesn't mention a battery 7 when giving examples, does he? 8 A. A POSITA reading Schröder would 9 understand that a battery would be required 10 certainly for an object such as a display and in 11 the embodiment that is enabled by Figure 7 where 12 everything is the inlay inside, the battery would 13 be there. 14 Q. So you show Figure 7 in Schröder on 15 page 119 of your -- and you rely on it, of your 16 declaration, right? 17 A. Yes. Figure 7 of Schröder. 18 Q. So that item labeled cavity, your 19 testimony is that that discloses a battery, a 20 PCB, sensors, I guess, and whatever other 21 components you can think of in that red 22 rectangle?	Page 207 1 A. Well, the teaching includes Figure 7 and 2 what's described in the patent, and in my 3 knowledge this includes the knowledge of a 4 POSITA. So it certainly is, as enabled and 5 taught in conjunction with the knowledge of a 6 POSITA, then, yes, they would be able to with 7 that functionality in the cavity defined by 8 internal and external housing components 16 and 9 18. 10 Q. So that rectangle tells you how to lay 11 out all those components in Schröder's ring in 12 conjunction with Schröder's description? 13 A. Well, the knowledge of a POSITA and the 14 options that could be considered in terms of the 15 layout is also brought to bear, but as I further 16 describe in -- when we get up to, for example, 17 page 125 of where different components may exist 18 inside of a cavity. But the knowledge of a 19 POSITA in conjunction with Schröder certainly 20 would understand different options for how to 21 arrange the components inside of the -- on the 22 inlay inside that cavity.
Page 206 1 A. Correct. As it is described there, the 2 POSITA reading Schröder in view of knowledge of a 3 POSITA would understand the inlay goes into that 4 cavity between 18 and 16 of Figure 7. And also, 5 I think there was a Figure 8 that had the other 6 shape as well. 7 Q. And does that rectangle that shows 8 nothing but a blank rectangle, does that convey 9 enough information to a POSITA as to how he would 10 construct a ring having a battery, PCB, sensors, 11 and antenna coil, and whatever other components 12 Schröder talks about? Is that rectangle enough 13 information for a POSITA? 14 A. Well, it's the rectangle in conjunction 15 with what's described and the knowledge of a 16 POSITA is sufficient for them to understand how 17 to enable a device that has that functionality 18 inside of the cavity. 19 Q. They could make a device out of that 20 rectangle? 21 MR. KAPPOS: Object to form. 22 Q. As the teaching?	Page 208 1 Q. And that, in your opinion, that wouldn't 2 require any undue experimentation on behalf of a 3 POSITA? 4 A. No, it would not. 5 Q. Where does the rectangle tell them to put 6 the battery relative to the printed circuit board 7 relative to the antenna coil relative to the 8 sensors, relative to any communication module, 9 relative to any power regulation circuitry? 10 Where does the rectangle tell the POSITA where to 11 put all that stuff and how to arrange it? 12 MR. KAPPOS: Object to form. 13 MR. SCHULTZ: Would you repeat the 14 question for the witness. 15 (Whereupon, the record was read as 16 follows: Question: "Where does the rectangle 17 tell them to put the battery relative to the 18 printed circuit board relative to the antenna 19 coil relative to the sensors, relative to any 20 communication module, relative to any power 21 regulation circuitry? Where does the rectangle 22 tell the POSITA where to put all that stuff and

Page 209 1 how to arrange it?" 2 A. Right. And as I was going through my 3 declaration pointing out it's Schröder with the 4 knowledge of a POSITA, and I subsequently started 5 to describe the various arrangements of 6 components inside of that cavity. So knowledge 7 of POSITA in addition to what's disclosed in 8 Schröder gives them the guidance in how to 9 arrange this. 10 Q. So Schröder doesn't tell them, but the 11 knowledge of the POSITA fills in all those 12 blanks? 13 A. Yes. And I described that in the 14 subsequent parts of my declaration, for example, 15 on pages 120, 121, 122, 123 and beyond. 16 Q. Puts a lot of design work on the back of 17 the POSITA, doesn't it? 18 MR. KAPPOS: Object to form. 19 A. POSITA, as I understand, is imbued with 20 the knowledge of the literature as I described 21 earlier in the -- or the prior art, so I don't 22 think it is undue knowledge of a POSITA to know	Page 211 1 is a -- well, half a rectangle is the PCB? 2 A. So this is all under the section that's 3 talking about element 1D, a printed circuit board 4 exposed between the internal housing company and 5 the external housing component, wherein the 6 printed circuit board extends where at least a 7 second portion of the cavity of the finger 8 wearable ring device different from the first 9 portion. 10 And so here, as I describe on page 124, 11 Schröder teaches a PCB that extends through a 12 portion of the cavity, a cavity different from 13 the first portion of the cavity where the battery 14 is located. Schröder teaches inlay 12 as PCB 15 disposed between the internal housing component 16 and the external housing component. In this 17 situation, the battery end is adjacent to the PCB 18 and takes -- the battery takes up a first portion 19 and the PCB would take up a second portion. 20 Q. So does Schröder say this, that half of 21 this rectangle is the PCB and half of it is the 22 battery?
