

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LG ENERGY SOLUTION, LTD.
SAMSUNG ELECTRONICS CO, LTD., and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

MOLECULAR REBAR DESIGN, LLC.
Patent Owner.

IPR2024-01012
Patent 10,608,282 B2

Record of Oral Hearing
Held: September 15, 2025

Before GRACE KARAFFA OBERMANN, KRISTINA M. KALAN, and
AVELYN M. ROSS, *Administrative Patent Judges*.

APPEARANCES:

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The above-entitled matter came on for hearing Monday, September 15, 2025, commencing at 1:00 p.m., at the U.S. Patent and Trademark Office, 600 Dulany Street, Alexandria.

P-R-O-C-E-E-D-I-N-G-S

(1:00 p.m.)

JUDGE OBERMANN: Good afternoon. This is a final hearing in IPR 2024-01012, LG Energy Solutions versus Molecular Rebar Designs. We have a joined party, Samsung Electronics. And it involves Claims 1 through 16 of U.S. Patent Number 10,608,282.

I'm Judge Grace Obermann. Joining me today remotely we have Judge Avelyn Ross and we have Judge Kristina Kalan.

I'd like to start with introductions of counsel. Who do we have for Petitioner?

MR. RENNER: Thank you, Your Honor. This is Karl Renner from Fish & Richardson on behalf of LG Energy Solutions. And I'm joined by co-counsel Hyun Jun In, to my left, and Tim Riffe, as well as Jennifer Hahm. And then the representatives from LG Energy Solutions as well. They include Yonghan Lee, Seung-Jun Lee, Daniel Lee, AJ Sutton, Hera Lee, and Kyle Vallecillo.

JUDGE OBERMANN: Thank you, Mr. Renner, and welcome to the PTAB, everyone. Mr. Renner, will you be presenting all of the arguments on behalf of your client, or will you be sharing?

MR. RENNER: Thank you for asking. Dr. In will be sharing the podium with me.

JUDGE OBERMANN: Okay, thank you very much. And who do we have for Patent Owner?

MR. ZINDA: Yes, Your Honor. Stephen Zinda from the firm Cabello, Hall & Zinda, on behalf of Patent Owner. I am joined by my colleague, Mr. James Glenn, and we will be dividing part of the time.

1 JUDGE OBERMANN: Great, thank you so much. Welcome. Well,
2 we have a hearing order in place, and the Petitioner will go first, followed by
3 Patent Owner. Both sides can reserve some rebuttal time if they like, up to
4 half of their total argument time, which each side has 45 minutes. I looked
5 at the record this morning, it appears to me that there are no confidential
6 documents in the record. Is that your understanding as well, counsel?

7 MR. RENNER: It is, thank you.

8 MR. ZINDA: Yes, Your Honor.

9 JUDGE OBERMANN: Okay, thank you, because I understand that
10 we do have a public line that is not only audio but also video today. So,
11 there can be members of the public here. If you'll give me just a second, I
12 need to wake up my computer.

13 MR. RENNER: Your Honor, did I hear correctly, we thought the
14 hearing was a 60-minute hearing per side. Is that -- I thought I heard you
15 say 45.

16 JUDGE OBERMANN: I looked at the hearing order this morning
17 and I thought I saw 45 minutes per side, but I will double-check. I also
18 heard a bunch of beeps, so my co-judges may be telling me I made a
19 mistake. Let me just wake up my computer. I may have looked at the
20 wrong thing this morning. I don't want to give you all a heart attack here,
21 let's see.

22 Okay, we think it's 45 minutes, so I'm going to go in and look at the
23 hearing order. I have it in my folder.

24 MR. ZINDA: Just for the record, your Honor, it's 45 minutes.

25 (Simultaneous speaking.)

26 MR. RENNER: Yeah, just confirmed with counsel. It is 45.

1 JUDGE OBERMANN: Okay, okay. I thought maybe I was going a
2 little nutty, but I did look at it this morning and I thought it was 45 minutes.
3 Okay, are you all right, Mr. Jenner? Is it Mr. --

4 MR. RENNER: Renner.

5 JUDGE OBERMANN: Renner, I'm sorry.

6 MR. RENNER: Yes, thank you.

7 JUDGE OBERMANN: Okay, thank you. So, when Petitioner's
8 counsel is ready, I won't start your time until you begin speaking, but if you
9 can tell me how much time you'd like to reserve, if any?

10 MR. RENNER: Ten minutes, please.

11 JUDGE OBERMANN: Ten minutes? I'm going to put 35 on your
12 clock. But before we get started, I'll just ask both sides, is there any
13 preliminary matter, anything else that you would like to discuss before we
14 go on the record, Mr. Jenner?

15 MR. RENNER: No, there isn't. Thank you.

16 JUDGE OBERMANN: Is it Mr. Jenner, or am I saying --

17 MR. RENNER: Renner.

18 JUDGE OBERMANN: Renner. I'm so sorry. Mr. Renner?

19 MR. ZINDA: Nothing here, Your Honor.

20 JUDGE OBERMANN: Okay, thank you. I don't have a pen, or I
21 would write down 'R,' but I think I'll remember that. Okay, I have 35
22 minutes on your clock, and I'll start it running when you begin speaking,
23 Mr. Renner.

24 MR. RENNER: Again, Karl Renner for Petitioner, LG Energy
25 Solutions. And if I could direct your attention to Slide 2, please. Issues are
26 listed on this, threefold, the first of which concerns the word discrete. This
27 term is recited as a modifier carbon nanotube fibers in each of the claims

1 that we'll address over the next two days, actually, this hearing and the ones
2 tomorrow, as well. And, therefore, it informs the dispute between the
3 parties, not only over its meeting, but with respect to various arguments in
4 those proceedings. We'll plan to address that term -- yes, Your Honor?

5 JUDGE OBERMANN: I'm sorry to interrupt so quickly, but are you
6 arguing that the same meaning of discrete applies in all four cases?

7 MR. RENNER: Yes, Your Honor.

8 JUDGE OBERMANN: And I know that in the cases we're going to
9 hear tomorrow there's an express description in the spec, but is there one
10 here?

11 MR. RENNER: There is also, Your Honor, here.

12 JUDGE OBERMANN: There is? Okay, I'd like you to also, in your
13 presentation, show us where in the spec we have an express definition.

14 MR. RENNER: Absolutely, and by all means. Thank you, Your
15 Honor, for highlighting that, because it's an important part of, we believe,
16 the case. The second issues, two and three, those issues relate to the prior
17 art. Those issues are going to be more about how the prior art actually
18 satisfies the claims under what is any definitions or constructions, we
19 believe, and my colleague, Dr. In, will be addressing those.

20 What is interesting is, when you hear his presentation, you'll notice
21 that the prior art references in this proceeding, the primary references inform
22 each of the non-overlapping grounds, those are both references that are
23 drafted by MRD, the other party. And so, the terminology is going to, you
24 find to be very similar, that's used in them, and that will inform, I think, the
25 obviousness that we'll be talking about.

26 If we look, please, to Slide 3, you'll see the claim that's represented,
27 Claim 1, and it tells us or shows us here, highlighting, two terms that are

1 really at issue in the proceeding. And in order, the first, discrete carbon
2 nanotube fibers has that word 'discrete' that we'll talk about. All the rest of
3 the highlighting pertain to aspect ratios, which are really more a dispute
4 about whether the prior art meets the claim than it is about a claim
5 construction. There's no dispute on the claim construction itself on that
6 term. The parties very much do disagree, however, on the meaning of
7 discrete.

8 Slide 6, please. As to the meaning of discrete, there exists no genuine
9 dispute, either, over whether the prior art actually discloses discrete carbon
10 nanotube fibers. What we see in the art is on each of the two grounds, we
11 have the Bosnyak-392, and there at paragraphs 56 and 88, will be discussed
12 by my colleague. It talks about fully exfoliated carbon nanotubes.

13 Dr. Chung, who is their expert, at LGS 1029, page 80, 12 to 22, tells
14 us that when it's fully exfoliated, speaking of carbon nanotube fibers, it
15 becomes discrete. And he'll be talking a lot about how that itself is an
16 express disclosure. Bosnyak-129, the other primary, gets even more
17 particular in talking about discrete individual fibers in one instance, and
18 discrete carbon nanotube fibers in another. Again, most of that will be
19 talked about by my colleague, but we just wanted to highlight this.

20 As for discrete itself, because it was an expressed construction that
21 was offered, we wanted to speak to it, notwithstanding the fact that we think
22 the art is very clear on the term. Slide 7, please. In doing so, there's three
23 different items that we thought we'd cover with 60 minutes. We might only
24 cover perhaps the first of this with a 45 minute clock, but it'll do the trick,
25 we think, because it speaks to the intrinsic and the extrinsic record that is
26 before us. We believe both support the claim and its plain meaning, not

1 encumbered with the limitation that the Patent Owner would have you
2 believe.

3 The other issues, if we have time for them, issue 1B speaks of the
4 infringement contentions, which shows them applying the art to structures
5 that they contend or show, and they suggest have an overlap or touch
6 between them. And the third argument is with respect to testimony from the
7 other proceedings and a witness in those other proceedings, which they bring
8 into this one and suggest that it has meaning that we don't believe that it has.
9 And we were thinking of explaining that, but we have it in the papers, so we
10 may leave that to Your Honors.

11 Slide 9, if I could. This shows us where they contend the meaning for
12 the term in question, discrete. To isolate this, there's three lines of
13 highlighted text here, the first three lines on this slide. The first two, we'll
14 talk about before we talk about the third, just to make it a little more
15 compact. The first two tell us, from the Patent Owner's perspective, that
16 plain and ordinary meaning of discrete carbon nanotube fibers is carbon
17 nanotube fibers that are separate and distinct from other nanotube fibers.
18 Not terribly controversial, it's not really what's at issue here. It's the third
19 line that is at issue.

20 That third line tells a different story. It says -- and in context, discrete
21 carbon nanotube fibers are not attached to other nanotubes. Now, through
22 this, MRD would have you preclude attachment of nanotubes from one
23 another as a consequence of the word discrete being used to describe them.
24 And this isn't justified by either intrinsic or extrinsic, and Your Honor, you
25 had forecast the point here, that the intrinsic record tells us to not do so, tells
26 us that the author intends for the word discrete to be read rather broadly. In

1 fact, he equates that word, as a term, he equates it, to exfoliation, in the
2 specification.

3 JUDGE KALAN: Counsel?

4 MR. RENNER: Yes, Your Honor?

5 JUDGE KALAN: This appears to be Patent Owner's proposed
6 express construction. Do you have a proposed express construction that you
7 can point us to, or are you going with the plain and ordinary meaning?

8 MR. RENNER: Excellent question, Your Honor, and you're leading
9 me right to the point. We do not construe this. We don't believe it needs to
10 be construed. It's not ambiguous. And you'll see in the specification that
11 we point to elsewhere that the author tells us to stay with plain meaning, but
12 for when a term is going to be meaningless, or essentially meaningless,
13 absent the construction. In this case, we don't believe the word discrete is
14 going to be meaningless, and more importantly, Patent Owner has never
15 even alleged that it's going to be meaningless. But, I'm jumping ahead a
16 little bit into the intrinsic when I go to that point.

17 Let me, if you don't mind, I'll take you to Slide Number 10, and we'll
18 show you a little bit of the intrinsic record that really bears directly on this
19 term, as opposed to more generally, as the definitions. Here you can see at
20 column 6, lines 50 to 54, the author of the patent explains without
21 equivocation that references made to discrete carbon nanotubes are
22 alternatively, an important word. So, references made are alternatively
23 references to exfoliated carbon nanotubes.

24 Now, the purpose of this writing is just to express what the author
25 wants these terms to be read as in the context of their specification, which
26 we all read and we all look at. It's enough to see this clear directive, and we
27 know that actually Patent Owner could be its own lexicographer. We don't

1 even need to get to lexicography. We just have a general relationship that's
2 formed here, an alternative reference that is made.

3 And we think it's clear and unambiguous. We think it's straight from
4 the drafter's arm to the paper, to our ears, and nose, and mouth. And what is
5 equally clear is, we don't have to imagine the implication of this. Look no
6 further than the lower text box on the right that's reproduced here, for Patent
7 Owner's witness' testimony, Dr. Chung, where we ask, you know, we see
8 her read line 20 on, and I'll do that with you, Your Honors, because she's
9 going to inform this.

10 She says here, in a slightly relevant piece, but she says, the term
11 individualized means that the nanotubes cut into individuals, but that doesn't
12 mean these individuals are not touching one another at all. Okay, so she's
13 saying individualized, it's not really a term in question, she's saying that
14 term doesn't require not touching. And then she says, the same thing is true
15 for exfoliations. She says it, that is exfoliations, doesn't imply that the
16 nanotubes are not touching at all.

