UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZHUHAI COSMX BATTERY CO., LTD.,

Petitioner,

v.

NINGDE AMPEREX TECHNOLOGY LTD.,

Patent Owner.

Case IPR2025-00432

U.S. Patent No. 11,575,148

REMOTE DEPOSITION OF

SAMUEL GIDO, PH.D.

November 13, 2025

Reported by: Susan S. Klinger, RMR-CRR, CSR

Job No. 607481

November 13, 2025

10:02 a.m. EST

Remote Deposition of SAMUEL GIDO, PH.D., held before Susan S. Klinger, a Registered Merit Reporter and Certified Realtime Reporter of the States of Texas and California.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 2 of 334

A P P E A R A N C E S:

Attorneys for Petitioner:

James Stein, Esquire
LEE & HAYES
75 14th Street NE, Suite 2500
Atlanta, Georgia 30309
404.736.1918

Attorneys for Patent Owner:

Brady Cox, Esquire
Madeline Byrd, Esquire
ALSTON & BIRD
2200 Ross Avenue, Suite 2300
Dallas, Texas 75201
214.922.3443

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 3 of 334

I N D E X

WITNESS	PAGE
SAMUEL GIDO, PH.D.	
EXAMINATION BY MR. COX	5

E X H I B I T S

(Exhibits previously marked not attached.)

No.	Page
Exhibit Paper 2	8
Exhibit Paper 6	46
Exhibit Paper 7	46
Exhibit Paper 8	47
Exhibit 1001	10
Exhibit 1003	40
Exhibit 1005	35
Exhibit 1007	252
Exhibit 1009	264
Exhibit 1010	53
Exhibit 1011	226
Exhibit 2003	25
Exhibit 2029	141
Exhibit 2031	113

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 4 of 334

P R O C E E D I N G S

SAMUEL GIDO, Ph.D.,

having been first duly sworn testified as follows:

MR. COX: And I'm Brady Cox from the law firm of Alston & Bird representing Ningde Amperex Technology Limited. I'm joined by my colleague Madeline Byrd, also of Alston & Bird.

MR. STEIN: I'm James Stein of the law firm of Lee and Hayes and I represent the petitioner in this case, CosMX.

EXAMINATION

BY MR. COX:

Q Good morning, Dr. Gido.

A Good morning.

Q Did I pronounce your last name correctly?

A You did.

Q And your name is Samuel Gido?

A Yes, Samuel Gido, you can call me Sam.

Q Okay. I'll call you Dr. Gido for purposes of this depo.

A Yeah, you can -- you can do that.

Q So my name is Brady Cox. I'm with Alston

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 5 of 334

& Bird and I'm going to be asking a few questions today on behalf of patent owner Ningde Amperex Technology Limited. Is that all right?

A Yes.

Q And if I say Amperex or ATL or patent owner, will you understand that I'm referring to Ningde Amperex Technology Limited?

A Yes.

Q And you have been retained by Zhuhai CosMX Battery Company Limited, correct?

A Yes.

Q And is it all right if I refer to them as CosMX or petitioner?

A Yes.

Q Okay. And am I pronouncing CosMX correctly to the best of your knowledge or is it CosMX or...

A To the best -- to the best of my knowledge.

Q And where are you physically located today?

A I am in my office at the University of

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 6 of 334

Massachusetts at Amherst.

Q Is there anyone else in the room with you?

A No.

Q Any notes or white boards within field of view or anything like that?

A No.

Q Do you have any written notes or other deposition aids with you besides exhibits that have no annotation or highlighting?

A I do not. I do have a blank sheet of paper here and a pen just in case, you know, there is something during the deposition that I need to jot down or you want me to write something down or whatever. But no -- no notes.

Q Okay. That sounds good.

And do you have -- on your computer do you have any programs open that could serve as a line of communication, a chat messaging program, email, anything like that?

A I do not.