Page 210 1 how to read Schröder in view of knowledge to meet 2 the limitations as they are described on the 3 subsequent pages. 4 Q. The reality is that Schröder discloses 5 some basic housing configurations and nothing 6 regarding the layer of the components, does he? 7 A. Again, my analysis is not Schröder by 8 itself. Schröder in conjunction with the 9 knowledge of a POSITA and with the knowledge of a 10 POSITA, certainly understands how to arrange 11 components on a flexible circuit board that would 12 fit inside of the cavity defined by 18 and 16, 13 the internal and external housing components. 14 Q. Can we look at paragraph 174? Why is 15 only -- why do you only color half the cavity 16 purple here? 17 A. So what's described here is in a 18 situation where the battery is not sitting on the 19 flexible circuit board but is connected to the 20 circuit board, and the PCB sits in one portion 21 and the battery would sit in another portion. 22 Q. So you're saying that the half the cavity	Page 212 1 A. So again, my analysis is Schröder in view 2 of the knowledge of a POSITA, and a POSITA 3 certainly would have the option to have the 4 battery on a section of it and a printed circuit 5 board on the other section. 6 Q. So this arrangement comes from the 7 knowledge of a POSITA, not from any express 8 disclosure in Schröder, correct? 9 A. Again, it's Schröder in view of a 10 POSITA's knowledge. And so POSITA, in looking at 11 the design trade-offs in terms of battery size 12 and providing power for the functionality on the 13 PCB, Schröder, in view of the knowledge of a 14 POSITA, would know how to arrange such components 15 inside of the cavity of Figure 7. 16 Q. So you've testified that the inlay is the 17 printed circuit board, and that's item 12, 18 correct? 19 A. Yes. Inlay is item 12. 20 Q. Okay. But here you're saying only half 21 of the inlay is a printed circuit board and the 22 other half is occupied by a battery?

Page 213 1 A. Schröder, in view of the knowledge of a 2 POSITA, would certainly consider that as design 3 options to place the battery in a portion of the 4 cavity that's not occupied by the printed circuit 5 board. 6 Q. But an inlay is not a battery, is it? 7 A. The cavity is defined by the internal 8 housing components and the printed circuit board 9 inlay goes into that cavity and the battery would 10 also sit inside of that cavity. 11 Q. But my question is, this Figure 7 drawing 12 from Schröder, 12, is the inlay, and it's the 13 entire rectangle, correct? 14 A. So the cavity is defined by 16 and 18, 15 and a POSITA could choose to occupy the full 16 piece of the cavity with the circuit board if 17 they needed more battery space as I've 18 highlighted here. The cavity would have space 19 for the battery adjacent to it in the fist 20 portion and the second portion. 21 Q. Well, Schröder doesn't suggest that that 22 rectangle is anything but the inlay, does he?	Page 215 1 Likewise, Schröder's PCB, by existing within the 2 cavity of the finger ring, takes up a second 3 portion of the cavity. The PCB cannot occupy in 4 this case the same portion as the battery, vice 5 versa. The respective portions of the cavity 6 must be different. So in my opinion, a POSITA 7 would have understood that the PCB extends 8 through a portion of the cavity that is 9 necessarily different from the portion of the 10 cavity occupied by the battery. 11 Q. Can we look at paragraph 180, please. So 12 your testimony is that Schröder's sensor acquires 13 data through the internal housing component, 14 which I guess in Schröder is a ring half; is that 15 fair? 16 A. The inner housing component. 17 Q. Okay. But again, Schröder doesn't say 18 that, does he? That's your relying on the 19 knowledge of a POSITA? 20 A. So Schröder -- my analysis is Schröder, 21 in conjunction with the knowledge of a POSITA to 22 acquire a vein image, you'd be doing it through
Page 214 1 A. As I describe, Schröder, in view of the 2 knowledge of a POSITA, as I describe in 3 paragraphs 172 and 173, would know how to use 4 that cavity defined by 16 and 17 to have the 5 inlay, the PCB and the battery inside of that 6 same cavity. 7 Q. So how big is the battery or what's the 8 size of the battery that's occupying the second 9 half of the rectangle in Figure 7? Would a 10 POSITA know that? 11 A. A POSITA would size the battery 12 appropriately for the function that they were 13 trying to accomplish. 14 Q. And you haven't done that analysis, have 15 you? 16 A. It was not necessary to do that analysis 17 in forming my opinions. As I describe here in 18 173, the two solid components, the battery and 19 the PCB cannot exist in the same space in the 20 situation. The -- applied to Schröder, the 21 battery exists within the cavity of the finger 22 ring and takes up a first portion of the cavity.	Page 216 1 that internal housing component. 2 Q. Schröder doesn't use that description, 3 though, does he? He doesn't say his sensor 4 acquires data through the housing, does he? 5 A. Well, in 179, Schröder teaches the finger 6 ring with a sensor configured to acquire data 7 from the user through the internal housing 8 component. Schröder teaches the biometric 9 sensor, captures a vein image of the user's 10 finger when the finger ring is pushed over the 11 wearer's finger. Schröder then also describes 12 capturing the wearer's fingerprint to capture a 13 vein image or fingerprint image. The sensor of 14 the finger ring is configured in a way so as to 15 capture these images through the internal housing 16 component. So the housing components of 17 Schröder's finger ring is made of plastic or 18 metal. 19 As discussed above, the sensor has 20 light-emitting and light-receiving components. 21 So, in my opinion, a POSITA, therefore, would 22 have recognized that Schröder's sensor acquires