17 JUDGE KALAN: Counsel, maybe I'm getting ahead of myself and
18 this will be in your presentation; what is the difference or the daylight
19 between attached and touching?

20 MR. RENNER: Oh. Your Honor, there hasn't been a meaningful
21 distinction being made on that point in this record. We don't believe there
22 really is a distinction being made in this record on that point.

23 JUDGE KALAN: In the briefing, there's some discussion of above
24 50%, below 50% degree of attachment, is that anything that you want to
25 discuss at this point on attachment with your discussion of the claim
26 construction?

1 MR. RENNER: No. Your Honor, we don't think that informs the
2 claim construction, we think that has to do with how the prior art applies.
3 But it's not really the meaning of the term, and that's not really been what's
4 -- here is the question, is whether or not there's actually any sort of a
5 physical attachment or a connection or whether or not these fibers are
6 discrete or distinct or individualized.

7 And we think, actually, those two things are a little orthogonal. The
8 notion of a bowl of spaghetti, you may have individual tubes of spaghetti in
9 that bowl, and each one is its own tube, each one is discrete, each one is
10 individual, whether or not it's touching. Whether or not it's attached to
11 something else is not really relevant to the word discrete. It is discrete, after
12 all. So, we think those are somewhat orthogonal concepts.

13 I'll turn us to Slide 11, if there aren't further questions on that, Your
14 Honor. And there, I'd ask you to focus on the upper right text box. In it, we
15 reproduce an excerpt from column 6 of the intrinsic specification, the '282,
16 to draw further attention to the fact that it tells us when you do have the need
17 for a definition, it tells you what definition to use. This author specifies that
18 with particularity. And before we talk about this specific dictionary that
19 they point out, if you look at the sentences preceding its identification of that
20 dictionary, it tells us that you only, and I've previewed this before, you only
21 construe using a dictionary under certain prescribed conditions.

22 It says, when construction of a term would render it meaningless or
23 essentially meaningless, is what this author asks us to do. We know that's
24 somewhat consistent with claim construction canons. If you don't have an
25 ambiguity or a reason to move away from a plain meaning of a term, then
26 why would we consult something extrinsic?

27 Your Honor seems to have a question.

1 JUDGE OBERMANN: I believe that you did say that the patent itself
2 contains a definition. Have you already addressed that, or are we getting to
3 it?

4 MR. RENNER: Actually, I flew by that in a way, in the reference to
5 the alternative of exfoliation, is in this specification, we believe, bearing
6 directly on the meaning of the term as it's used by this author. So, it's not I
7 think that discrete means this. You'll see that in the '909 and some of the
8 other patents, and here, you don't have that, you have instead here the author
9 saying, I think when I write the word discrete, I want you to alternatively
10 consider it to be exfoliated. That's how they essentially put forward what
11 they want to have as the meaning, which we know exfoliation doesn't --
12 well, we have no record evidence to suggest that it implies attachment. And
13 in fact, when we've seen definitions of that term, we know that they don't in
14 fact inform that.

15 So, Your Honor, when I spoke earlier of the specification, the intrinsic
16 speaks of the term's meaning. It's that reference to the alternative of
17 exfoliation that this specification does.

18 JUDGE OBERMANN: But this falls a little short of definitional
19 language.

20 MR. RENNER: It does, and that's why we looked to Dr. Chung, their
21 expert. And we asked Dr. Chung, hey, when you look at the word
22 exfoliation, the one that has been used as an alternative by this author for the
23 term in question, what do you think it means? And you saw the testimony
24 that she gave, which is reproduced again on Slide 10, where she references
25 that and says oh, that word, exfoliation? And I'll read it again, it doesn't
26 imply that the nanotubes are not touching at all.

27 JUDGE OBERMANN: Okay.

1 MR. RENNER: That's where we get to. It is an indirect, we agree,
2 but nevertheless, when you see the testimony on the record, we know that
3 exfoliation does not require attachment. We don't believe distinct does
4 either, but either way, we think you get to the same answer, which is there's
5 no definition or no requirement for there having to be a preclusion of
6 touching. Thanks for the question on that. I didn't mean to run by that too
7 fast, I can imagine that came quickly.

8 As to the definitions, back again, we don't have any kind of term here
9 that we think would call for definitions. There's no ambiguity and whatnot,
10 so we don't think we're needing that from a claim construction canon, we
11 also don't think you're needing that from these authors' actual directives in
12 the patent disclosure itself, and then when we look at what definitions have
13 been offered, the definition is old. 1999, by the Patent Owner.

14 We gave you a 2009 definition that doesn't -- that demonstrates that
15 even the word discrete is without the need for a lack of attachment. Now,
16 I'll point out something that our definition is also not from the same
17 dictionary that's in this paragraph. It's not the third edition, we couldn't find
18 it, but we went to the one that was as close as we could get. Same year,
19 same Webster's, best we could do. And Your Honors, we were hard pressed
20 to find anything that had attachment really being required in it.

21 Slide 13, if I could. It has the plain and ordinary meaning. The
22 highlighted text that we produced in Slide 13 here. We see that the MRD,
23 they argued that the POSITA would understand that a discrete carbon
24 nanotube can provide electrical insulation, because they're not attached to
25 one another. We think this is upside down. The point of putting carbon
26 nanotube fibers into the mix is to actually enhance conductivity. And when
27 we recall that that's the goal of the '282 Patent for using these tubes, to

1 inform that addition, and the selection of their concentration for that matter,
2 the objective would have been frustrated or certainly not advanced by
3 precluding attachment of the variate carbon nanotube fibers that are being
4 added

5 . Testimony from Dr. Chung here again is helpful, and if we look at
6 Slide 15, we can see her paragraph 65. In it, she says, she contextualizes the
7 role of CNTs, these carbon nanotube fibers, in the kind of binder that is
8 talked about in the '282 Patent.

9 So, we try to make sure that it's a contextualization here. And she
10 explains here that the binder serves as a glue to mechanically hold together
11 discontinuous parts of an electrode, including electrochemically active
12 materials or particles. She speaks of instances in which electrochemically
13 active material isn't sufficiently electrically conductive, and she confirms
14 that carbon nanotube fibers are a known electrically conductive additive to
15 be used to enhance that conductivity.

16 In fact, she tells us that they can be added as needed to render the
17 electrode electronically conductive. And in deposition, she acknowledges
18 what could hardly be seen as a mystery for POSITAs, and that is carbon
19 nanotube fibers that are touching, well, they're going to serve to improve the
20 conductivity of a material into which they're added to improve its
21 conductivity.

22 Slide 16, we can see reference to the supplemental declaration that we
23 offered from our expert, and in it, the '282 Patent didn't look to carbon
24 nanotube fibers as additives to enhance conductivity. Even if they didn't do
25 that, which they did, a POSITA would have known that it's infeasible to
26 keep carbon nanotubes from touching, if added with a concentration that
27 makes them useful for purposes promoted by the '282 Patent.

1 Dr. Chung explained this. You just have to have a certain amount of
2 carbon nanotube fibers in order to have them serve the purpose of enhancing
3 conductivity. And if you don't, you won't see performance by them. You
4 won't see them actually perform the way that the '282 calls on them to
5 perform.

6 With our shortened time I'm going to perhaps leave a little bit of this
7 to you, but in Slides 17, 18, 19, 20, 21, and 22, we step through various
8 portions of his declaration here, where he explains this in great detail. He
9 explains, for instance, that because the higher aspect ratios of these carbon
10 nanotube fibers, even at low concentrations, it's just not possible to think
11 that they won't touch, or to get them to avoid touching, at least in a few
12 instances. He goes on to say that to ensure they're completely isolated and
13 never touching would require such a low concentration they wouldn't do the
14 job that they're called upon.

15 And he does -- and if I'm at Slide 20, where paragraph 13 exists, he
16 does testing to demonstrate this. He goes through and makes sure when he
17 checks on different aspect ratios that he's right. He shows that to us in this
18 testimony, and he deduces from it two things. That one, a POSITA would
19 expect contact between nanotubes at the composition -- this is in paragraph
20 14, there it's specified in the '282 Patent. And as a consequence of that, he
21 tells us that a discrete nanotube, the word discrete that's referenced to it in
22 the '282 Patent, it wouldn't be considered by a POSITA to be a reference to
23 that, to being isolated completely, that is completely separated, completely
24 apart, that is not touching. It would be antithetical to its teachings.

25 Your Honor?

26 JUDGE KALAN: Counsel, you had said earlier that the objective, or
27 one of the objectives of the '282 Patent is the electrical conductivity, but

1 there's also discussion of electrical resistivity, and is that going to change
2 the nature of the construction here, as far as discrete?

3 MR. RENNER: We don't believe so, no, Your Honor, because the
4 carbon nanotube fibers are there to enhance its conductivity, and if you don't
5 have a certain amount of them, you don't get to any sort of a meaningful
6 result. This is what his testimony, and it wasn't rebutted, and they actually
7 cancelled his deposition. It's a very thorough exposition of it. It explains
8 this, we believe, in great detail, but even before it, we know that a nanotube
9 is there to enhance that conductivity, and if you don't have enough of them,
10 you're going to not see the kind of performance gain that the '282 is calling
11 for. And its examples tell us that 10%, for instance, of a ratio is useful for
12 this, whereas a .5% doesn't get you anywhere but insulation.

13 JUDGE KALAN: So, zero touching would lead to zero conductivity,
14 whether that's possible or not, is that --

15 MR. RENNER: I don't think I'd say zero, I'd just say so low that
16 you're not going to achieve the purposes of the '282 Patent and its examples.

17 JUDGE KALAN: Okay.

18 MR. RENNER: And that's where his testimony comes in. it actually
19 looks at the concentrations that they were promoting in the examples and in
20 the claims of the '282, and he concludes in those that you can't actually
21 achieve, this is his paragraph, if you want to later reference it, it appears on
22 Slide 22. And in the end of it, his conclusion is that it'd be impossible to
23 have the combination of aspect ratios and nanotube concentrations claimed
24 in '282 without having numerous points of contact between the nanotubes.

25 A person of skill knowing that would know that the word discrete is
26 not there to tell us to keep those things apart. That's just not its purpose; the
27 purpose must be something else. And we know from looking at the author's

1 reference to exfoliation as an alternative, which doesn't have anything to do
2 with attachment either, that this is not an element or some sort of restriction
3 that should be read into this claim. And without it, we'll see.

4 JUDGE KALAN: So, as written, Claim 1 is directed to a binder that
5 has enhanced electrical conductivity, resistivity is not the objective?

6 MR. RENNER: It might be an objective, it's not the only objective.
7 And the only objective that is served through the carbon nanotube fibers is
8 this conductivity, Your Honor.

9 JUDGE KALAN: Thank you.

10 MR. RENNER: Of course. I will yield time to have my co-counsel
11 speak to the prior art. So, any other questions before I do? Thank you, Your
12 Honors.

13 DR. IN: Thanks, Karl. Good afternoon, Your Honors. So, as we
14 quickly saw in Slide 5, Petitioner has presented two non-overlapping
15 grounds, and each was based on a different primary reference, which, as Mr.
16 Renner said, was authored by the same inventors as the '282 Patent. So,
17 these grounds presented the Board with two alternative paths to the same
18 result. If the Board adopts either ground, we believe all challenged claims
19 should fall.

20 If we could go to Slide 29. So, I'll address the two grounds here in a
21 little bit more detail, and I'll begin here with a quick overview, if it's okay,
22 with the Bosnyak-392 and the Son references, then address these two
23 references. I'm going to try to focus on the main issues here, two main
24 issues that are in dispute here among the parties. First being whether or not
25 the nanotubes in the Bosnyak-392-Son combination art are discrete, and
26 second, relating to whether this combination discloses the claimed
27 distribution of aspect ratio ranges.

1 If we go to Slide 31, please, in the Bosnyak-392 reference, we can see
2 that its disclosure really closely resembles what is in the '282 Patent.
3 Namely, on Slide 31 at the top right side, it talks about energy storage
4 devices and polymer composites containing exfoliated carbon nanotubes.
5 And if you look at the bottom right side of Slide 31, Bosnyak-392 talks
6 about the use of, again, exfoliated carbon nanotubes, and it further says that
7 that allows one to take advantage of the physical properties offered by the
8 individual carbon nanotubes, and it contrasts that in a situation where the
9 carbon nanotubes are aggregated into bundles. So, it's trying to distinguish
10 itself from the aggregated bundle form of carbon nanotubes. And that's very
11 similar as in the '282 Patent, where they were trying to get exfoliating
12 nanotubes over bundled or aggregated varieties.