Q Okay. So today's depo relates to the proceeding IPR2025-00432 relating to U.S. Patent

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 7 of 334

Number 11575148. Is that your understanding?

A It is.

Q Okay. And is it all right if I refer to that patent as the '148 patent?

A Yes.

Q And if I refer to this proceeding, you will understand this IPR2025-00432?

A If that's the -- I -- you know, I -- I would have to look at one of the documents to know that that's the, you know, number that's been assigned to this by the Court, so I'm not sure about that number.

Q That's fair. You can go ahead and open paper number 2.

(Exhibit Paper 2 discussed.)

A Okay. Let's see. Paper number 2. Okay. Yeah, it has here a IPR case number and I don't remember what you said, but if you could say it again I will confirm it.

Q Sure. So this relates to IPR2025-00432.

A Yes.

Q And that has to do with the '148 patent?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 8 of 334

A Yes.
Q Which you understand is an Amperex patent?
A Yes.
Q Did you review the '148 patent before preparing your declaration in this case?
A I did.
Q Okay. And you prepared a declaration that's shown at Exhibit 1003, correct?
A Let's see. You mean in -- in -- in my exhibit number?
Q That's right.
A Yeah, because I don't see it list -- wait, here it is.
Q It's CosMX something, something --
A Yeah, yeah.
Q -- CosMX Exhibit 1003.
A They look a little different than -- than the documents I have but I -- I do see, yes. Let me -- well, let me flip through this and make sure that it is, in fact, the same as what I submitted. Yes, that appears to be my declaration.
Q And as I mentioned, you reviewed the '148

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 9 of 334

patent before preparing this declaration?
A I did.
Q Including careful review of the patent claims?
A Yes.
Q And did you understand the patent claims when you prepared your declaration?
A I read them. And I suppose I understood them well enough to evaluate them with respect to various prior art.
Q Was there anything about the claims that you did not understand or the claim language that you did not understand?
A Well, maybe we should go to the patent. I'm not going to do that off the top of my head I don't think. So what exhibit is that?
Q So that one is 1001.
(Exhibit 1001 discussed.)
A Oh, there is, yes.
Q And yeah, if you want to go to page 17 of that exhibit, you can see the claims.
A Right. So -- okay, so I'm here so why

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 10 of 334

don't you repeat your question.

Q So were there any claims in this patent or any terms in the claims that you did not understand when you prepared your declaration?

A I -- I understand the words. I think that some of the language in claim 1 is kind of broad and it's a little bit difficult for me to know where the absolute bounds of that language is, although I felt confident that I understood sort of the central core of where we were with it. And so I was able to -- to make the relevant evaluations of the prior art.

Q Is there a particular term or phrase that you had trouble understanding what the bounds of the term were?

A I wouldn't go so far as saying I had trouble understanding, I just -- the bounds weren't fully specified, I suppose. They were -- but they were specified enough so I could know sort of what the middle of -- of the range was. And that relates to the -- the element, I think it's -- we call it a 1.3 and 1.4. So porous film

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 11 of 334

comprises porous formed by the binder and the pores at least comprise a part of the inorganic particles.

Q I want to be clear, you said the -- the pores at least comprise a part of the inorganic particles?

A Yeah, I'm just reading from the -- from the claim. Did I misread it?

Q So the literal text says the pores at least comprises a part of the inorganic particles.

A Oh, oh, oh, okay, all right, sure.

Q But -- but did you understand it when you read it to refer to the pores at least comprise a part of the inorganic particles?

A Well, I think that comprises or comprise here there's -- there's -- I don't see much, if any difference, but, you know, I certainly -- certainly was aware of what it actually says.