Page 217 1 data from the user through the internal housing 2 components by acquiring information through the 3 ring half that touches the finger, thus Schröder 4 teaches one or more sensors electronically 5 coupled with a PCB and battery and configured to 6 acquire data from the user through the internal 7 housing component. 8 Q. You can't think of a way that Schröder's 9 sensor could acquire the vein pattern without 10 acquiring it through the ring half that touches 11 the finger? 12 A. Would a POSITA consider other structures 13 such as windows, potentially. But what's 14 described here is in the embodiment with having 15 these rings. It acquires data through the 16 components. 17 Q. Okay. You just made a distinction there, 18 acquiring it through a window is different from 19 acquiring it through the internal housing 20 component? 21 A. Well, a window could be part of an 22 internal housing component here, but what I'm	Page 219 1 (Proceedings interrupted at 5:08 p.m. and 2 reconvened at 5:23 p.m.) 3 THE VIDEOGRAPHER: We're back on the 4 record. The time is 5:23. 5 BY MR. SCHULTZ: 6 Q. Let's jump up to paragraph 186, and this 7 refers to your position with respect to claim 3 8 of the '178. 9 And this is still with respect to 10 Schröder in view of the knowledge of a POSITA, 11 correct? 12 A. Correct, yes. 13 Q. Why are you talking about Mestas in 14 paragraph 186 and 187? 15 A. So here I'm using still under Schröder, 16 in view of the knowledge of a POSITA, I'm 17 pointing to Mestas as representative of knowledge 18 of a POSITA and not proposing that we're 19 combining in this case as it is give background 20 knowledge of a POSITA in 186 and 187. And in 188 21 sort of describe how a POSITA, with the knowledge 22 of looking at Schröder, would have been motivated
Page 218 1 describing here is acquiring the data through the 2 internal housing component. 3 Q. Through a window or not through a window? 4 A. A POSITA could do that either way 5 actually. 6 Q. And as an expert, can you think of a way 7 to acquire the vein pattern in Schröder without 8 acquiring the data through the ring half? 9 A. Other embodiments are discussed in 10 Schröder, for example -- well, no, so that's with 11 respect to the chip module. So the functionality 12 of acquiring the vein image is going to be 13 through the housing to acquire that data. 14 Q. You're saying it has to be? 15 A. Well, in the embodiments that are 16 described, for example, using the Figure 7 17 structure, it's going to be going through the 18 housing. 19 MR. SCHULTZ: Why don't we go off the 20 record for a bit. 21 THE VIDEOGRAPHER: Time is 5:08. We're 22 off the record.	Page 220 1 to have the portions overlap for, et cetera. And 2 I compare that just for completeness. When I do 3 exclusively instead use Schröder in view of 4 Mestas making it clear, for example, in paragraph 5 240 that a POSITA would have been motivated to 6 combine Schröder and Mestas, but here in 186 I'm 7 pointing to Mestas as knowledge of POSITA -- a 8 representative of knowledge of a POSITA. 9 Q. Okay. So in paragraph 188, you say 10 POSITA would have been motivated to design a 11 first portion of the cavity that has the battery 12 to at least partially overlap with the portion of 13 the cavity that has the PCB to reduce the risk of 14 electrical components and the PCB losing 15 mechanical or electrical connections to each 16 other. 17 Is that losing electrical connections to 18 non-overlap? Is that a problem in the art? 19 A. Well, again, here and with knowledge of a 20 POSITA, in order -- and considering design 21 trade-offs and manufacturing trade-offs, having 22 them at least partially overlap would help to

Page 221 1 serve to reduce the risk of electrical components 2 and PCB losing connection, as opposed to if they 3 weren't overlapping and given other design 4 trade-offs, they could have an increased risk of 5 losing connection, electrical and mechanical. 6 Q. Can you give me an example of that where 7 non-overlapping components have a risk of losing 8 mechanical and electrical connections? 9 A. Well, for example, on a wearable device 10 that's experiencing a lot of potential motion and 11 vibration from its use, depending on the design 12 trade-offs of the battery, the size of the 13 components, the size of the cavity, and the 14 expected level of vibration induced, having them 15 more intimately coupled could serve to reduce the 16 risk of disconnection. 17 Having them further apart could have 18 other advantages but would potentially increase 19 the risk of having the electrical or mechanical 20 components disengage under extreme motions, for 21 example. 22 Q. Okay. Can you provide examples of when	Page 223 1 electrically fault. 2 Q. Can you give me a specific example of 3 that? 4 A. You know, an example in the context of 5 say, for example, a ring, all right, if you had 6 overlap and you're running a jackhammer, for 7 example, and having the components intimately 8 connected, you'd have less risk of things 9 breaking apart. 10 If it weren't intended to be a 11 jackhammer-type usage, having them sort of 12 adjacent to each other and connected would be 13 less tolerant potentially to vibration, but if 14 the use didn't experience, for example, a 15 jackhammer usage, that could be okay given the 16 design trade-off. 17 Q. And what's an example of a device you've 18 designed that you designed components to be 19 partially overlapping due to this issue? 20 A. I've designed handheld ultrasound probes 21 that take into account different form factors and 22 different use models of sensors that go on