13 In Slide 32, here Bosnyak-392, we see that it actually, and this goes
14 more to the aspect ratio distribution, it talks explicitly about the benefits of
15 using both short and long nanotubes, and says that using those together
16 simultaneously in the CNT composite can provide both improved strength
17 and electrical conductivity. And while Bosnyak-392 doesn't go fully into
18 the details of its bimodal aspect ratio distribution, it certainly mentions that
19 you can use full length carbon nanotubes together with shortened carbon
20 nanotubes to get both structural integrity and electrical conductivity.

21 Slide 33 introduces the Son reference, which as Your Honors know is
22 the secondary reference. And here, again, Son is very similar to the
23 Bosnyak-392 reference and also the '282 Patent in that it talks about the use
24 of polymer composites that include carbon nanotubes, and it again expressly
25 recognizes that you can use carbon nanotubes with a large aspect ratio
26 together with carbon nanotubes with a small aspect ratio. And you can see a
27 3D representation of that that is provided in Son on Slide 33, from Figure 1.

1 And again, similar to Bosnyak-392, Son explicitly recognizes that by using
2 two different types of the nanotube aspect ratios, you can improve both
3 electrical and mechanical properties.

4 One thing to really note here, in which Son goes beyond the
5 disclosure of Bosnyak-392 regarding the aspect ratios, is that one, it
6 explicitly recognizes, Son does, that the aspect ratio distribution can be, and
7 I quote, easily determined by a person of skill in the art, depending on which
8 of the mechanical properties or electrical properties to give priority to. And
9 then, also very important, and as you will see later, Son provides very
10 specific examples of how it envisions having these two different types of
11 aspect ratios, and then we explicitly refer to these examples provided in Son
12 to convert that into the number percentage that is required in the claims.

13 In Slide 34, here again, this is sort of a textbook case law
14 combination, a POSITA would look to Son to supply the specific aspect
15 ratio distribution teachings that Bosnyak-392 simply leaves to routine skill.
16 And because both references really are using the same types of aspect ratio
17 distributions for achieving the same sort of benefits, we think a POSITA
18 would have certainly expected success in that combination.

19 I think really at issue here, Slide 35 please, is concerning whether
20 there are discrete carbon nanotubes that are in these references. And as Mr.
21 Renner mentioned earlier, we think again, the two primary references,
22 Bosnyak-392 and Bosnyak-129, both authored by the same inventors, really
23 very clearly discloses the presence of such nanotubes. If we could go to
24 Slide 36, please, here we see the actual text from Bosnyak-392, which again
25 forms the basis for this nanotube composite we have in this combination,
26 and it says that these nanotubes are, and I quote, separated, exfoliated carbon

1 nanotubes that exist in a non-aggregated state. And with that, if we could
2 quickly just go to Slide 39, briefly.

3 And Mr. Renner was getting to some of this earlier. This is during
4 deposition of Patent Owner's expert, Dr. Chung, there Dr. Chung
5 acknowledged that, quote, unquote, a fully exfoliated carbon nanotube is one
6 that she considers to be discrete. And we can see that testimony on bottom
7 right side of Slide 39, from her deposition. And then keeping that fully
8 exfoliated term in mind, again, in Bosnyak-392 for example, at paragraph 56
9 or paragraph 88, it actually uses the terms 'fully exfoliated' to describe the
10 nature of its nanotubes. If we could now go back to Slide 38, please.

11 So, I don't think the Patent Owner, or at least I don't recall in the
12 records disputing that Bosnyak-392 has discrete nanotubes, they do provide
13 quite a bit of pages to why the Son reference does not disclose discrete
14 nanotubes. And here on Slide 38, we see sort of the evidence that they
15 provided here. It's a top-down schematic from the Son reference, Figure 3,
16 and the Patent Owner notes that this figure clearly shows that each and every
17 one of the larger aspect ratios CNTs in Son are interconnected with another,
18 larger CNT. We think there are a couple things wrong with that statement.
19 First of all, as I just discussed, it's the nanotubes in the Bosnyak-392, which
20 we believe very clearly provide these fully exfoliated discrete carbon
21 nanotubes, that form the basis of this combination. And second, as Mr.
22 Renner explained earlier, you know, we don't believe carbon nanotubes
23 somehow, you know, stop becoming discrete because they happen to touch
24 some other nanotube at one point.

25 Skipping over to Slide 40 now, again, looking at this Figure 3 from
26 Son and sort of using this as a basis to determine that there are not discrete
27 nanotubes in Son, we think there's a couple problems with that approach.

1 First of all, this is just a simplified drawing showing, I think, just seven high
2 aspect ratio carbon nanotubes that are in Son, and second, this is a two-
3 dimensional view of a drawing that Son provides. And if we look at,
4 actually, Slide 42 just briefly, their deposition when Patent Owner's expert,
5 Dr. Chung, was asked, Slide 42, presented with these two sketches of
6 nanotubes and asked whether those are touching or not, you know, she
7 actually said that she couldn't tell, because there is a third dimension that is
8 not shown in that two-dimensional representation. So, again, even based on
9 Patent Owner's own expert's rationale, we don't think Figure 3 definitively
10 shows that these tubes in Son are touching each other.

11 And then, actually, if we look at the 3D view of that same
12 representation that Son provides, and we can see that in Slide 41, here, you
13 know, we also see seven high aspect ratio carbon nanotubes but in this more
14 accurate three-dimensional view. Again, these are not shown as touching, as
15 they were in the two-dimensional version that Son showed. So, with that, if
16 we could go to Slide 44, please.

17 One of the other main issues that the parties had been trying to
18 address is this Limitation 1B, concerning what we've been calling the so-
19 called bimodal aspect ratio distribution. And just to quickly recap, that
20 means 40-90% by number of carbon nanotubes have the 30 to 70 aspect
21 ratio, and 1-30%, again by number, of carbon nanotubes have an aspect
22 ration of 80 to 140. So, it has not been disputed that, you know, both
23 Bosnyak-392 and the Son reference disclose this so-called bimodal aspect
24 ratio distribution. And like I mentioned earlier, they disclose it for the exact
25 same benefits that is also mentioned in the '282 Patent.

26 The core dispute here concerns whether the aspect ratio or distribution
27 that is given as a weight percentage in the Son reference can be correlated to

1 the number percentage aspect ratio distribution that is in the claim here.
2 And if we could go to Slide 45, before we delve into this issue a little bit
3 more closely, it is worth noting that there's nothing really in the '282 Patent
4 to suggest that these claimed ranges of aspect ratios are somehow giving
5 unexpected results or otherwise have some special significance.

6 So, with that, if we can go to Slide 46, we can see the bimodal
7 distribution ratio that is provided in the Son reference, and again, the one
8 difference is that it is given as a weight percentage as opposed to a number
9 percentage. But, the disclosed ratios in Son, which is having aspect ratios of
10 10 to 65 in one bucket and then 130 to 1,000 in another bucket, that
11 currently overlaps with what is claimed in Claim 1 of the '282 Patent. And
12 just simply beyond this disclosure, please recall Son's explicit teaching that,
13 and I again quote, these ratios are easily determined by a person of skill in
14 the art, depending on which mechanical properties and electrical properties
15 to give priority to. And as noted in the institution decision at page 20, we
16 think this clearly establishes a prima facie case of obviousness that we don't
17 think has been proven otherwise throughout these proceedings.

18 Slide 48, please. And here, we get a little bit now starting to go into
19 how the conversion of the two distribution realms or domains was provided
20 by Dr. Guido, Petitioner's expert. The first thing he does is, here he notes that
21 because Son discloses such a broad range of possible aspect ratio
22 distributions between these two aspect ratio buckets, Dr. Guido opined that
23 the aspect ratios of Son would certainly cover what is in the claims, given
24 how broad Son was about that. But Dr. Guido certainly did not stop there. In
25 fact, starting on Slide 49, he provides three separate approaches to going
26 from weight percentage to number percentage, and each one sort of provides
27 an increased level of precision. And with these three approaches, he's able

1 to actually take embodiment three, which is a very specific example that is
2 provided in Son, and then he converts that from the weight percentage into
3 number percentage.

4 So, for the interest of time, let me go ahead and go to the second
5 approach on Slide 51, and here, this is where Dr. Guido made an assumption.
6 And he assumed that the diameters of the nanotubes in the two aspect ratio
7 buckets are kept same, and then that the aspect ratio is varied by changing
8 the length. And we think this is a reasonable way, reasonable assumption to
9 make here, especially because if you recall in Bosnyak-392, it talked about
10 using, you know, short tubes and long tubes to achieve this ideal aspect
11 range. And the Son reference as well, at paragraph 5, talks about shortening
12 the length of carbon nanotubes, again suggesting that it too contemplated
13 varying the aspect ratio by varying the length. And based on this, you know,
14 very reasonable assumption as we see on Slide 52, he took the embodiment
15 three example from Son and then he converted that. And so with that, he got
16 that a 17.65% of Son's nanotubes in embodiment three fit within the high
17 aspect ratio bucket, and that 82.35% fit within the low aspect ratio bucket.
18 Again, both are well within the claimed aspect ratio ranges of the '282
19 Patent.

20 JUDGE OBERMANN: You have about a minute and a half.

21 DR. IN: Thank you.

22 JUDGE KALAN: Thank you. Counsel, so for the first approach,
23 Patent Owner has a number of concerns. Simply for the reason that the Y
24 axis is different than Son and there's the weight ratio and then the number
25 ratio, for purposes of addressing that in our final written decision, should we
26 be focusing on the second and the third approach, given the concerns that
27 you can't have a one to one correlation when the units are different?

1 DR. IN: Yeah, I would certainly, the second and third approaches are
2 more mathematically rigorous and more precise, but that said, it's worth
3 noting that all three approaches, again, give you the converted values that all
4 fall within the claimed ranges. So, and, like Dr. Guido explained with respect
5 to the first approach, if you take the assumption, a reasonable assumption
6 that your nanotubes in the two buckets aren't wildly different in size and
7 diameter, that typically they tend to give a similar result. And I think all
8 three approaches here that are applied to embodiment three of Son show
9 that.

10 And in my last minute here, I'll take three more minutes here, your
11 Honors. Slide 53, we go through his third approach where -- and the really
12 interesting here about the third approach is one, Dr. Chung, Patent Owner's
13 expert, she actually does not dispute the very rigorous and tedious math that
14 Dr. Guido provided in his declaration. She says that the math is good, but her
15 issue is that she doesn't agree with some of the assumptions that Dr. Guido
16 was making here. But, if you actually go through the math that is shown in
17 both the petition and declaration, the only assumption that Dr. Guido made is
18 that each aspect ratio for certain carbon nanotube has an average diameter.
19 That's all that he assumed. That's something that Dr. Chung, I think, agreed
20 to as well, that, you know, when you buy a nanotube, you buy it or you
21 specify it in terms of average diameters. But if you actually follow the math
22 in Dr. Guido, even the average diameter drops off.

23 So, you know, whatever reasonable assumption that we made to start
24 the conversion, by assuming that there is some average diameter and sort of
25 a distribution of diameters that is, you know, persistent through different
26 aspect ratio categories, even that drops off. And ultimately, in the petition at
27 page 28, he provides a graph. And what that graph is, he plots the Son's

1 embodiment three as a number percentage, or, weight percentage, as it is
2 originally disclosed in Son. And then using this very, you know, precise
3 math conversion that he performed, he superimposes the same graph, but in
4 terms of number percentage. And you can see that, not surprisingly, there's
5 a high degree of overlap there, and again, the claimed ratios, aspect ratios,
6 are shown based on that conversion. The last thing I'll say, in my last
7 minute --

8 JUDGE OBERMANN: You've gone over by almost two minutes, but
9 we would like to hear some about Ground 2. So, we're going to give you an
10 extra, I don't know, eight minutes and see how that goes, and we'll give
11 corresponding time to your friends. So, basically it'll be a total of 10
12 minutes, I think.

13 DR. IN: I appreciate that, Your Honors. So, if you could skip over to
14 Slide 64. So again, Bosnyak-129 --

15 JUDGE KALAN: Counsel, I apologize. Before you get to Ground 2,
16 in the Ground 1 discussion, in the record I believe the parties said that Patent
17 Owner doesn't necessarily disagree with the math, but disagrees with the
18 premise. Is that accurate in your understanding?

19 DR. IN: Yes. Yes, Your Honor.

20 JUDGE KALAN: Thanks.

21 DR. IN: Okay. So, Slide 64, again Bosnyak-129 is another older
22 reference by the same inventors of the '282 Patent. And the really
23 interesting thing here -- there's two interesting things here. One is,
24 Bosnyak-129 actually uses the words discrete carbon nanotubes in
25 describing its nanotubes. And then the other interesting thing is that the
26 Albuerne reference, it actually talks about the distribution of carbon
27 nanotubes in number percentage, just as it is in the '282 Patent. So, right off

1 the bat we sort of were able to knock off some of the issues that we were
2 dealing with for Ground 1.