Q And so your understanding of what that phrase requires is that the -- the thing that must comprise a part of the inorganic particles is the pores, correct?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 12 of 334

A Yeah, that -- that's what it says.
Q And what the porous film must comprise is pores formed by the binder, correct?
A That's what it says.
Q And that was your understanding?
A Yes, yes, to the extent that I could understand it. Again, it's -- yes.
Q Okay. There are a couple of phrases -- terms before that binder and inorganic particles, do you understand what both of those terms mean?
A Yes.
Q What's a binder, Dr. Gido?
A A binder is a material, usually a polymer, that is used to hold things together basically like a glue. And in this particular application, it is holding together particles and also comprising part of the structure of a porous layer or porous film.
Q And what's a polymer, Dr. Gido? I know you know this pretty well.
A Well, a polymer is a high molecular weight chemical substance, usually an organic chemical

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 13 of 334

substance or usually like carbon based with perhaps other smaller amounts of other types of atoms in there and it's a high molecular weight molecule.

Q And in the context of the '148 patent, what is the intended application for the binders and the inorganic particles?

A Well, the intended application the -- what the patent says is that they are trying to prevent gaps from forming between the electrode and the separator layer. So, you know, to some degree on a large macro scale, that's the -- the intent of the invention.

Q What's a pore?

A A pore is a hole in something, typically a small hole, which is composed of a boundary or wall of the pore and a empty space.

Q And so in your view a pore includes the wall of the pore or is the pore the empty space?

A The pore has to include the wall of the pore, otherwise, if you just have empty space it could be unbounded. You need to have that wall

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 14 of 334

being part of the pore to make it small, and therefore, a pore.

Q Yeah, and perhaps my question isn't entirely clear.

My question is, certainly a pore has a wall surrounding it, we'll agree, right?

A Right.

Q And my question is, is the wall a part of the pore or in your view, does the wall define the pore?

MR. STEIN: Objection, asked and answered.

A I think the wall define -- if something defines the pore, then it's part of the pore. I mean, you know, if it's defining the pore, then it's making the pore, and therefore, it is part of the pore.

Q So from your point of view, the -- the clause in claim 1 that says, the pores at least comprises a part of the inorganic particles, that -- that can be met even if the inorganic particles are entirely within the wall and not sticking out into the empty space?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 15 of 334

MR. STEIN: Objection.
Q Is that your --
MR. STEIN: Sorry.
Q -- position?
MR. STEIN: Objection, form of the question.
A Well, I guess a couple of things there. One, yes, the -- if the particle is in the pore wall, it's still defining the pore, and therefore, part of the pore. Also, if the particle is in the pore wall but partially sticking out of the pore, which is basically always the case unless it's rattling around loose, which they aren't ever, then it still is part of the pore wall.
I mean the wall is coming along, it's binder, binder, binder and then there's a particle that's sticking out and the wall follows the contour of that particle that's sticking out. That's part of the pore wall.
Q Is that true even if the particle is completely enveloped in binder?
A Well, if the particle is completely

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 16 of 334

enveloped in binder, it's part of the pore wall. And if it's sticking out, it's also part of the pore wall and it's part of the pore.

Q I understand your position.

And so at least to that understanding, you understood what it meant that the pores at least comprises a part of the inorganic particles?

MR. STEIN: Objection, asked and answered.

A I mean, well, I -- that's the understanding that I had to examine the prior art. Again, it's not clear all the possible different cases that might push the limits of this claim element, but I didn't really have to think about that to -- to take the positions that I did on the prior art.

Q So in the litigation in an accused product, if the accused product had an inorganic particle that was fully within the wall and not sticking out into the void, so to speak, you would say that that product had pores that at least comprise a part of the inorganic particles, correct?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 17 of 334

MR. STEIN: Objection, assumes facts not in evidence, form.

A Right. I mean, I have not been asked to form an opinion on infringement matters in this case. And I'm basically looking at one of three issues here. And so I really haven't thought about that in enough detail to -- to have an opinion.

Q Okay. So in a piece of prior art, if a product had an inorganic particle that was fully within the wall and not sticking out into the void, you would say that that product had pores that at least comprise a part of the inorganic particles, correct?