Page 222 1 you've experienced in your work losing mechanical 2 or electrical connections that would have been 3 remedied by a partial overlap? 4 A. I've certainly experienced design of 5 things that experience vibration and shock and 6 become disconnected. And, again, a POSITA in 7 looking at design trade-offs could -- would 8 understand that to have them overlapping would 9 serve to minimize the distance, the space between 10 components, and therefore, have less of a risk of 11 things shaking apart, as one example. 12 Q. Okay. Can you give me an anecdote of 13 where you believe things have -- connections have 14 been lost due to non-overlapping components? 15 A. Certainly within some of the handheld 16 devices that we've built, we designed both things 17 that are small and have a lot of overlap between 18 components and they are more rugged in some 19 dimension compared to devices that are connected 20 with wires only, that have the risk of relative 21 displacement between them such that the 22 connections could mechanically break or	Page 224 1 vehicles, sensors that are embedded into the 2 sockets of amputees after we've printed them to 3 have conformal fit in order to do our testing 4 evaluation. So those are certainly instances 5 where the mechanical motion introduced by the 6 person moving can be variously affected by how 7 you connect them. 8 Some of the wearable patches that we 9 make, same thing, and depending on the level of 10 motion, you'll be constrained with different sort 11 of needs to make it more compact to maintain 12 connection versus allowing a little more 13 flexibility. 14 Q. Okay. So in this paragraph you talk 15 about the POSITA would have been motivated to 16 have portions of the components overlap to avoid 17 these issues that are discussed here. And 18 paragraph 183 and 184, and I guess I would refer 19 to 184, you talk about motivations to have the 20 first and second portions of the battery not 21 overlap. 22 So my question is, would a POSITA be

Page 225 1 motivated by -- to not overlap, or would a POSITA 2 be motivated to overlap as described in your two 3 paragraphs here? 4 MR. KAPPOS: Object to form. 5 A. Well, as I describe in 184, there are 6 many motivations to have the first and second 7 portions of the battery not overlapped based on 8 factors that a POSITA would have considered when 9 designing the particular device for a particular 10 use. POSITA would have been motivated -- I'll 11 slow down -- to design the first portion of the 12 cavity that has the battery to not overlap in 13 order to have a thinner or more compact Figure 1 14 wearable device to reduce the volume making the 15 ring potentially more comfortable to wear. 16 Second, by not overlapping you can 17 potentially design or save on material costs, 18 less components, substrates to accommodate. 19 And third, would have been motivated to 20 design non-overlapping for better battery 21 performance in the context of thermal management. 22 If the battery portion overlaps a portion with	Page 227 1 reliable connections. So, again, design 2 trade-offs would lead a POSITA to have a variant 3 where it's overlapping or not overlapping. 4 Q. You don't find those two paragraphs 5 inconsistent with one another? 6 A. Again, a POSITA considering different 7 design trade-offs of the use scenario, the 8 manufacturing costs, the trade-offs, no, they are 9 not inconsistent. 10 Q. And you're talking about the same 11 reference there, Schröder, correct? 12 A. Correct. 13 Q. So moving on to paragraph 197 where 14 you're talking about Schröder in view of Niwa. 15 And you're talking about combining Niwa and 16 Schröder, correct? 17 A. Schröder with the teachings of Niwa. 18 Q. Okay. And you say in paragraph 197, Niwa 19 provides beneficial configurations for Schröder's 20 LEDs and sensor, right? 21 A. In paragraph 197, yes. 22 Q. So one of the sensors Niwa provides is
Page 226 1 other electrical components, the battery will 2 warm up faster, less space around the battery to 3 allow for temperature variation, heat to 4 dissipate. 5 Fourth, a POSITA would have been 6 motivated to prevent overlap to ease assembly. 7 Fifth, to reduce noise. 8 And taken together, those are motivations 9 in given design trade-offs that a POSITA would be 10 familiar with it. In the context of overlapping 11 for different design considerations, a POSITA 12 would have been motivated to at least -- this is 13 in paragraph 188 -- at least partially overlap 14 with the portion of the cavity that has the PCB, 15 for example, to reduce risk to electrical 16 components, the PCB losing connections, 17 mechanical and electrical. 18 A POSITA would have been motivated to 19 have the portions overlap to better utilize the 20 limited form factor of the ring. Overlapping 21 would allow for smaller form factor to occupy 22 less space. Second overlap would allow for	Page 228 1 called -- determines pulse oximetry; is that 2 right? 3 A. Yes. 4 Q. Does pulse oximetry tell you what a vein 5 pattern is? 6 A. Do we introduce Niwa into the record 7 before I access it? 8 Q. I can mark it. 9 (Anthony Exhibit 8, U.S. Patent 10 Application 2012/0016245 A1, marked for 11 identification.) 12 Q. So we've marked as Deposition Exhibit 13 Number 8 United States Patent Application 14 Publication U.S. 2012/0016245 to Niwa, and that's 15 Petitioner Exhibit 1005. 16 And to Rhee-ask the question, one of the 17 functions Niwa performs is -- Niwa has a sensor 18 that performs pulse oximetry; is that right? 19 A. Yes. 20 Q. And my question was, does pulse oximetry 21 tell you vein patterns? 22 A. Well, as I describe in the motivation to