3 Going to Slide 66 very quickly, Bosnyak-129 discloses, similar to
4 Bosnyak, the other Bosnyaks and the '282 Patent, making battery
5 components that contain well-dispersed exfoliated carbon nanotubes. It
6 actually talks about a acid treatment step to further improve the dispersibility
7 of his nanotubes. And on Slide 66, this is where in the Bosnyak-129
8 disclosure we can see how they refer explicitly, and I quote, discrete carbon
9 nanotube fibers. So, I think regardless of the exact definition of, you know,
10 where discrete starts, where it ends, we think Bosnyak-129 covers that very
11 clearly, based on the same vocabulary used by the same inventors and
12 authors.

13 Slide 68, Albuerne is also a prior art reference that is similarly
14 directed to CNTs or polymer composites containing CNTs. It also uses an
15 acid treatment step to provide these individual carbon nanotube steps that
16 they are well-dispersed. And to get to sort of the most important thing about
17 Albuerne here, on Slide 71. So, what Albuerne did is, as part of its
18 experimentation with the acid treatment step, it bought off the shelf carbon
19 nanotubes, and then it actually performed the acid treatment step that it talks
20 about. And it, you know, painstakingly counted the number of nanotubes
21 that fall within these different aspect ratio buckets, and then if you plot that,
22 you see what you see here on Slide 71. And here, in the low aspect ratio
23 regime on the left side, you see a 59.7% by number, and again that's well
24 within what is claimed in the '282 Patent, and on the right side in the high
25 aspect ratio regime, you see 1% of nanotubes that they counted by hand fall
26 within that regime. One percent, you know, it's not a big percentage, but
27 again, in Claim 1, it simply requires 1-30% of that high aspect ratio regime.

1 And the last thing I'll leave before our rebuttal time is, Slide 75,
2 during deposition when Dr. Chung, Patent Owner's expert, was presented
3 with a hypothetical where you had one nanotube in this high aspect ratio
4 bucket, and when we asked, does that satisfy the one -- does that satisfy the
5 claimed ratio, even if you just counted one nanotube there? She said yes.
6 So, with that, unless Your Honors have any questions, we'll save --

7 JUDGE KALAN: I have a question about that example. The Patent
8 Owner pointed out that the one nanotube in that hypothetical would have
9 constituted 10% of the total content. Isn't that a little different than what
10 we're talking about in your proposed combination?

11 DR. IN: It is a little bit different, Your Honors, but the main thing
12 that we were trying to convey here is that just having one, you know, is not
13 sort of grounds to say that it is unreliable. One nanotube is one nanotube,
14 whether it's, you know, among 10 or among 100. And the Albuerne
15 reference clearly recorded that it counted at least one, which is 1%.

16 JUDGE KALAN: Thank you. And another question about the graph
17 on your Slide 71, you're talking about requiring or looking for a bimodal
18 graph, is this bimodal a definition that we should adopt? Do we need to
19 adopt a definition of bimodal?

20 DR. IN: Yeah, that is a great question, Your Honor. So, bimodal is
21 actually not a term that appears in the claims. It is in the spec and I can find
22 the refence later, but our expert, Dr. Gido, actually explains that you don't
23 need two peaks to satisfy the claimed ranges of Claim 1. All you need is 1-
24 30% of one, and then the other percentage of the other. So bimodal, it'll
25 certainly, if you have two peaks in your distribution, it can satisfy that, but
26 again, there's no requirement, but you have to have two big, sort of, you
27 know, camel hump-like peaks to satisfy that.

1 JUDGE KALAN: If you could find that cite for our record, that
2 would be helpful. I'm sure it's in the papers, as well.

3 DR. IN: Thank you, Your Honor.

4 JUDGE OBERMANN: Any other questions? It does not look like it.
5 Thank you very much. So, I'll say that you had eight extra minutes, and
6 we'll give your friend an extra eight minutes as well. So, instead of 45
7 minutes, we're looking at 53 minutes. And I'm sorry, what is your name
8 again?

9 MR. GLENN: James Glenn, Your Honor.

10 JUDGE OBERMANN: Oh, Mr. Glenn. Thank you very much.
11 You'll go first?

12 MR. GLENN: Yes, ma'am.

13 JUDGE OBERMANN: Okay. And of your 50 -- is it 53 minutes that
14 I said?

15 MR. GLENN: Yes, Your Honor.

16 JUDGE OBERMANN: How many would you like to reserve?

17 MR. GLENN: We'd like to reserve, at the moment, five minutes for
18 rebuttal.

19 JUDGE OBERMANN: Five minutes? Okay. So, that would put you
20 at 48 minutes. Let me just get that up here. And correct me if I'm wrong on
21 the math. And I will start the clock running when you begin to speak, Mr.
22 Glenn.

23 MR. GLENN: Yes, Your Honor. Let me just get us switched over
24 here. Okay. As I said, my name is James Glenn, I represent Molecular
25 Rebar Design, and after a short overview of the technology of the '282
26 Patent, I will turn it over to co-counsel to discuss the first major issue today.
27 That is the construction of discrete carbon nanotube fibers. After that

1 discussion, I will come back and discuss both Grounds 1 and Ground 2
2 under the petition, and we can just move on forward.

3 It's well understood that the addition of carbon nanotubes into
4 components can add to their structural integrity. The mechanical properties
5 of carbon nanotubes are very known to be beneficial. In components for
6 something such as a battery, as we see here in Patent Owner's demonstrative
7 number three, each one of these components could benefit from having the
8 addition of carbon nanotube fibers for its structural integrity, but when you
9 add carbon nanotube fibers, just in general, because they are conductive
10 materials, you are going to alter the resistivity of these components, and not
11 every part of a battery likes to have its resistivity or its conductivity altered
12 in such a way.

13 The components that the '282 Patent specifically references are a
14 binder, an electrolyte, and a separator film. The binder is the glue. It's a
15 material that combines or attaches to the active material, holds it together
16 with any carbon black or other conductive material that might be used in the
17 binder, and joins all of it together on the electrode keeping it there. A
18 binder, typically, wants to be, or is desirous, to have it be electrically
19 conductive. So, it doesn't mind, or it's quite useful to have carbon nanotube
20 fibers or carbon nanotubes, either discrete or non-discrete, added in there,
21 because the change in conductivity is not detrimental. But electrolytes and
22 separators need to have a certain level of resistivity to be functional within a
23 battery. An electrolyte, which is meant to be an ionic conductive
24 communication between the anodes, needs to have a certain electrical
25 resistivity, otherwise it shorts the battery, just like dropping a wrench on top
26 of the two poles of a car battery.

1 The same with the separator, which is intended to physically separate
2 the anode and the cathode, so they don't come into physical contact and
3 short. It needs to be ionically conductive, allow the ions from the active
4 material pass between it, going to the anode or the cathode, but it needs to be
5 sufficiently resistive of electrical conductivity, again, so that the battery does
6 not short. The '282 Patent, as we see here in demonstrative number six from
7 the Patent Owner, uses discrete carbon nanotubes to add the physical and
8 mechanical properties of carbon nanotubes, but does so in a way that it can
9 control the conductivity, or control the drop in resistivity that normally
10 occurs when carbon nanotubes are added.

11 In the claims, as we move to demonstrative number seven, the claims
12 show with, for separator films it is using shorter aspect ratio discrete carbon
13 nanotubes, we can maintain a sufficient electrical resistivity to be useful in
14 these products, or we can add for binders higher aspect ratio carbon
15 nanotubes, and even get a bump in the electrical conductivity that these
16 particular objects desire. I'll now turn it over to co-counsel to discuss claim
17 construction.

18 JUDGE OBERMANN: Thank you. And it's Mr. Zinda, correct?

19 MR. ZINDA: Yes, Your Honor.

20 JUDGE OBERMANN: Thank you.

21 MR. ZINDA: Good afternoon, Your Honors. I am Stephen Zinda.
22 I'm counsel for Patent Owner. Let me make sure I've got this. Okay.

23 So, I'm primarily going to be focused on the issue of claim
24 construction. And turning to MRD Slide Number 9, I note earlier
25 Petitioner's counsel said they didn't have an express claim construction. I
26 think we just disagree. They've actually proposed an express construction
27 both in their petition, and that was affirmed by their expert during his

1 deposition. I will get to his deposition testimony in a little bit, but I put side
2 by side, the parties, the way we view it, the parties' claim constructions.

3 And one thing that you'll notice, Your Honors, is there's actually
4 quite a bit of agreement between the parties on one issue, and that is that
5 there is a lack of direct association under their construction, and then in our
6 construction, we don't think there is any association at all. The issue is, is
7 they have this peculiar additional carve out in theirs, that's in red here,
8 where the lack of a direct association is with one another along substantially
9 the length of the nanotubes. We have no idea where they got that from.
10 They haven't actually explained in the petition or in the reply what the basis
11 is for that, the red part of the claim construction that they proposed.

12 JUDGE OBERMANN: Can I ask a question?

13 MR. ZINDA: Yes, Your Honor.

14 JUDGE OBERMANN: I'll ask you the same question that I asked
15 your friend. Are you proposing a construction for discrete in this case that's
16 the same as the other three cases we'll be hearing tomorrow?

17 MR. ZINDA: Yes, Your Honor, we are, and just to clarify, we are
18 proposing that the same construction applies, but it is possible the Board
19 could interpret discrete to have different meanings, because they are separate
20 patent families. So, that doesn't necessarily mean it has to have the same
21 construction. We believe that it does, but just because the Board finds it
22 means something in one patent doesn't necessarily mean that's the case for
23 the other, just because they're different specifications. I just wanted to make
24 that clarification.

25 JUDGE OBERMANN: Okay. What I'm looking at here, as between
26 the Patent Owner and the Petitioner's definition, this goes to whether or not
27 you can actually have nanotubes that touch each other --

1 MR. ZINDA: Correct.

2 JUDGE OBERMANN: -- where you say they wouldn't, and
3 Petitioner says they can as long as substantially the length of the nanotubes
4 is not in direct association with other fibers.

5 MR. ZINDA: Correct, Your Honor. There's this, substantially the
6 length limitation that they've got in their construction. We've laid that out
7 in the papers.

8 JUDGE OBERMANN: Thank you.

9 JUDGE KALAN: Another thing I heard Petitioner speak to is the, I
10 think it was the term discrete with the term exfoliated, but I don't see this on
11 your Slide 9. Is that something that you recognize is part of the definition?
12 Or are you going with your proposed construction set out in Slide 9?

13 MR. ZINDA: Yes, Your Honor. We don't believe that the language
14 in the specification about exfoliation, we don't believe that's definitional.
15 We think it's relevant, obviously, and that will be addressed in the coming
16 slides, but we don't think that's actually part of the definition. Just to
17 foreshadow that a little bit, our position is that discrete carbon nanotubes
18 have to be exfoliated. That is how you separate them out, is you have to
19 entangle them. And so that's what we believe the specification is noting, is
20 that you can refer to them as exfoliated, because that's just how they have to
21 be. That's how you create them. That's how you get to discrete carbon
22 nanotubes.

23 JUDGE OBERMANN: As if you are speaking to a kindergartener,
24 can you tell me what it means to exfoliate nanotubes?

25 MR. ZINDA: I will try my best, Your Honor. Essentially, it means to
26 untangle the carbon nanotubes. You have to recall that these begin as these
27 heavily agglomerated bundle nanotubes, and they undergo certain

1 procedures, oxidation, sonication, and eventually you can untangle them to
2 where they separate out.

3 JUDGE OBERMANN: And that was known in the art?

4 MR. ZINDA: I would say that there is evidence that fully exfoliating
5 carbon nanotubes was known in the art.

6 JUDGE OBERMANN: Was it known in the art to exfoliate them by
7 oxidation and sonication, or is that something that you all discovered, that
8 the Patent Owner discovered? Because I know that's in the examples of the
9 patents that we're going to talk about tomorrow.

10 MR. ZINDA: Yes, Your Honor. That is not an issue that's been
11 raised in this proceeding, how you get to the exfoliation. So I can't speak, at
12 least in this proceeding, about whether or not it was known that you would
13 oxidize to do that. I don't think there's a dispute about that.

14 JUDGE OBERMANN: I'm also interested in the sonication step. Is
15 that something that was known in the art to assist in exfoliation?

16 MR. ZINDA: I'm not sure, Your Honor. My understanding of
17 sonication is it's essentially really fast stirring, and I think that in a lot of
18 applications it is known that if you stir things around really quickly, you can
19 separate them out. I don't know if that means it was known in this particular
20 application. I just don't want to speak out of turn about it.

21 JUDGE OBERMANN: Sure. And then is there something that you
22 do where you snip them as well so that they become rebars?