MR. STEIN: Objection to the form, assumes facts not in evidence.

A If the particles are in the wall, yes, I mean, you -- you kind of have to look at each case, but yes, if the particles are in the wall and, you know, the -- it forms a porous structure and the walls aren't abnormally thick, meaning some of this prior art, like in the comparative

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 18 of 334

examples, the walls are so thick that it's, you know, like a bulk of stuff and if there's particles in there, then it's maybe not the case, but if it's in a pore wall, yes, it would be part of the pore.

Q How thick is the transition to which they're no longer a part of the pore?

MR. STEIN: Objection, assumes facts not in evidence, calls for speculation.

A I have not put a number on that, but, you know, it would be basically, you know, much thicker than what's claimed in the patent and much thicker than what's in the prior art to the extent that some of the prior art talks about that issue.

Q And you're talking about, you know, an example where the ratio of binder to inorganic particle is high, correct, when you're talking about these thick walls, talking about a high ratio of binder to particle?

MR. STEIN: Objection, mischaracterizes the prior testimony.

A You would -- certainly there would have to

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 19 of 334

be a lot of binder if the -- if the -- if the wall is composed of binder is very thick.

Q And by a lot of binder, you mean relative to the amount of things that aren't binder?

A Well, yeah, a lot of binder. Yeah.

Q In all of these in -- in macro terms we're talking about very small amounts of everything, correct?

A Yes.

Q These are, you know, nanoscale types of structures, correct?

A Nano or micro, but yeah, yeah.

Q Have you had your depo taken before Dr. Gido?

A Yes.

Q About how many times?

A Maybe 30.

Q And in -- how many of those cases were in connection with IPR proceedings versus other types of proceedings?

A Probably, I don't know, about five to 10 were IPR proceedings. I would have to look at my

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 20 of 334

case list, but, yes.

Q And for the others, how many of those were district court proceedings versus ITC proceedings or some other type of proceeding?

A I've done two ITCs, one a few years ago, and one that's actually ongoing, although I've already had my depo taken. Most of the rest would have been district court cases, although there were some other things like some sort of insurance dispute and, you know, that was handled with like an arbiter or something like that, but yes.

Q Was the insurance dispute -- was that -- was that related to you personally or were you an expert witness in -- in connection with that insurance dispute?

MR. STEIN: Objection.

A I was -- I was an expert witness.

Q And I -- I'm not trying to get into anything confidential, but what was the nature of your expertise vis-a-vis that insurance dispute?

MR. STEIN: Objection, form.

A It -- it had to do with a component in a

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 21 of 334

product that failed and the failure -- and the failure of the component basically ruined about a billion dollars worth of a electronic device that is very popular and well-known. And the company that made that device was suing this manufacturer for damages and the manufacturer of this component had insurance against this sort of thing. And there was a proceeding in which the insurance company needed to establish that component supplier had indeed screwed up.

And so I was working for the component supplier and my job was to -- to investigate the situation and they wanted to take the position that yes, we have indeed screwed up, so insurance company please pay us. So that's what that was about.

And -- and the component that got screwed up was -- was a polymer component. That's why I was involved.

Q Got it. You've also offered declarations against a company called Molecular Rebar Design. Are you familiar with that?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 22 of 334

A Yes.
Q And in those proceedings you represented Samsung and LG Energy?
A Yes.
Q And are those still ongoing?
A Yes, I would -- I wouldn't say that I represented them, you guys represented them.
Q Sure.
A I -- I am an expert witness, but -- but I was retained by -- by those companies.
Q Understood. Yeah, you were retained by them. That's fine.
Are you assisting in any way in the district court litigation against Molecular Rebar?
A Let me think about that. I do not believe so, no.
Q And are you presently aware of any conflicts of interest for you in representing a party adverse to Amperex?
A No.
Q For your IPR proceedings in which you've testified, have they all been for a petitioner?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 23 of 334

A Let me think about that. I believe they have.