Page 229 1 combine, you know, pulse oximetry uses sensors 2 similar to Schröder to capture information about 3 the veins, and those sensors in Niwa include 4 multiple light-emitting portions in different 5 wavelengths. 6 So a POSITA would have been motivated to 7 incorporate the teachings of Niwa to provide 8 other beneficial physiological monitoring 9 biometric information, as I described earlier 10 today such as alive, dead, and also teaches the 11 beneficial use of multiple LEDs and wavelengths 12 which serve as redundancy, which would be 13 beneficial to Schröder. 14 And so PPG sensors, the intent for PPG is 15 not to measure a vein image but it is in the 16 related area. And the POSITA would have been 17 motivated to combine Schröder and Niwa as I 18 describe in paragraphs 194 through 198. 19 Q. Okay. I understand your position is that 20 they're related technologies. As to Schröder's 21 use of vein patterns for authentication, PPG 22 sensing wouldn't be of much use in that	Page 231 1 and he matches it with a stored vein pattern, 2 correct? 3 A. That's what's described in Schröder by 4 itself, but, again, I'm not analyzing Schröder by 5 itself. I'm describing in these paragraphs you 6 pointed to why a POSITA would be motivated to -- 7 Q. I understand the qualifications, but I'm 8 just asking directed questions. 9 For that type of vein pattern matching, 10 is PPG sensing or pulse oximetry or oxygen 11 saturation level or heart rate, are those 12 useful -- is that data that can be used in vein 13 pattern matching as described in Schröder? 14 A. If in the hypothetical we narrow it only 15 down in asking is PPG -- was PPG relevant to vein 16 imaging, but that's not the only thing Niwa 17 teaches. Niwa also teaches using multiple LEDs, 18 multiple wavelengths, which would certainly a 19 POSITA would understand that those would be 20 beneficially used to enhance the performance and 21 the redundancy in a device such as Schröder. 22 Q. Okay. So you said if in the hypothetical
Page 230 1 application, would it? 2 A. Well, the broader teachings of Schröder 3 in the context of PPG at least -- 4 Q. Just talking about vein pattern 5 authentication. 6 A. Well, the teachings of Schröder are an 7 authentication using a biometric marker, and they 8 use vein patterns. But a POSITA reading that 9 would also understand that there are other 10 biometric information that would be relevant such 11 as those taught by Niwa, such as PPG to 12 identifying a person in order to, for example, at 13 minimum confirm person live or dead or looking at 14 the heart rate variability that comes from the 15 PPG signal that tends to be more unique for an 16 individual or tends to be able to help you 17 identify an individual which would be relevant, 18 for example, for the security applications of 19 Schröder. 20 Q. But I was speaking specifically about the 21 vein pattern matching that occurs in an 22 embodiment of Schröder. He takes a vein pattern	Page 232 1 we narrow it down to vein imaging, your testimony 2 is that in that narrow application PPG wouldn't 3 be terribly useful, would it? 4 A. That's what I said, and I expounded on 5 the fact that the teachings of Niwa, though, are 6 beneficial to be incorporated with Schröder to 7 provide the enhancement such as redundancy and 8 multiple wavelengths. And that furthermore, it 9 would be beneficial to have other signals such as 10 pulse oximetry to help identify the person for 11 security applications. 12 Q. But, again, let's take them one at a 13 time. Oxygen saturation level, that's not going 14 to help you in the narrow, as you say, 15 application of vein pattern matching, is it? 16 A. Well, the application of Schröder is not 17 vein pattern matching per se, it's security, and 18 it uses vein pattern matching. But pulse ox, if 19 pulse ox were zero, for example, that would 20 indicate what persons -- it's not a person, it's 21 a phantom that has a vein structure that could be 22 analogous to a person. So pulse ox could be used

Page 233 1 for directly the security application of getting 2 information from a vein as described in Schröder. 3 Q. Does it provide an image of a vein? 4 A. The sensors that would be, for example, 5 in the combination sliding over the finger would 6 have multiple LEDs, multiple wavelengths that 7 could also collect multiple vein images under 8 those different wavelengths in different viewing 9 positions, which would help in Schröder. But, 10 again, I describe completely why the POSITA would 11 have combined Niwa and Schröder -- 12 Q. No, no, no. I'm just talking about Niwa 13 sensors that you're describing here, and I think 14 you've answered this, but I just want to make the 15 record clear. Niwa doesn't disclose sensors that 16 take vein pattern images, does it? 17 A. So I've agreed with you in the sense that 18 in isolation my opinions were not formed in 19 isolation of either here Niwa or Schröder, and 20 there are many reasons why the teachings of Niwa 21 are relevant to Schröder. 22 Pulse oximetry could be acquired	Page 235 1 enhance it and improve the functionality. 2 Q. Okay. And that wasn't -- didn't answer 3 my question. 4 My question was, is there a suggestion in 5 Schröder that it needs enhancing? 6 A. Well, there's plenty of discussion in 7 Schröder that talks about the different 8 applications, and if you want to make a device as 9 secure as possible, a POSITA would look to ways 10 to improve for hyper secure or would look to 11 incorporate, for example, the teachings of Niwa 12 in doing so. 13 Q. Is there a specific suggestion in 14 Schröder that would be apparent to a POSITA that 15 Schröder's disclosure of a sensor used to 16 authenticate vein patterns is inadequate or needs 17 improvement? 18 And I'd like you to carefully consider 19 how my question was worded. 20 MR. SCHULTZ: Could you repeat the 21 question? 22 (Whereupon, the record was read as