23 MR. ZINDA: That's a good point, Your Honor. One of the reasons
24 our clients call them molecular rebars is not because carbon nanotubes have
25 high electrical conductivity and thermal conductivity. It's actually because
26 they're basically little rebars, and they provide a lot of mechanical strength
27 and reinforcement for their applications.

1 And it is true that in our specification -- I don't know the specification.
2 I may be thinking of the other patents for tomorrow, but I do know that at
3 least in those patents it does talk about how if you separate them out a
4 certain way initially or you undergo, I'll call a preprocessing procedure, that
5 helps you achieve, ultimately, discrete carbon nanotubes. I don't recall if
6 that's in the specification, and I don't want to conflate the issues.

7 JUDGE OBERMANN: That's fine. Okay. Thank you.

8 MR. ZINDA: I have it on my screen, but I'm not showing it up there.
9 There we go. Thank you. Thank you, Your Honor. So we believe that our
10 construction of discrete is fully supported by both the intrinsic and extrinsic
11 evidence, and that there's really no evidence that supports the portion of their
12 construction where there's a substantial length requirement or, I guess,
13 preclusion.

14 I want to start with the specification, first, where it actually talks about
15 how a polymer separator film comprising discrete carbon nanotubes can
16 improve ion transport yet still provide the necessary electrical insulation
17 between the electrodes. The way that discrete carbon nanotubes are able to
18 do that is because they are not interconnected. If you had 10 percent by
19 volume interconnected carbon nanotubes, you would have a significant
20 increase in electrical conductivity, and that would make them more difficult
21 to use for these other applications where you want to have a sufficient
22 amount of resistivity.

23 And the specification goes on to discuss how you can control
24 electrical conductivity, which you can improve electrical conductivity to
25 help potentially with binders, but how you can also use the discrete carbon
26 nanotubes to maintain electrical resistivity greater than a certain amount,
27 which is better for these other applications where you don't want it to have

1 high conductivity because you could short-circuit the battery, right. It just
2 wouldn't work.

3 And the very last sentence of this passage specifically talks about one
4 aspect of carbon nanotubes that's helpful for all applications, as far as I'm
5 aware, and that's that they provide mechanical strength. And that's
6 important because if you have a binder, for example, it might be highly
7 conductive. Maybe you have a lot of carbon black in it. The problem is, is
8 that carbon black is a little more brittle. It can break apart. So carbon
9 nanotubes can help with mechanical strength.

10 So the carbon black carries the electrical conductivity load of
11 improving the binder, but then the nanotubes can help with the mechanical
12 strength. So it's not a this-or-that thing. The patent actually contemplates
13 having both. Claim 4 talks about having carbon black in the composition.
14 And I think that's a really important thing to understand because the other
15 side seems to think this is just, it's a one or the other thing. And reading the
16 patent, the claims are not limited to just having discrete carbon nanotubes.

17 You can have a composition that has the percentages claimed in
18 our claim discrete and still have carbon black or still even have other
19 nanotubes that aren't discrete that provide the conductivity, but these non-
20 discrete ones are still there to help provide structural support. So I just think
21 that's a very important point. And this is a, I think --

22 JUDGE KALAN: Counsel, the way Claim 1 is drafted in this case, is
23 it directed to maximizing conductivity or minimizing conductivity or just
24 reaching a sweet spot between conductivity and resistivity?

25 MR. ZINDA: Yes, Your Honor. And that's, I think, the beauty of the
26 claim in the patent in a way, is it gives these bimodal ranges, right? And
27 within those ranges, you can change -- there's quite a bit of range within

1 each one, 40 to 90 percent and 1 to 30 percent. You can modify those to fit
2 whatever purpose you need the composition to fit. For example, if you
3 wanted it to be a binder, you're going to want more carbon nanotubes -- you
4 want to have more carbon nanotubes because they necessarily increase
5 conductivity just because they're highly conductive.

6 But if you want to have more resistance or maintain resistance, right,
7 while still providing mechanical strength, you tone it down. You go to the
8 lower end of the spectrum. So now you have nanotubes, and maybe they're
9 not the primary engine for your electrical conductivity, but they sure as heck
10 help a lot with the mechanical strength.

11 So that's the claim. That's why the claims, at least in my view, that's
12 part of the reason the claims are so broad, is it allows you to adjust it to fit
13 all three of these purposes in the preamble, if that answers your question.

14 JUDGE KALAN: Yes, thank you. So, Claim 1 is directed only to the
15 binder, and the binder has a particular function within the overall structure,
16 correct?

17 MR. ZINDA: Well, it's for use as a binder, an electrolyte material, or
18 a separator film material.

19 JUDGE KALAN: Okay. So it could be any of those three, right?
20 Thank you.

21 MR. ZINDA: And let me go back, because I jumped ahead a little bit
22 to get to that slide. And so I want to talk about -- the specification talks
23 about discrete oxidized carbon nanotubes, alternatively termed exfoliated
24 carbon nanotubes. Well, the reason they're exfoliated is because that's a
25 necessary step for you to separate out carbon nanotubes to become discrete.
26 I mean, you have to go through that step.

27 The patent uses the term exfoliated and discrete throughout to refer to

1 nanotubes, and they refer to Dr. Chung's testimony, but Dr. Chung testified
2 consistent with what I just said, that a fully exfoliated carbon nanotube is
3 discrete, but not all exfoliated nanotubes are discrete, right? You have to
4 exfoliate to get to discrete, but just being exfoliated does not necessarily
5 mean the nanotubes are not touching.

6 JUDGE OBERMANN: I hate to beat a dead horse, but exfoliated, I
7 know that you get the sort of raw state of these things that are like a tangled
8 mess. I think of like hair when you take it out of the brush, you know, it's
9 just a tangled mess, right? At what point does it become exfoliated? How
10 separated are they?

11 MR. ZINDA: I think the point at which they become exfoliated is
12 when they're no longer entangled with each other.

13 JUDGE OBERMANN: Okay. But they can still be touching --

14 MR. ZINDA: They can still be touching, right. And that's the
15 difference between -- I mean, that's just in the ordinary parlance of, and we'll
16 get to the dictionary definitions in a minute, but discrete has this
17 separateness implication. It is exfoliated, they can still touch, but they're not
18 entangled anymore.

19 JUDGE OBERMANN: So that does seem to be really important here,
20 because it seems to me the distinction between your definitions is whether
21 they're touching or not. So you would say that being exfoliated is not
22 enough because they're still touching or could still be touching?

23 MR. ZINDA: They could still be touching, correct.

24 JUDGE OBERMANN: And what about that part of the spec where
25 they seem to say that a discrete nanotube, that an exfoliated mass is an
26 example at least of a discrete set of nanotubes?

27 MR. ZINDA: Are you referring -- just to be clear, are you referring to

1 this portion --

2 JUDGE OBERMANN: The spec of this patent where I kept harping
3 on it when your friend was up here, and I wanted them to point to the part of
4 the specification that was definitional. And they admitted that they don't
5 quite use the definitional words, but it definitely, I'll see if I can find it. I'm
6 sorry, I'm going to --

7 MR. ZINDA: I believe it's on the screen, Your Honor.

8 JUDGE OBERMANN: Oh, it's on the screen. Yeah, sorry about that.
9 Yeah, there it is. Okay. So doesn't that seem to say that exfoliated carbon
10 nanotubes are at least one type of discrete nanotube?

11 MR. ZINDA: Well, it's true, a discrete carbon nanotube has to be
12 exfoliated, but not all exfoliated carbon nanotubes are discrete.

13 JUDGE OBERMANN: Okay.

14 MR. ZINDA: So when you untangle them, you can get -- they're
15 exfoliated, right? You can partially exfoliate them, you can fully exfoliate
16 them, right? Where they're still in contact.

17 JUDGE OBERMANN: Right.

18 MR. ZINDA: But you separate them out, and now they become
19 discrete carbon nanotubes.

20 JUDGE OBERMANN: So a fully exfoliated batch of nanotubes are
21 going to not be touching?

22 MR. ZINDA: Correct.

23 JUDGE OBERMANN: Okay.

24 MR. ZINDA: Because they've been completely untangled and
25 separated.

26 JUDGE OBERMANN: Got it. And that's your view of what discrete
27 is?

1 MR. ZINDA: Correct, Your Honor. We don't -- we certainly believe
2 there's nothing in the spec or on the record that supports their construction
3 which has this weird substantial amount of attachment that you can have.
4 There's just nothing -- but they do seem to agree with this, that discrete does
5 have something to do with attachment. It's just kind of, what's the line,
6 right?

7 JUDGE OBERMANN: Yeah, right. Okay.

8 JUDGE KALAN: So if I'm restating this again, I apologize. But in
9 the Petitioner's view, it appears that discrete equals exfoliated. But in your
10 view, would it be accurate to say discrete equals fully exfoliated?

11 MR. ZINDA: I think that's a fair characterization. Discrete is a step
12 beyond just some exfoliation. It's got to be fully exfoliated. And that's
13 inconsistent with what Dr. Chung testified to. She did not testify that
14 discrete means exfoliated. She testified that if you exfoliate nanotubes, they
15 could still be touching and not discrete. But if you fully exfoliate them, they
16 are discrete. And that's just, if you look at -- I know it's not on the record
17 here, but discrete and exfoliate mean different things. They're different
18 words. They have different meanings, right?

19 And our view of the phrase here is that it's just saying if you have a
20 discrete carbon nanotube, it is exfoliated, which is true. That is always true
21 for discrete carbon nanotubes. They have to be exfoliated.

22 JUDGE OBERMANN: So assuming this is not definitional, this
23 could just be a phrase that actually means fully exfoliated?

24 MR. ZINDA: That's one way to look at it. Another way to look at it
25 is just describing a characteristic of all discrete carbon nanotubes, which is
26 that they're exfoliated.

27 JUDGE OBERMANN: Right.

1 MR. ZINDA: Because this -- I guess the part I wish I had left up here
2 for Your Honors is if I expanded that out a little bit, this is all talking about
3 how you separate them out and you sonicate and all of that. So this is sort of
4 like explaining, this is how you do it. It's via exfoliation. We agree, or we
5 do not believe this is definitional. We don't think this comes anywhere close
6 to the level of definitional.

7 JUDGE OBERMANN: Great. Okay. Thank you.

8 MR. ZINDA: Now, obviously, I'm well aware -- I'm very familiar
9 with the Board is not supposed to rely on dictionary definitions to define
10 terms just in the abstract. But obviously the word discrete is a word that has
11 a common ordinary meaning. And so we have relied on the dictionary here
12 to point out some of the common ordinary meanings of discrete, which this
13 is the one that we think is most consistent with the specification.

14 And by the way, I think their counsel said they don't disagree with
15 separate and distinct. Well, I would argue that that settles the dispute then,
16 because to me separate means not touching. I don't know what else separate
17 can mean. They seem to take issue with not attached.

18 JUDGE OBERMANN: What about this idea that if you have -- you
19 know, you've got a lot of carbon nanotubes in there, right? What if you have
20 one that's floating around by itself and the rest are attached?

21 MR. ZINDA: Well, I would say that's a discrete carbon nanotube.

22 JUDGE OBERMANN: And is that all you need to make a claim?

23 MR. ZINDA: If you have one, if you have -- well, it depends. The
24 claims require, I think, a plurality. So you have to have at least two.

25 JUDGE OBERMANN: Okay.

26 MR. ZINDA: And I would say, yeah, the claims don't put a limit on
27 the number of discrete carbon nanotubes you have to have. So there could

1 be two.

2 JUDGE OBERMANN: Right.

3 MR. ZINDA: Realistically, that's not -- that's never going to happen
4 in real life, but I agree with that. There's not a limit.

5 JUDGE OBERMANN: Okay.

6 MR. ZINDA: This is actually their dictionary that they cited, as they
7 claimed it supports their position. But I'll just note the constituting a
8 separate entity, individually distinct, consisting of distinct or unconnected
9 elements. So these definitions all have this concept of not being attached,
10 not being connected.

11 JUDGE OBERMANN: Is discrete different from distinct?

12 MR. ZINDA: Discrete different from -- I would say, yes. Well, you
13 know, I haven't looked up distinct in the dictionary, but I believe that there is
14 a distinction. Distinct is something being identifiable as something.

15 JUDGE OBERMANN: Oh, okay. And what about dispersed?

16 MR. ZINDA: Dispersed, you know, my not having the benefit of a
17 dictionary or other evidence is I would say that refers to how spread apart
18 things are.

19 JUDGE OBERMANN: Okay. Thank you.

20 MR. ZINDA: And I want to point out, so we did rely on Dr. Zhu's
21 testimony. Dr. Zhu is the expert that they've retained in the other three
22 proceedings. They raised arguments in their reply that it's improper for us to
23 rely on Dr. Zhu's testimony, different patents. What I will say, Your
24 Honors, is they applied the same level of ordinary skill in the art in both
25 proceedings, in all the proceedings.