Q You -- you -- and in none of your declarations have you tried to -- or been asked to offer evidence that a patent is, in fact, valid?

A You -- you've frozen. Can you hear me?

Q Yes, I can hear you. Can you hear me?

MR. COX: Looks like his --

THE WITNESS: Can you guys hear me?

MR. COX: You're clipping a little bit.

THE WITNESS: Is it -- is it my internet that's bad?

MR. COX: I think it's yours, because we're all hearing each other okay.

THE WITNESS: Yeah, I think it -- I think it's back. I -- you know, this was kind of a situation -- the -- yeah, sorry I --

MR. COX: Yeah, we'll let him log off and log on again. We'll go off the record for a minute.

(Recess, 9:29 a.m. to 9:33 a.m.)

Q Okay. And I'll say, and in none of your

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 24 of 334

declarations have you tried to or been asked to offer evidence that a patent is, in fact, valid?

MR. STEIN: Objection to the relevance.

A In district court cases I have worked for the patentholder in a number of cases, probably about, you know, 50 percent of the time.

Q IPR proceedings though, certainly always petitioners, correct?

MR. STEIN: Same objection.

A Yeah, always petitioners and IPRs. The district court cases were infringement cases that also had an invalidity component and so I was working basically doing something somewhat similar to what the patent owner expert will be doing in -- in an IPR, although there was also like 112 kind of grounds that were available there, but not here, so yes.

Q Got it. Could you go ahead and open Exhibit 2003?

(Exhibit 2003 discussed.)

A Yeah, I got it open.

Q Without getting into anything

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 25 of 334

confidential, have -- have you provided any advice or consulting related to the district court case?

MR. STEIN: Objection.

A The -- the district -- you mean the district court case involving Jones Day for instance?

Q No, I'm sorry, I mean the district court case between CosMX and Amperex?

MR. STEIN: Objection to form, relevance.

A Yeah. I mean, with regard to this particular patent, yes, I -- I have had some discussions about that.

Q Are you aware -- if you go to page 32 of Exhibit 2003, are you aware that CosMX has taken the position in district court that some of the claim terms of the '148 patent are indefinite?

A So -- so -- so is this 32 of the PDF or 32 at the bottom of the page because I'm --

Q Coincidentally on this one it's the same.

A Wait, I'm looking --

Q Exhibit 2003.

A I'm looking at -- yeah, page -- what I'm

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 26 of 334

looking at here, 32 at the bottom of the page corresponds to 30 -- oh, oh, oh, oh, there's two different page numbers at the bottom of the page. Is there? Yeah, I guess so. Wait a minute.

Q Do you have Exhibit 2003 open?

A Oh, 2003.

Q Yes, 2003.

A Oh, I was looking, at 1003. Okay. All right, 2003. Do I even have Exhibit 2003?

Q Yeah, it -- it starts with Ningde Amperex Tech, Exhibit Number 2003.

A Amperex -- oh, Exhibit -- oh -- oh, here it is. Defendant's initial -- okay, yeah. All right. 32, all right, so where do you want me to look? There's -- there's claim charts here. The following claim terms fail the requirement of 112. All right.

Q And so my question was, and I'll ask it again, are you aware -- if you go to page 32 of Exhibit 2003, are you aware that CosMX has taken the position in district court that some of the claim terms of the '148 patent are indefinite?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 27 of 334

MR. STEIN: Objection, relevance.
A Yeah, I -- yeah, I -- I have heard that, yes.
Q Okay. And is that your opinion? Do you have an opinion that these claim terms are indefinite?
MR. STEIN: Objection, relevance, calls for a legal conclusion.
A I -- I was not asked in connection with the -- with -- with this IPR, which is basically all I've worked on to any extent to date to form an opinion on --
Q But you do understand --
A -- on indefiniteness.
Q -- as part of your opinions regarding the validity of the claims, you need to interpret the claims and what they mean, correct?
A I understand that.
Q And when you did so, did you find that any of the claim terms were indefinite or that a person of skill in the art would not understand the scope of them?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 28 of 334

MR. STEIN: Objection, asked and answered and calls for a legal conclusion.