Page 234 1 certainly while you're sliding the ring and 2 getting that vein imagery, and having those 3 multiple wavelengths would give you additional 4 redundant information to help with the 5 embodiments of the application of Schröder, and 6 as well with further teachings of Niwa, would 7 help to provide the identification and security 8 applications envisioned. 9 Q. Is there a suggestion in Schröder that 10 his vein pattern detection and authentication is 11 not adequate? 12 A. Well, as I describe, depending on a 13 POSITA reading Schröder and in order to enhance 14 functionality, improve performance, would have 15 been, for example, motivated to combine the 16 teachings of Niwa to provide multiple LEDs for 17 redundancy, to provide additional biometric data 18 that is relevant to security beyond the vein 19 image. 20 Certainly what's taught in Niwa by itself 21 provides function, but a POSITA reading that 22 would understand in the teachings of Niwa how to	Page 236 1 follows: Question: "Is there a specific 2 suggestion in Schröder that would be apparent to 3 a POSITA that Schröder's disclosure of a sensor 4 used to authenticate vein patterns is inadequate 5 or needs improvement?") 6 A. So Schröder teaches using a vein pattern, 7 POSITA reading Schröder would understand you want 8 the best vein pattern possible, and the given 9 design considerations you may want to have an 10 extremely good versus a good enough. 11 And so having the teachings of Schröder 12 or Niwa would be beneficially combined given what 13 a POSITA would want to try to accomplish in using 14 Schröder for its applications and other reasons 15 for the motivation to combine here, but... 16 Q. So your -- the reason Schröder would -- 17 you'd modify Schröder to add sensors from Niwa is 18 because you're trying to build the best possible 19 device; is that the motivation? 20 A. Well, my motivation, you were asking 21 quite specifically just about the -- a narrow 22 aspect, and my motivations to combine are fully

Page 237 1 articulated in the paragraphs 194 through 198. 2 And then I was opining, as we were discussing 3 here, the other reasons that would be motivation 4 to combine, such as using the functionality of 5 Niwa for like a live dead check or use of the 6 variability in heart rate, the heart rate 7 variability as a further identification of the 8 person. 9 So there are multiple reasons that I 10 describe here for why a POSITA would have been 11 motivated to combine Schröder with the teachings 12 of Niwa. 13 Q. Okay. Again, that didn't answer my 14 question. That's nonresponsive. 15 What disclosure in Schröder can you point 16 to, if any, that suggests his vein pattern 17 matching embodiment needs improvement? 18 Dr. Anthony, I take it none immediately 19 popped into your head responsive to my question? 20 A. Well, I was responding to your question 21 and in the way that I was highlighting my 22 description both in the motivations to combine,	Page 239 1 A. I'm sorry. That was column 9, and it was 2 line 62. The biometric sensor can be integrated 3 into the finger ring such that a biometric -- 4 such that the biometric sensor captures, e.g., at 5 least a partial vein image in the finger while 6 the finger ring is being pushed over a finger. 7 So a partial vein image is not as unique 8 in identifying similar to a fingerprint. A 9 partial fingerprint is not as unique in 10 identifying, so a POSITA would understand the 11 benefits of incorporating additional 12 functionality as taught by Niwa to have 13 additional LEDs and sensors to capture, for 14 example, the full vein image. 15 Furthermore, it talks about various 16 manufacturing techniques. And given the 17 tradeoffs between manufacturing techniques and 18 acquiring the vein image beneficially having 19 redundancy in multiple wavelengths, multiple LEDs 20 would also serve to be beneficial. So a person 21 reading Schröder would understand some of the 22 trade-offs in enhancing what is disclosed in
Page 238 1 and so you asked some additional further nuance, 2 and so I'm reviewing again the Schröder reference 3 in order to fully answer your question. 4 Q. All right. So you can't answer my 5 question without reviewing the Schröder 6 reference? 7 A. That is not true. I'm reviewing it to 8 give a complete answer. 9 Q. Okay. Well, I don't have time to sit 10 here and wait for you to read Schröder to respond 11 to my question. So if you can't respond to it 12 based on your work to date, then we'll move on. 13 A. Well, for example, insofar that I've 14 gotten through, there is at least two examples. 15 You know, in this situation, a person reading 16 Schröder capture at least a partial vein image. 17 So a partial vein image would be less identifying 18 than a full vein image. So incorporating 19 additional sensors, additional LEDs to capture 20 the full vein image would be beneficial. 21 Q. And what part of Schröder are you 22 referring to there?	Page 240 1 Schröder. 2 Q. So Schröder also says that column 9 where 3 it says, at least a partial vein image below 4 that, as biometric sensors there can be employed, 5 for example, at least one infrared diode and at 6 least one infrared sensor. So clearly he 7 contemplates more than one potentially infrared 8 sensor. 9 Would more infrared sensors provide a 10 better vein image? 11 A. Potentially. And a POSITA would look at 12 that and understand, would be more details on 13 both the wavelengths and the number as also 14 described in Niwa. 15 Q. And Schröder also says in column 10, line 16 4, upon a first capture, e.g., of a vein image of 17 the ring finger, the vein image must be captured 18 along the whole finger line from all possible 19 angles in order to enable a later authentication 20 of the user to be carried out from arbitrary 21 angles upon arbitrary displacements along the 22 finger. That suggests that Schröder has already