26 JUDGE OBERMANN: Did you introduce this in this action?

27 MR. ZINDA: It was filed as an exhibit, Your Honor.

1 JUDGE OBERMANN: It was, okay, thank you.

2 MR. ZINDA: It was filed as an exhibit. And we did rely on this -- I
3 don't remember if it's in our Patent or Patent Owner's response. But this is
4 his sworn declaration testimony where he's trying to apply the word discrete
5 carbon nanotubes to a prior reference called Ohato, which I'm sure the Board
6 is somewhat familiar with for tomorrow. But the first part of it is really
7 important. He says it can be seen that most of the nanotubes are depicted as
8 being discrete, non-agglomerated, and exfoliated.

9 Okay. If you look at the figure, the only nanotubes in there that you
10 would argue are not discrete are the ones that are touching. So Dr. Zhu is
11 clearly interpreting discrete carbon nanotubes to mean nanotubes that are
12 fully isolated from one another. That's consistent with what he said in the
13 next sentence.

14 JUDGE OBERMANN: He also seems to be equating exfoliated with
15 discrete and non-agglomerated, or am I wrong?

16 MR. ZINDA: I think that's arguably true. Tomorrow we'll talk about
17 it. He has been all over the place with his meaning of what discrete means.
18 But regardless of whether he's treating it the same here, the point is, he only
19 says some of them qualify, not all of them. And the only ones that clearly
20 wouldn't qualify under this testimony would be the ones that are touching.
21 They're not even entangled in these illustrations. They're just on top of each
22 other touching.

23 So in other words, the way he's applied it is 100 percent consistent
24 with the way we've applied it in this proceeding. It's consistent with the
25 dictionary definition. It's consistent with our specification. It's consistent
26 with the fact that our patent is concerned about maintaining resistivity as
27 well.

1 JUDGE OBERMANN: But is he really saying that the ones that are
2 touching are not discrete? Is he just trying to say some of them even meet
3 your view that they have to be fully isolated?

4 MR. ZINDA: All I can say, Your Honor, is when he says it can be
5 seen that most of the nanotubes are depicted as being discrete, the only way I
6 can read that is he's viewing some of those nanotubes as not being discrete.

7 JUDGE OBERMANN: Okay. Do we have the issue here where in
8 three dimensions it could be that all of them are discrete?

9 MR. ZINDA: I would say we have that issue in certain areas. But
10 what I want to make clear about Ohato is Ohato says that they're touching,
11 and it says in the spec. So I don't think there is an actual issue in this
12 reference. But that is an issue that comes up, and I will touch on it if I have
13 time, because I'm going to try my hardest.

14 JUDGE OBERMANN: Okay. Thank you.

15 MR. ZINDA: But here's his deposition --

16 JUDGE KALAN: Can I ask a question?

17 MR. ZINDA: Yes, Your Honor.

18 JUDGE KALAN: Really quickly. Okay. So I get the touching, but is
19 attached different than touching?

20 MR. ZINDA: I don't think for purposes of these proceedings it
21 matters. I would say that there could be a dispute about whether -- because
22 there's these things called Van der Waals forces that exist, and there's ionic
23 and covalent bonding. And you could say, well, is Van der Waals really
24 attaching? Is covalent bonding really attaching? I don't think it matters. I
25 don't want to say there's not a difference. I guess for purposes of this
26 proceeding, I would say it's not relevant.

27 Now, this is Dr. Zhu's deposition testimony, and I specifically asked

1 him, not objected to, with respect to the same Ohato figure we just looked at.
2 And so you're identifying that nanotube as discrete because it's fully isolated
3 from the other nanotubes. Yes.

4 JUDGE OBERMANN: I'm sorry, what slide is that?

5 MR. ZINDA: Yes, Your Honor. I'm sorry, this is Slide 15.

6 JUDGE OBERMANN: Thank you.

7 MR. ZINDA: I will start announcing them. I'm sorry. I should be
8 doing that for the court reporter.

9 JUDGE OBERMANN: Thank you.

10 MR. ZINDA: And then the second quote that we have here, your
11 testimony was that discrete carbon nanotubes are non-bundled nanotubes
12 that are separate from each other, correct? Yeah. And I don't know how
13 they're viewing separate, but when you say two nanotubes are separate, to
14 me, that means they're not connected. They're not touching.

15 Now, as mentioned before, they have a construction in this
16 proceeding. They may not call it an express construction, but it's very clear
17 that the Petitioner and its expert are applying a very specific definition of the
18 term discrete. And they may argue it doesn't matter for purposes of their
19 prior art whether you adopt theirs or not. They just need you to find ours
20 wrong. But this is the deposition testimony of Dr. Guido where he confirmed
21 that this limitation of, they're not associated with each other along the
22 majority of their length or something to that effect, is how they are
23 construing the word discrete.

24 And in fact, he struggled really badly to tell me how he would be able
25 to tell what's discrete and what's not discrete under his definition. First, he
26 said, this is not, well, defined necessarily. You just have to look at these
27 things. Then he said -- I asked him, well, 50 percent, would that be

1 substantial? I would say that 50 percent is a fair amount of association.
2 Again, not giving me an answer about how you would even be able to tell
3 what's discrete under his application of that term and not.

4 And ultimately, he said, I didn't try to put a number on it. But I think
5 the part of the testimony that's the most remarkable is that he testified that
6 even if they're entangled, they would still not be -- they could still not be
7 discrete under his definition. He said it depends on how tight they're
8 entangled. And then he gave this very long answer about water hoses and
9 how they entangle.

10 But the point is, Your Honor, is that they do have a position on claim
11 construction on discrete. It's not, just, we're wrong. And that position is
12 kind of vague and ambiguous and not supported. And so the Board has at
13 least one proposal from us that we believe is fully supported by the spec.
14 And then you have one from them that they didn't even want to talk about in
15 their opening arguments. I mean, they didn't even touch. This is their
16 construction. They went a whole 45 minutes nearly and didn't talk about
17 their own construction. So that's where I'll leave that.

18 JUDGE KALAN: I have a question about the substantially along or
19 along substantially the length of the nanotubes. Just to give us an idea of
20 how these things work in reality, because the scanning electron depiction
21 looks like it's all over the place. Do nanotubes necessarily line up side by
22 side like melted Twizzlers?

23 MR. ZINDA: Your Honor, I would say that's -- from everything I've
24 seen, that's not how -- they don't look like Twizzlers. They look more like a
25 nest of hair that's all entangled. And I guess as you do disentangle them,
26 you can have some that aren't entangled that way. But as you exfoliate them
27 more and more and more, eventually they pop out. So that's my

1 understanding. And I wish I had them in these slides. I have them for the
2 ones tomorrow. But we have some images of some raw bundled that give
3 you a good idea of what they look like.

4 JUDGE KALAN: We have access to those in the records. So is the
5 Petitioner's analogy of pick-up sticks a little closer to reality, in your view,
6 or what's the problem with that?

7 MR. ZINDA: I don't agree with that analogy, Your Honor. I'm going
8 to get to that. All of those arguments that they presented, the eight slides
9 that they had on the pick-up sticks, that was all in their expert's declaration.
10 It wasn't even in their reply.

11 There was one sentence, the one that they put on the projector. And
12 then they had eight pages of their experts arguing and doing all this scientific
13 math that honestly we've objected to in our papers that that's improper
14 incorporation by reference. And I will get to that and I will show exactly
15 how they did that. They're still wrong and we did address it, but I just
16 wanted to make note of that.

17 So one of their key arguments is nothing in the '282 Patent suggests
18 that the inventors were interested in achieving non-touching nanotubes.
19 That's, again, Your Honor, just not the case. We went through the
20 specification, and they even admit that having discrete carbon nanotubes that
21 aren't touching does help provide electrical insulation. We talked about how
22 you need to maintain resistivity and how also in these compositions you can
23 have, for example, two carbon-like particles that maybe are far apart.
24 They're not conductive, electrically conductive.

25 You put one discrete carbon nanotube in there, you link them together
26 and you've improved conductivity even though you don't have other
27 nanotubes touching that nanotube. So it's not just a black and white issue.

1 As much as they want it to seem simple like that, unfortunately it's very
2 complex science and that's --

3 JUDGE OBERMANN: So I may be way off here, but it won't work
4 the same way if the nanotube is touching another nanotube?

5 MR. ZINDA: No, the point is, Your Honor, if a nanotube is touching
6 another nanotube, you presumably have better increased electrical
7 conductivity, right? And so if all of your nanotubes you're touching, the
8 composition becomes very conductive. And in this application, a lot of
9 these applications, you don't want that. You don't want it to be too
10 conductive because then all of a sudden something that's supposed to be
11 non-conductive shorts out your -- it becomes conductive and it shorts out
12 your product.

13 So that's the only point I was making, is you don't -- discrete carbon
14 nanotubes have a benefit even if you don't have other nanotubes touching
15 them. Carbon black can touch them. Ionic conductors can touch carbon
16 nanotubes and then the carbon nanotube extends the conductivity through
17 the composition, even if it's not chained to another carbon nanotube. And I
18 hope -- slow me down if that doesn't make sense because I know I'm going
19 really fast, but --

20 JUDGE OBERMANN: Is that the electron bridging thing that we're
21 going to talk about tomorrow?

22 MR. ZINDA: Tomorrow we'll talk about -- and I do have a slide on it
23 here. There's a scientific principle known as electron tunneling, which
24 means electrons can actually jump from one nanotube to another, partially
25 because they're highly conductive.

26 And then there's another scientific principle called the percolation
27 threshold which is really complex. But in simplest terms I can describe it is

1 if you have a sufficient volume of carbon nanotubes or any conductive filler
2 in a composition, even if it's a non-conductive composition, you can actually
3 transform that entire composition to becoming conductive. Which seems
4 odd because you say, well, what if it's in the PVDF that's not conductive?
5 Well, it still works. We've got evidence that shows that.

6 So that's an issue that we will definitely discuss tomorrow, and it's
7 slightly relevant to our arguments here. But any other additional questions,
8 Your Honor? I'll keep moving. Thank you. So, just moving on. The
9 specification teaches us that you can control strength, ionic conductivity and
10 resistance via discrete carbon nanotubes. That's allowed because they are
11 not touching. You have more resistivity with discrete ones than you do with
12 the ones that are connected.

13 And then finally, nothing in the specification supports -- I guess we're
14 touching that more often. Nothing supports their construction, which they
15 didn't discuss. I'm going to see if I can get this to go back. Sorry.

16 And this is to the point -- actually to the point you just asked about,
17 Your Honor. They do have one or two arguments or maybe one or two
18 sentences in the reply where they say, well, how can you increase
19 conductivity with carbon nanotubes if they're not touching, right? And
20 again, like I said, this invention is about more than increasing conductivity.
21 There's resistance as well and ionic conductivity.

22 But the two principles I've just described, therein, our expert, Dr.
23 Chung, testified about them in another proceeding, but they filed the
24 transcript in this one, so we relied on it. And she's discussed electron
25 tunneling and the percolation threshold. The bottom line is carbon
26 nanotubes do not have to touch to increase conductivity and connect.

27 Now, the further apart they are, the more resistance there is, and

1 eventually they will not have any conductivity between them, right? But if
2 they're close, they can still conduct electricity. And this is just -- we went
3 over this earlier, Your Honors, Slide 21. We went over the composition
4 useful for a binder, an electrolyte material, or a separator film.

5 I just want to note, again, the claims require discrete carbon nanotubes
6 and then two percentage ranges that have to fall within these different ratios,
7 right? The claims do not preclude there from being other components in this
8 composition. There could be carbon black. Claim 4 further requires carbon
9 black. So the carbon nanotubes in our claim, they do not have to do all of
10 the heavy lifting for resistivity or for conductivity. There's other things that
11 are in play.

12 Going back to the dictionary, they referenced this one passage from
13 the specification. This is Slide 22, where they said, well, the patent says
14 you're not supposed to rely on dictionaries. Well, it says -- what it says is
15 where the construction of a term would render it meaningless or essentially
16 meaningless, that's not the case here. Neither party is advocating for a
17 construction that would render the claim term meaningless. So we think this
18 paragraph is just inapplicable.

19 But even if you proceed to apply the dictionary definition, they've
20 admitted they don't have this dictionary, they couldn't find it. The
21 dictionary's not before the Board. And even if it was, we would say that's
22 not binding because, again, neither party is saying that the claim term is
23 meaningless. So we think this is kind of a red herring argument.

24 They provided a dictionary, said, well, look at this dictionary. Again,
25 it's not the third edition. It's not the dictionary that's actually cited in that
26 portion of the spec. And of the two that they did provide, they support our
27 construction. Sorry, the one we provided and the one they provided both

1 support our construction.