A So again, the issue here is does this prior art fall within these claim terms and I did not really have to fully understand the absolute metes and bounds and all the different, you know, possible boundaries of this claim term and evaluate its definiteness or indefiniteness to know that what I was looking at, with respect to this prior art, you know, fell within -- fell within that language.

Q And so in interpreting the claims and applying them to the prior art, you applied the plain and ordinary meaning of those claim terms as you understood them, correct?

MR. STEIN: Objection, asked and answered.

A I applied an understanding that I was able to glean from reading this language which, although, not definitive necessarily of the aspects or boundaries of this claim, but it was clear that the prior art met it, was -- was well within whatever the boundaries would have been.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 29 of 334

Q What about the phrase, wherein the porous film comprises pores formed by the binder, and the pores at least comprises a part of the inorganic particles, do you contend are unclear and whose boundaries you would not understand the metes and bounds of?

MR. STEIN: Objection, asked and answered.

A Well, for instance, how many pores have to have a particle in it. Can you have a sample that has pores that some of them have no particles and some of them have particles. And then to what degree, you know, where is the boundary, if for instance, you have a film that's got pores composed of binder and one of them has a particle in it or maybe 90 percent of them have particles in there.

Where is the -- you know, where is the boundary? So -- so that's an example.

Q And is it your position that that was not difficult in the prior art because it's your position that every pore in the prior art has multiple inorganic particles in it?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 30 of 334

MR. STEIN: Objection, asked and answered and mischaracterizes testimony.

MR. COX: So, Mr. -- Mr. Stein, you're objecting a lot to asked and answered, and these are all new questions and he's not answered them so I'm just going to put that on the record.

Q Go ahead, you can answer my question, Dr. Gido.

A Yeah, could you -- can you reask the question? I got little bit lost here in the back and forth.

Q That's fair.

Is it your position that it was not difficult to determine in the prior art if the claims were met or not, because it's your position that every pore in the prior art has multiple inorganic particles in it?

A Well, first of all, I wouldn't say that -- I never said it was not difficult. You know, I thought about this quite a lot. And, you know, I have a certain level of expertise, so it's not a trivial exercise. And I didn't do a survey of,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 31 of 334

you know, the prior art to determine how many of the pores have particles or not. Some of them have -- some of the prior art have some images that you can look at, although those images don't really represent a statistically significant sample of anything. It's just one image or a couple of images.

And other prior art doesn't have images and so, you know, I was -- but I -- I knew from the prior art that there were plenty of particles comprising the pores in the pores.

Q So if in the prior art 10 percent of the pores did have a part of the inorganic particles in them, in your -- in your opinion, would that meet this claim limitation?

MR. STEIN: Objection, calls for speculation.

A I did not think at all really about limits like that. So I really -- I really can't say.

Q Understood. And -- and you said yourself that the images in the prior art do not represent a statistically significant sampling of the

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 32 of 334

product, correct?

A Yeah, I mean, to the extent that an SEM image, one or two SEM images taken at a fairly high magnification, they give you some idea of what's going on but they -- you know, so you can see, for instance, whether there's particles in the pores or protruding into the pores.

But you're asking me do, you know, some analysis of 10 percent or whatever percent of the pores have particles and you really can't -- you really can't get that by looking at an image that, you know, has 20 pores or even 100 pores. It's not statistically good.

Q So you can't tell from looking at just 20 pores or 100 pores if the entire porous film has pores that comprise a part of the inorganic particles?

A Oh, I mean you can -- you can tell qualitatively that there are pores -- there are particles in pores. And in a case where there are lots of particles in pores, and then there's really no problem drawing that conclusion.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 33 of 334

Again, you were asking me about a 10 percent threshold. So, you know, in that case, it -- it gets to be a little bit more tricky.