Page 241 1 thought about obtaining a complete vein pattern 2 and a vein pattern accurate enough to perform 3 authentication; isn't that right? 4 MR. KAPPOS: Object to form. 5 A. So, you know, a person skilled in the art 6 reading that all possible angles could include 7 putting it on once at one orientation, another 8 orientation to have the partial vein images at 9 all, and a POSITA would also understand and using 10 the teachings of Niwa to have sensors all around. 11 So that with one insertion, you would have all 12 the multiple angles and views that would give you 13 the full image with one without having to 14 potentially reorient the finger or the ring. 15 Q. Well, you already said Niwa doesn't 16 perform vein image. So why would one look to 17 Niwa's sensors for that? Wouldn't one of 18 ordinary skill in the art just add additional 19 infrared sensors for performing that function 20 which are already disclosed in Schröder? 21 A. Again, I think I've described multiple 22 reasons. Again, paragraphs 194 through 198 for	Page 243 1 art. And for all the reasons described in 194 2 through 198, POSITA would indeed have been 3 motivated to combine. 4 Q. You would agree with me that designing a 5 finger ring, a wearable finger ring, space is at 6 a relative premium, correct? 7 A. Well, as I've described in a number of 8 the things we've already talked, sort of design 9 trade-offs, including use of space relative to 10 other design factors, so space is certainly a 11 consideration that a ring could be bigger or 12 smaller and still be a finger ring. 13 Q. But you've also discussed there's 14 motivation to make the ring, as Asada mentioned, 15 as compact and as comfortable as possible, right? 16 A. Again, there are multiple design axes 17 along which you're designing the 18 manufacturability, the comfort, the size, the 19 space, the cost. And having it be a ring and 20 constraints, it has a range of size, but doesn't 21 make it have to be the tiniest thing possible. 22 Q. Okay. So given those design
Page 242 1 why a POSITA would be motivated to combine. 2 Enhancing, for example, the pulse -- the pulse ox 3 could potentially inform or enhance methodologies 4 like vein pattern biometrics and other biometrics 5 such as live dead, such as the heart rate 6 variability. So POSITA would be certainly 7 motivated to combine the teachings of Niwa in 8 view of Schröder. 9 Q. So does Niwa disclose a better way of 10 vein pattern imaging than Schröder? 11 A. I'm sorry. Can you ask that again? 12 MR. SCHULTZ: Could you repeat the 13 question? 14 (Whereupon, the record was read as 15 follows: "So does Niwa disclose a better way of 16 vein pattern imaging than Schröder?" 17 A. So Niwa's teachings, when combined with 18 Schröder as I describe here, enhance performance, 19 provide functionality, improving performance and 20 characterization. Niwa by itself, which is not 21 what I'd analyzed, is not talking about vein 22 pattern imaging, but it is in the same field of	Page 244 1 considerations, a POSITA would not be motivated 2 to add components that aren't necessary to the 3 functioning of the device, correct? 4 A. It depends on how much redundancy they 5 want in that function and how much enhanced 6 signal-to-noise ratio, for example. You can have 7 a function that operates within some range of 8 operation parameters, and improving that function 9 could be enabled by adding additional components, 10 which could then, on the other axis, make it a 11 little bit bigger, a little more costly but 12 enhance the function. 13 Q. And if your sole goal, for example, is 14 sensing vein patterns, and you wouldn't be 15 motivated to add sensors that don't perform that 16 function, would you? 17 A. Well, again, the sole -- the sole goal of 18 Schröder is not to capture a vein image. The 19 sole goal in Schröder in isolation is targeted to 20 providing security. And as I've described and 21 personal identification can be accomplished with 22 vein imaging plus enhanced with some of the other

Page 245 1 functions that would be enabled by the 2 combination of Niwa, for example, live dead with 3 pulse ox, heart rate variability also from the 4 pulse ox or PPG signal. 5 Q. Let me try and ask it in a way that you 6 would accept. A person of skill in the art 7 designing a wearable fingering, they wouldn't 8 want to add unnecessary components, would they? 9 A. They would not add unnecessary components 10 to accomplish the target of what they're trying 11 to accomplish, and a POSITA has different things 12 they try to accomplish in designing a device and 13 would be motivated to enhance performance to 14 improve signal-to-noise, cost manufacturing 15 issues, amongst others. 16 Q. And one of the reasons they would not 17 want to add unnecessary components is they're 18 trying to, in the case of wearable rings, 19 construct a thinner more compact finger ring, 20 correct? 21 A. Again, they're design trade-offs. Adding 22 components would tend to increase size, but	Page 247 1 housing component, should be flipped. 2 Q. Is this noted on the corrections you 3 provided earlier? 4 A. This one is -- let's see, paragraph -- 5 no. 6 Q. Okay. So this is another mistake that's 7 not noted on Exhibit 1? 8 A. That is correct. 9 Q. How did you determine which part of the 10 green shading you were labeling external housing 11 component and internal housing component? 12 Are you still considering the answer? 13 A. I'm reviewing my paragraphs prior to 14 those figures to make sure I'm giving you the 15 correct answer. 16 So this is in the section describing 17 Schröder in combination with Niwa. And so in 18 Niwa, I'm using the Figure 7 embodiment, for 19 example, that has the cavity and that external 20 housing component, internal housing components 21 would be forming the ring into which that the 22 components in Niwa would be assembled.