2 Now, in their brief, they kind of suggested that we cherry pick this
3 dictionary. And I just wanted to throw a slide in that basically shows the
4 Board routinely relies on the Webster's New World College Dictionary.
5 And so, you know, that's what we have done here.

6 Your Honor, you asked a question about the SEM images and the
7 issue about whether they're crisscrossing and whether it looks like they're
8 touching and not touching. They do in their brief, they rely on our
9 infringement contentions.

10 And what they didn't show you in their briefing was our other SEM
11 images, which here show what Patent Owner identified as discrete in the
12 contentions. We have several slides that show that, highlighted blue. And
13 the ones that they focus on were these kind of zoomed out ones where all
14 the, it looks like all of the -- looks like the nanotubes were all go live
15 together. But both parties are in agreement that in an SEM image, it may
16 look like the nanotubes are touching, but they may not be touching at all. So
17 we provided SEM images that show that.

18 And I think, Your Honor, in the interest of time, because I don't have
19 a lot of time, I'm going to skip to my last little slide here. They didn't get to
20 this in their slide deck, but they did cite to this single sentence from their
21 reply where they -- where Dr. Guido says, because of the high aspect ratio of
22 carbon nanotubes, it is simply not feasible to have even a very small
23 concentration of nanotubes without them crossing it and contacting one
24 another.

25 First thing I'll say is, then how did they create their product? Because
26 the SEM images we have displayed here, that's their product. They have
27 carbon nanotubes that don't crisscross with one another. They're not

1 touching. They also argue that the prior art was able to do it. So if the prior
2 art was able to do it, why is it impossible for our patent to do it, according to
3 them?

4 But finally, this one sentence that they cited and they have the little
5 sticks, I believe Your Honor mentioned before the little stick figures that
6 they took. All I would ask the Board to do is go back and read their reply
7 where they have this sentence. You will not find anywhere in there where
8 they explain this at all. They cite to paragraph 7 to 16 of his declaration,
9 eight pages of expert testimony. Very complex expert testimony. Not in the
10 reply. And we specifically objected to that in our papers and said we believe
11 the Board should not consider it because it is improperly incorporated by
12 reference.

13 And so, you know, we think they're wrong and we've explained why
14 we think they're wrong, but we've also explained why we think it's not
15 proper for them to try to bring that in.

16 And with that, Your Honors, I will turn it over to my colleague, Mr.
17 Glenn, who I've left with not as much time as I wish I had. Thank you.

18 JUDGE OBERMANN: Thank you.

19 MR. GLENN: Thank you, Your Honors. Because we are so short on
20 time, and we have two full grounds, before I just sort of jump in and run
21 through a whole bunch of slides really fast, are there any specific points that
22 Your Honors would like to discuss so that I don't maybe just get there by
23 luck, but we can actually discuss the things that Your Honors have at issue.
24 If not, I can jump through slides, but --

25 JUDGE OBERMANN: It doesn't look like we're going to be able to
26 give you a lot.

27 MR. GLENN: Not a problem. Ground 1 is the combination of

1 Bosnyak-392 with the reference sign. And the Petitioner has argued that the
2 Bosnyak-392 teaches, I mean, two different aspect ratios. And I'm at Patent
3 Owner's demonstrative number 36, having two different aspect ratios. And
4 it's cited to two paragraphs into Bosnyak-392, and that's paragraph 37 and
5 paragraph 73.

6 But if we look at, and I'm now at demonstrative 37 for Patent Owner,
7 if we look at paragraph 37 of Bosnyak, there's no discussion of multiple
8 aspect ratios, be they bimodal or otherwise. In paragraph 73, Bosnyak does
9 say, for example, by having at least a portion of longer carbon nanotubes just
10 present with the electrical device, such as energy storage device, that's it.
11 That's the only reference to multiple aspect ratio ranges. The concept of
12 being bimodal or there being just two aspect ratio ranges, that's not in
13 Bosnyak.

14 It is in Son, but then the whole bimodal concept thus comes from Son.
15 Bimodal is not in necessarily Bosnyak at all. And Son has a bimodal aspect
16 ratio of distribution of small aspect ratios and a large aspect ratios. But
17 specifically teaches that by using a bimodal distribution in this way, which
18 again, is an upper aspect ratio range that is not discrete by intent. The intent
19 is that they in fact be touching, that they provide conductivity. That's why
20 Son did it.

21 There's been some dispute of whether or not it's Figure 1 or Figure 3
22 we ought to be looking at, but if we go to the tech of Son, it's kind of
23 dispositive. Figure 1 and Figure 3 are not different embodiments. They're
24 the same embodiment. And Son describe them as, in the upper range, they
25 are an electrical network of electrical contact that's maintained, having gone
26 through the extrusion process in Figure 2.

27 So the connections, as you see in Figure 3, some intend them to exist

1 in Figure 1 and they are maintained through the extrusion process of Figure
2 2 that's left out here through to Figure 3 where they still exist. They are
3 intended to be connected, they're intended to be non-discrete. That's in fact
4 the purpose that Son puts them to for having a bimodal aspect ratio range.
5 He puts long ones in there so that they end up being not discrete.

6 So what does that do with this combination? You have Bosnyak who
7 is using discrete carbon nanotubes. Good question. And a POSITA, even if
8 we give them the impermissible hindsight of standing on top of the claim
9 going, hmm, I'd like to generate a bimodal aspect where both modes are in
10 fact discrete as the claim requires. The claim requires both the low aspect
11 ratio range and the high aspect ratios be discrete. What motivation would a
12 POSITA have to provide a bimodal aspect ratio that on purpose creates non-
13 discrete carbon nanotubes in the high aspect ratio? He wouldn't.

14 Moreover, what expectation of success would there be for creating a
15 bimodal aspect ratio distribution that's discrete in both ranges? It wasn't.
16 Son says it doesn't happen. So there's no even expectation of success.

17 Further, it's not really disputed that the '282 also requires
18 concentrations, concentrations of carbon nanotubes that are delineated in
19 Claim 1 as a number percentage, a number of tubes out of the total number
20 of tubes. And that Son's concentrations, to the extent that he provides them
21 at all, he is in weight percentages. And weight percentages and number
22 percentages are not in any way shape or form the same thing. They come
23 out to be different numbers, that's why they're treated very, very differently.

24 But to try to go from a weight percentage calculation to a number
25 percentage calculation requires detailed information about the nanotubes.
26 Aspect ratio is the length divided by the width. You've got two variables in
27 there. And if I'm trying -- if I've got X times Y is equal to four, there's an

1 infinite number of X's and Y's that solve that equation. If I assume Y is two,
2 well, then there's only one. Two. Two times two is equal to four.

3 In order to solve Dr. Gido's equations, and again, we don't fault his
4 math. He solves the equations correctly. Our argument is that the only way
5 you got there is by making assumption of what Y is, which you have no
6 information to do. You have no right no ability to be able to do that. The
7 first assumption he makes is this one-to-one correspondence between
8 number ratio or number percentage and weight percentage. That's nonsense.
9 You can't do that.

10 If we look here at demonstrative number 45, we've got three sets of
11 nanotubes, and the first set we've got ten nanotubes. The very long one
12 that's depicted there is 10 percent of the nanotubes depicted, but it would be
13 50 percent of the weight of those nanotubes. In the second group, we also
14 have ten nanotubes. The very wide one there at the bottom is again 10
15 percent of the nanotubes. It's one of the ten, but would be more than 50
16 percent of the weight.

17 If we go to the third example where we're varying length and width
18 more or less at random, which is what occurs in a normal group of carbon
19 nanotubes, it gets even far more complicated. Without knowing what the
20 dimensions will be, specifically the width and the length, you have no way
21 to determine what the weight contribution of any particular tube to be able to
22 suss out what its number percentage contribution would be. One-to-one
23 correspondence simply is not possible.

24 In the second methodology, in order to get the variable he doesn't
25 know, to get X times Y is equal to four, having to assume what Y is, the
26 Petitioner has assumed essentially a constant average tube diameter across
27 the nanotubes. That's not a reasonable assumption. They apparently are

1 getting it because -- here I'm at the Petitioner's demonstrative number 51,
2 where they say, for my second approach, I note that a POSITA would have
3 recognized that Son contemplates changing the aspect ratios by changing the
4 lengths while keeping the diameters constant.

5 Well, this is a very good way of describing an aspect ratio range in the
6 abstract that we can talk about increasing abstract rate of abstract ratio if we
7 just hold the nanotubes diameter constant and increase the length we will get
8 an increase in aspect ratio. It's an abstract description. Nobody can actually
9 say this is what Son did. Son doesn't say he did this, and it would make no
10 sense for Son to have done this.

11 To do this, you would have to go nanotube by nanotube, pick out the
12 ones that have the right diameters that you want -- that have the right
13 diameter, and then selectively pick out the lengths. And a bundle of billions
14 and billions of nanotubes without ever claiming or stating in any way that
15 you did this? This is not a reasonable thing for Son to actually have done,
16 yet the Petitioner has to assume that he did this, otherwise they cannot make
17 the very calculations they claim to make.

18 The third is mathematically more complicated but still makes the
19 same assumption. I'm here at demonstrative number 47 where we see that
20 they assume that the distribution of carbon nanotube diameters is similar
21 across the aspect ratio ranges. They have to assume that in order to cancel it
22 out of the equation. Without the assumption, you can't even begin the math.
23 And the assumption, again, is simply not warranted.

24 I'm going to skip over the -- whether the ranges are rendered obvious,
25 except to say, the generic decision says that a prima facie case of these
26 overlapping ranges has not been met. When the prior art reference's range is
27 so very broad and contains many different -- many different structures, that

1 it's no longer a prime case of obviousness that is just refining that a person
2 of ordinary skill in the art would just be willing to do willy-nilly.

3 Here, we're talking about a difference in ranges that is obscene. The
4 patent is from 80 to 130 -- or 80 to 140. The prior art is 130 to 10,000. It's a
5 huge difference in aspect ratio range with many, many, many different
6 structures and behaviors along, in that aspect ratio range. It's no longer a
7 prima facie case just to say you would be willing -- a person of ordinary skill
8 in the art would be willing to go through all of them.

9 Moving quickly to the combination with Albuerne. To understand
10 what's going on, we first got to understand what Albuerne did. Now,
11 Albuerne did go through his acid treatment and got samples of agglomerated
12 carbon nanotubes through the acid treatment, and then he took a sonicating
13 probe and broke out a couple before dumping it out onto a silicon wafer, and
14 then counted 100 of them.

15 And he specifically pointed out, there may be longer nanotubes in
16 there that are part of the agglomeration, but we just didn't count because we
17 just kicked out a hundred of them. And he got these two figures here. And
18 the only thing that Albuerne does with these two figures is to point out that
19 between the two different types of carbon nanotubes that were used, they
20 appear to be the same. And after you go through the oxidation, it does
21 appear that the lengths kind of get longer.

22 He does not call this a bimodal distribution. He does not claim this is
23 actually the distribution of aspect ratios in the sample. Not even on the
24 silicon carbide wafer. It's just the distribution of the hundred that he
25 measured. That's it. No POSITA would look at this and say this is the
26 distribution of aspect ratio that you would get if you did Albuerne's
27 procedure. It's just the distribution they got of the hundred they counted on

1 the day they did the example. Thank you, Your Honors. I see I'm out of
2 time.

3 JUDGE OBERMANN: Thank you so much. Before you step away,
4 let me just see if there are any questions. It does not appear so. Thank you.

5 MR. GLENN: Okay.

6 JUDGE OBERMANN: We have Mr. Renner. You have ten minutes.
7 Let me get that on the clock for you. And I'll begin your time. Take your
8 time. We won't start until you're ready.

9 MR. RENNER: Thank you, Your Honors. Again, Karl Renner on
10 behalf of Petitioner. Just a few points before my colleague will join. First
11 and foremost, the Patent Owner wrongly characterizes the record in referring
12 to Petitioner's position on construction. I'll direct you to the Petition at page
13 7, quote, no formal claim constructions are necessary in this proceeding.
14 And at Petitioner's reply at page 2, Petitioner maintains that no formal claim
15 construction is necessary.

16 Despite this, you hear today that the Patent Owner is contending that
17 we construe. We don't. The record is all about whether or not that one
18 limitation they've introduced as their attempt on construction is a justifiable
19 one. That's our position and has been since the beginning.

20 I will mention something to follow up my earlier commentary. I'm
21 trying to make things a little simpler. When I characterized the first two
22 lines on the page of our slides that speaks to their construction, it was our
23 Slide 14. I said that that the Petitioner doesn't take issue with the way that
24 that's characterized. It actually has the words separate and distinct. That
25 was trying to be simplifying there.

26 You'll see tomorrow we do -- we're going to apply across all three the
27 same meaning, and we don't see a problem with doing so. You'll see that

1 separate is actually not consistent and appropriate for discrete, and we'll see
2 an express indication of that in the materials tomorrow. I just wanted to
3 make sure we didn't leave any confusion on that point.