Q Is this claim limitation met by a porous film where only two of the pores have inorganic particles in them?

MR. STEIN: Objection, calls for speculation.

A It's hard to say. I mean, that -- that's not -- it's not specified. So it -- it's hard to say. I would say that -- you know, first of all, if there is -- if you have got a whole film, like forming a separator and a battery and there's only two particles in pores throughout that whole thing, to the extent that you might look for those particles using electron microscopy, for instance, chances are you're not going to find them even if they're there because the SEM is being done at a magnification of like 1,000 times or 5000 times. And that is only looking at a tiny little part of this piece of separator, which is actually, you know, microscopic in size, like centimeters by

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 34 of 334

centimeters.

And so you would have to look at, you know, 10,000 or 100,000 images looking for two particles. It's just not practical.

Q Do you know, looking at Exhibit 1005 --

A Exhibit 1005 is Murakami?

(Exhibit 1005 discussed.)

Q Murakami, that's right.

A Okay.

Q Do -- do you recognize this exhibit?

A I do.

Q You relied on Murakami as prior art in your declaration, correct?

A Yes.

Q How many pores, in Murakami, have inorganic particles in them?

MR. STEIN: Objection, calls for speculation.

A Murakami doesn't provide any images, but based on -- well, I mean, Murakami actually teaches a -- quite a broad range of particles to binder, right. Like, preferably 95 percent to --

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 35 of 334

5 percent to 95 percent particles to binder. And, you know, within that range you could have cases where there's a lot of particles. You know, you could have cases where basically every pore has multiple particles, you know, as part of it. And you could also have cases where, you know, very few of the pores have particles.

Murakami's example 3 for instance, and I think maybe example 6, have no particles at all. So it actually covers quite a broad spectrum and everything in between.

Q Let's -- let's look at example 1, for example.

A Okay.

Q And that's beginning at around paragraph 135.

A Okay. Give me a second.

Q Sure.

A All right, yes.

Q What's the percentage of binder used in this formulation?

A In this formulation, let's see. Let's

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 36 of 334

see. Where does it say? Three parts of CMC, so that's carboxymethyl cellulose, was mixed with 100 parts by weight of alpha alumina.

And so I believe if you calculate that out, because you need to divide like 100 by 103, that comes out to like 97 percent particles by weight.

Q Well, would that include pores formed by the binder?

A The binder -- there are no pores formed if the binder is not there holding the particles together. So the pores are formed by the binder. The pores are formed by the particles and the pores are formed by the binder. Neither -- yeah, the particles can't do it themselves.

Q So in your position, if it's 97 percent particle and 3 percent binder, you believe the pores are nonetheless still formed by the binder, not formed by the particles?

A The claim language does -- does not exclude being formed by the particles to be formed by the binder. It just says the -- the pores are

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 37 of 334

formed by the binder. So that -- that's not mutually exclusive. That doesn't mean that the particles can't participate in forming the pores as well.

Q So in forming your opinions, you understood "formed by the binder" to also include pores are formed by the particles and binder?

A Well, I mean, the pores -- the pores comprise part of the particles. I think -- I think that's it or the particle comprise part of the pores, I forget which way that is turned around. But -- but yes, they're both -- in this particular case they're both participating.

MR. COX: Objection, nonresponsive.

Q In forming your opinions, you understood the claim term "formed by the binder" to also to be met by part where the pores are formed by the particles and binder?

MR. STEIN: Objection, asked and answered.

A Certainly the pore structure, the walls of the pores include binder and the surface of particles, yes.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 38 of 334

Q And so a pore -- a pore is the interstitial space between material, right?

MR. STEIN: Objection, asked and answered.

A The pore is a structure that includes a open -- a small open space and the walls that define it.

Q And that's the understanding you applied in your entire declaration, correct?