Page 246 1 increase performance, increase functionality. 2 Q. "Trade-offs" meaning thinner is a 3 motivation, a thinner ring is a motivation? 4 A. It's one of several motivations, 5 including cost and manufacturability and 6 performance and function. 7 Q. Can you go to paragraph 203, and you have 8 an annotation of Figures 27 and 28 here. 9 Do you see that? 10 A. Yes. 11 Q. So you label -- I guess, in Figure 27, 12 and Figure 28, you label two, I guess, sections 13 of a green shading of Niwa as external housing 14 component and internal housing component. 15 Do you see that? 16 A. Yes. 17 Q. Did you mean to -- for Figure 27, is 18 external housing component in the correct spot? 19 A. It is not. Those should be -- so it is 20 external housing component that's on the outside 21 around the finger. So in Figure 27, as annotated 22 there, the external housing component, internal	Page 248 1 Q. Okay. Let me make sure I understand 2 that. So you're not saying that Niwa by itself 3 has external and internal housing components. 4 You're saying this is an annotation reflecting 5 the combination of Niwa and Schröder? 6 A. Right. The external housing component, 7 internal housing component structure of Niwa 8 combined with Schröder. 9 Q. Okay. Is it your testimony that Niwa has 10 an external housing component and an internal 11 housing component? 12 A. So if we were up at under ground 5, I 13 start to describe Niwa in view of the knowledge 14 of a POSITA and highlight how external housing 15 components and internal housing components are 16 taught by Niwa. But in the section we were 17 referring to, it's the combination that I'm 18 referring to, Niwa and Schröder. 19 Q. Okay. So does Niwa have external and 20 internal housing components? 21 A. So, for example, on page 202 under ground 22 5, teaching element 1(b)(i), internal housing

Page 249 1 component defining an inner circumferential 2 surface of the finger wearable ring device, the 3 internal housing component coupled with the 4 external housing component. So in ground five, 5 it's my opinion that Niwa teaches element 6 1(b)(i), and I describe in paragraphs 319 and 7 320. 8 Q. So could you look at Figure 22 of Niwa. 9 So 40 is the housing, correct? 10 A. Finger ring type housing, housing is 40, 11 correct. 12 Q. Does Niwa say that's constructed of 13 multiple components? 14 A. Well, as I describe in 320, it's my 15 opinion that a POSITA would have understood that 16 the internal housing component with the external 17 housing component together form the housing for a 18 unified device. 19 Q. So is 40 a unitary housing? 20 A. So 40 is described in Niwa as the finger 21 ring type housing. And as I describe in 22 paragraph 319, the shown, the annotated Figure 22	Page 251 1 design requirements including considerations for 2 durability, maintenance and performance 3 optimization. 4 Q. Okay. Is it your testimony that housing 5 40 is two pieces somehow coupled together? 6 A. Again, as they highlight in paragraph 7 320, a POSITA would consider that as one of the 8 options. 9 Q. Well, I'm asking you what Niwa says, not 10 a POSITA. 11 A. Well, Niwa is silent on it, I believe. A 12 POSITA reading Niwa would, as I describe, 13 understand that there are multiple ways, 14 including having the two components structurally 15 integrated and assembled. 16 Q. But Niwa is -- as you say, Niwa is silent 17 as to the issue of whether housing 40 is 18 comprised of components? 19 A. But POSITA reading Niwa would -- 20 Q. Before you say "but," can you answer my 21 question? 22 A. I am answering the question.
Page 250 1 and 26, Niwa's finger ring type housing has an 2 inner portion green that surrounds the ball side, 3 and the inner portion green is coupled with the 4 outer portion to form Niwa's circular finger ring 5 type housing 40. 6 Q. And Figure 22 of Niwa, it appears to be a 7 single piece. Are you viewing that as having 8 inner and outer components, or are you 9 interpreting that as part of the housing is the 10 inner and part of the housing is the outer? 11 A. So as I describe in 320, in my opinion, 12 POSITA would have understood that the internal 13 housing component with the external housing 14 component together form the housing for a unified 15 device. This understanding includes recognizing 16 various assembly techniques that might be used 17 whether the components are integrated through 18 direct physical contact which simplifies the 19 design and enhances structural integrity or 20 through the use of an intermediate structure that 21 might add functionality or facilitate simply the 22 choice in formation would depend on the specific	Page 252 1 Q. Is the answer "yes, but?" 2 A. Niwa is silent as I described. 3 Q. Silent with respect to what? 4 A. Silent on 40 of how it is constructed. 5 Q. Okay. 6 A. POSITA reading 40, reading Niwa would 7 understand that it can be integrated through 8 direct physical contact or assembled as I 9 highlight in the annotated Figure 22. 10 Q. Well, it's not silent in the sense that 11 it shows a unitary body in Figure 22, right? 12 A. It's showing a body, but it's silent on 13 how that body was created. So a POSITA reading 14 that would understand there are multiple ways to 15 do it, including as they've provide in paragraph 16 220. 17 MR. SCHULTZ: Let's recess until 18 tomorrow. 19 THE VIDEOGRAPHER: Time is 6:26. We're 20 off the record. 21 (Whereupon, deposition was adjourned for 22 the day at 6:26 p.m.)

Page 253 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 14 further certify that I have no disqualifying 15 interests, personal or financial, in any party in 16 this action. I further certify that the deposition 17 of BRIAN W. ANTHONY, Ph.D., occurred IN PERSON on 18 February 25, 2025 in Boston, Massachusetts, 19 commencing at 9:09 a.m. and adjourning at 6:26 p.m. 20 _____ 21 Dana Welch, CSR, RPR, CRR 22 Notary Public My Commission Expires: August 21, 2031	Page 255 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. 9 Deposition Date: February 25, 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 15 (Check appropriate box): 16 () The same is a true, correct and 17 complete transcription of the answers given by 18 me to the questions therein recorded. 19 () Except for the changes noted in the 20 attached Errata Sheet, the same is a true, 21 correct and complete transcription of the 22 answers given by me to the questions therein recorded. _____ DATE WITNESS SIGNATURE _____ DATE NOTARY
Page 254 1 Brian W. Anthony, Ph.D., 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 25, 2025 8 Deponent: Brian W. Anthony, Ph.D. 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 256 1 Digital Evidence Group, LLC 2 1730 M Street, NW, Suite 812 3 Washington, D.C. 20036 4 (202)232-0646 5 6 ERRATA SHEET 7 8 Case: Samsung Electronics Co., Ltd., et al. v. Ouraring, Inc. 9 Witness Name: Brian W. Anthony, Ph.D. 10 Deposition Date: February 25, 2025 11 Page No. Line No. Change 12 13 14 15 16 17 18 19 20 21 _____ 22 Signature Date