4 Slide 10. When we look at exfoliated versus discrete, you heard a lot
5 from Patent Owner in their presentation attempting to distinguish the two.
6 Patent Owner recognizes, you heard also, that exfoliated does not preclude
7 touching. We see that in the record pretty well established, but they
8 acknowledge again today that that's true.

9 Patent Owner spends therefore significant energy trying to talk us out
10 of reading what the author wrote in column 650 to 54, and that document
11 tells us what the author thinks it wants to do here. And it describes -- and it
12 isn't bashful in doing so, specifically, and I will read it again just to make
13 sure we're all really clear on it. Discrete oxidized carbon nanotubes,
14 alternatively termed exfoliated carbon nanotubes.

15 So here they're telling us how -- they're giving us a bit of an indication
16 of how to read this document they've given us. You don't need to demand a
17 dictionary definition or a definition at all. They just tell you what it's
18 supposed to be. We know exfoliated doesn't require attachment. And
19 they're saying -- when you look at discrete, which is a word that people
20 apparently have debate over, you shouldn't read it differently than exfoliated
21 in this sense.

22 Now, with exfoliated known not to preclude attachment, their attempt
23 to read that limitation in the discrete is a high hill to climb, should be a high
24 hill to climb. And what we see from them is reliance essentially at the end
25 of the day on a dictionary, a dictionary ten years older than the priority date.

26 JUDGE OBERMANN: I have a basic question. If we were to accept
27 your view that discrete means exfoliated, and exfoliated can contemplate

1 some attachment, where is the line? I mean, how do we determine whether,
2 you know, something that's just a big bundle and has lots of attachment is
3 not discrete, but something with, as you would say, some percent or some
4 degree of where do we do it? I know you're saying you don't need it. In
5 order to apply the prior art, we have to know where that is. And what is
6 your position on that?

7 MR. RENNER: Yeah, thank you, Your Honor. Very good question.
8 Exfoliated, they've told us the line to use.

9 JUDGE OBERMANN: Fully exfoliated? Partially exfoliated?

10 MR. RENNER: They tell us exfoliated. Exfoliated means it's broad,
11 so broadly exfoliated. Yes, is the answer, unless the patent drafter tells us
12 something different to be more specific. It's their job to articulate their claim
13 in a manner that would give us the answer here, but they shouldn't get the
14 benefit of narrowness because they haven't said so, and that's what they'd ask
15 Your Honors for. They're trying to inject even the word fully here. That
16 phrase doesn't say fully. Had it said fully, we'd know what to do, we'd know
17 to exclude things that aren't fully. But it doesn't say that, doesn't limit it to
18 that.

19 Our position is, read them for what they said, read that specification of
20 what it tells us. It allows it for fully, sure, or partially. It's not precluding
21 either one of those either. And as it's not precluding anything other than
22 fully -- exfoliated, sorry, then you shouldn't preclude the things that are
23 contemplated by exfoliated when you read that term discrete. There's no
24 basis to do so, that's the point there. They're using a construction here to do
25 what the claims and the specification fail to do, and that's what we think is
26 improper and frankly outside of the intrinsic record you have.

27 Your questions, I honor them. I believe they're the right questions.

1 The party that owns the problem that exists is the Patent Owner on that.
2 And when they don't define the narrowness in the way that they today seem
3 to want, well, then they shouldn't get the benefit of that narrowness because
4 the public doesn't have the benefit of that narrowness.

5 The public asks the same questions you're asking, and they say, oh,
6 well, I don't see a limitation for fully. What do I do with that? Well, I don't
7 narrow it to fully. And they don't narrow it to, I don't know, attached or
8 precluding of attached because I didn't see the author say that. They could
9 have, they didn't.

10 Slide 15, we have Dr. Guido tell us that a certain amount of touching is
11 necessary to accomplish what Dr. Chung recognizes in her testimony that
12 improved productivity cannot be achieved. And she tells us this. There's
13 really no question here. We know there's a certain amount that's necessary
14 to accomplish it, and Dr. Chung acknowledges it as well.

15 Dictionaries, again, I've got a dictionary. It's ten years old, older than
16 the priority. That dictionary is not the only dictionary in the record. There's
17 one that's actually contemporaneous with the priority. It tells you that a
18 person of skill doesn't demand precluding the attachment. I'll ask my
19 colleague, if there are no further questions for me on this, to use the time we
20 have together.

21 JUDGE OBERMANN: I don't think we have anything.

22 MR. RENNER: Thank you very much, Your Honors.

23 PARTICIPANT: Thank you, Your Honors. Earlier, there was a
24 question about whether the aspect ratio limitation 1b requires two peaks. I'm
25 sure I can find better cites if I was at my desk, but for now, in Dr. Guido's
26 declaration, Exhibit 1003 at paragraph 47, he equates bimodal distribution to
27 simply, quote, to using two different types of CNTs.

1 And then he goes on in paragraphs 74 to 81 to show that even if you
2 have these distribution graphs that only have single peak as you see in the
3 graph, and you will see that on paragraphs 34 to 41, he nevertheless says that
4 those satisfy the claim because they have carbon nanotubes with aspect
5 ratios that fall within those buckets, even without having two prominent
6 peaks.

7 Earlier, there was a mention of how the '282 Patent -- there's one
8 example where it creates a separator layer that is meant to be insulating and
9 uses some nanotubes in there. In that one example, I think they sort of
10 sprinkle in like 0.5 percent of nanotubes to try to minimize the conductive
11 nature of that material. But everywhere else, if you look in the '282 Patent,
12 and this is in our Petitioner reply at page 4, the '282 Patent repeatedly touts
13 the importance of adding more discrete carbon nanotubes to achieve low
14 electrical resistivity.

15 And then Dr. Chung, Patent Owner's expert, confirmed that if you add
16 more carbon nanotubes, then you can render the electrode more conductive,
17 and that is her declaration at paragraph 65. And during deposition, she said
18 that, and I'll quote this from her deposition page 36, you need to have a
19 plurality of nanotubes coming together and making electrical contact
20 between one another, that is touching one another, you know, in order to
21 create an electrically conductive structure as desired in the '282 Patent.

22 Quickly, opposing counsel said in Dr. Gido's second approach where
23 he kept the diameters of the nanotube constant to make his calculation
24 simpler. In Slide 56 of our demonstratives, we point to actually the '282
25 Patent itself where the only disclosure of this bimodal aspect ratio is shown
26 on Figure 1 of the '282 Patent, and it's actually just the length. And they
27 have actually kept the diameters constant in that only example that they

1 provide of this bimodal distribution.

2 And Slide 57 of our demonstratives go on to show how even Patent
3 Owner's own expert acknowledged that the way to vary aspect ratios is to
4 keep the CNTs to have the same diameter and then you adjust the aspect
5 ratios to suit the particular function that is needed. For the third approach,
6 there was some talk about, again, keeping the diameters constant as we
7 discussed in my presentation earlier about the third approach. There was no
8 such assumption made. The only assumption made was that there was an
9 average diameter, and as Patent Owner's expert agreed, you always have an
10 average diameter.

11 And then, again, that also drops out of the equation. So, again, we
12 don't think that is an assumption, a false assumption, or even any assumption
13 that we made with regard to that part of our approach. So unless there are
14 any other questions, I think that's it for me.

15 JUDGE OBERMANN: I think that's all.

16 PARTICIPANT: Okay. Thank you, Your Honors.

17 JUDGE OBERMANN: Thank you. Okay. Mr. Glenn, you have five
18 minutes, and I will start the clock when you're ready. Take your time --

19 MR. GLENN: I'm actually setting this up for counsel.

20 JUDGE OBERMANN: Oh, okay. Thank you.

21 MR. ZINDA: I'll be in for surrebuttal. Thank you, Your Honor.
22 Your Honor, I want to touch on just three points, and they all relate to the
23 claim construction issue that we discussed earlier about the word discrete.
24 First, I want to note that originally, Petitioner's counsel said they were fine
25 with separate and distinct. And on his rebuttal, he came up and said,
26 actually, they changed their mind again. That's the first thing I want to point
27 out. Apparently they're not okay with separate. They never argued against

1 separate in their briefing, but now at this hearing, they're telling you they
2 have an issue with separate.

3 Secondly, the counsel was specifically asked, well, so any level of
4 exfoliation, would that then be discrete? And he essentially said yes. And
5 the problem with that is if you slightly sonicate carbon nanotubes, you
6 arguably have exfoliated them to some degree. And so it really doesn't put
7 any meaning into the word discrete to say that any level of exfoliation
8 renders them discrete.

9 And so we don't agree that, and that's actually inconsistent with what
10 their own expert said in his deposition. And I'm going to go back to it
11 because they keep claiming that he didn't have a position on claim
12 construction or they don't have a position on claim construction. This is his
13 sworn deposition testimony.

14 JUDGE OBERMANN: Can you please tell us the slide number?

15 MR. ZINDA: Yes, Your Honor. Slide 16 --

16 JUDGE OBERMANN: Thank you.

17 MR. ZINDA: -- of Patent Owner's slides. I don't know how much
18 more clearly he could have made his position here. And he got all twisted
19 up when I asked him how you would even know whether something is
20 discrete under his definition. The following slide he gets twisted up pretty
21 heavily trying to explain to me how you would even be able to tell. And
22 then their counsel comes up and says any level of exfoliation is sufficient.

23 JUDGE OBERMANN: What about their view? And I heard Mr.
24 Renner to essentially say that there is ambiguity in this claim term. And of
25 course, we don't address indefiniteness here, but, you know, what do we do
26 if their position is that this basically is an indefinite term and that somehow
27 that cuts against your position, because the Patent Owner had a burden to

1 make it clear in the spec?

2 MR. ZINDA: Sure, Your Honor. And I believe our position is that it
3 is clear in the specification. This is describing how you create discrete
4 carbon nanotubes. You create them by exfoliation. And it walks through in
5 the part that's not shown here, and it walks through that process. It mentions
6 sonication. And so, we think you can naturally read this consistent with our
7 interpretation.

8 JUDGE OBERMANN: Okay. I'm reading this, and it's fluid, I'll give
9 you that. But I'm reading this particular snippet here to explain, not
10 definitionally, what a discrete carbon nanotube is, but sort of explaining how
11 you get there, and you get there by exfoliation. Is there something else that
12 you're relying on in the spec that tells us the degree to which you have to,
13 you know, not the degree to which, but that tells you that it's got to be
14 separate and discrete?

15 MR. ZINDA: I would say, Your Honor, that unfortunately this patent
16 does not have SEM images. It does provide examples of compositions
17 where they created discrete carbon nanotubes, but those images are not --
18 there's no images in the specification that show the results of that.

19 JUDGE OBERMANN: Okay. Okay. Thank you.

20 MR. ZINDA: And then, Your Honor, the final point I want to address
21 in this short time I have left is, they again mentioned that you have to have
22 contact between nanotubes to increase conductivity. Again, we talked about
23 before how you can have carbon nanotubes mixed with carbon black in
24 which case a discrete carbon nanotube can connect the carbon black particles
25 together, increasing conductivity. So you do not have to have discrete
26 carbon nanotubes touching one another. They can be touching other
27 conductive materials or conductive agents within a composition.

1 And with that, Your Honor -- if counsel has any -- Mr. Glenn has any
2 rebuttal?

3 MR. GLENN: A few, yes.

4 MR. ZINDA: I will step out of the way.

5 JUDGE OBERMANN: Thank you.

6 MR. GLENN: For the second methodology that the Petitioner has
7 used to try to convert the weight ratio concentrations, the third methodology,
8 I believe counsel said, well, that no assumptions were made in doing that
9 one. If we turn to, again, Patent Owner's Slide 47, it's right there. If we
10 assume that the distribution of carbon nanotube diameters is similar across
11 the range of aspect ratios, that's their assumption. That's the thing we say is
12 unwarranted to do in every single one of their methodologies. First
13 methodology, second methodology, third methodology.

14 They have to make an assumption to get rid of one of the variables,
15 because they've got an equation that has too many variables to give them a
16 definite answer. It's an infinite number of solutions. They have to remove
17 one. The only way to do it is to assume something they have no right to
18 assume.

19 Thank you, Your Honor.

20 JUDGE OBERMANN: Thank you very much. Okay. No questions,
21 I see no questions from counsel. Okay. Thank you so much. I really
22 appreciate your presentations today. It was really helpful, and I greatly
23 appreciate your degree of preparedness on both sides. You both very aptly
24 and ably represented your clients today. We are looking forward to seeing
25 you all tomorrow, I think.

26 And, with that, the case is submitted, and the hearing is adjourned.

27 (Whereupon, the above-entitled matter went off the record at 2:54 p.m.)

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