A The pores are an open space in the walls that define it and those walls can be -- well, those walls have to be composed of binder or have to include binder and can also include the particles.

Q So if the -- the walls surrounding a pore is 99 percent particle and one percent binder, you would deem that met by this claim limitation, right?

MR. STEIN: Objection, calls for speculation.

A Well, I didn't think about quite that -- you know, quite that limit of the situation. Examples 1 and 2 of Murakami actually have 93

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 39 of 334

percent by volume of particles, which is -- it's really the volume that's more relevant than the -- the mass percentages, because that indicates how much space these things take up.

And at 7 percent binder, there's going to be part of the sides of those pores that, you know, are binder. And yeah, it would be -- part of those pores are going to be binder. And it has to be, otherwise it would just be a loose powder and wouldn't hold its shape.

Q And in your opinion, that would meet the claim requirement requiring that the pores be formed by the binder?

MR. STEIN: Objection to the form.

A Yes, that's -- it would meet that limitation, yes.

Q Did you review in this -- hang on.

Could you go to paragraph 33 of your declaration?

A Yeah, let's see.

(Exhibit 1003 discussed.)

Q And your declaration is Exhibit 1003,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 40 of 334

Zhuhai CosMX Exhibit 1003.

A Yep, I got it. Okay. Yeah, that's what I opened before when it was 2003. So where did you say you wanted me to go?

Q So if you go to paragraph 33, which begins on page 19 of 123, if you use the bottommost page number.

A Yep.

Q In this image that you show -- this is an image you created yourself, correct?

A I did.

Q And you -- you added this annotation yourself?

A I did.

Q And the pores that you have annotated -- what -- what is the pore in this structure?

A Well, the pore is that space and the wall around it that define it.

Q And as you have drawn it, the wall is completely binder, right, no pore ever touches a ceramic filler particle in this annotation you've created?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 41 of 334

A The annotation is really not designed to be sort of definitive with respect to structure, but in this particular -- and this is also not presented as prior art, right? This is presented as just a general discussion of battery separators and there certainly are potentially battery separators where the particles might be completely coated with binder.

So as labeled there it looks like that, but again, that's not -- that's not a definitive position of what battery structures are like. It's just an example.

MR. COX: Objection, nonresponsive.

Q As you've drawn it, the wall is completely binder, right, no pore ever touches ceramic filler particle in this annotation you've created?

MR. STEIN: Objection.

A Yeah, I mean that's -- that's the way I drew it. Basically I drew these particles and then I -- the particles have a line around them and I made that line fat and I put an arrow on it that says "binder." That doesn't really

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 42 of 334

constitute a position as to, you know, the details of all separator structures but it's just an example.

Q Are you familiar with the term "porosity"?

A I am.

Q What is porosity and how is it measured?

A Porosity is open space in a material, so you know, the material has solid structure made out of things like binder and particles. And it has open space which may be filled with air, for instance. And porosity is basically just the percentage of that open space relative to the -- the total volume, that sort of the nominal volume of the material, right.

So it's one way you can measure it, which is discussed in various art, is to -- to just -- to take a piece of material and measure it sort of macroscopic nominal dimensions and then use some other technique that measures the actual volume of material in there.

There is various techniques you can use that sort of, you know, infuse something into the

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 43 of 334

pores and see how much volume there is and so forth, like mercury or absorbing a gas on the surface. There's various ways can you determine, you know, how much empty space is in there.

And then you can divide -- basically divide the empty space by the total size and you can get a porosity.

Q So porosity is -- it is essentially a fractional or percentage value that ranges from 0 percent to 100 percent?

A Yes, those -- those would be the limits on it, certainly.

Q And you measure it -- setting aside the technical issues, just mathematically, it's a fraction with a numerator and a denominator, correct?

A Yes.

Q And the numerator is the volume of space that is the pores and the denominator is the total volume?

A That's right.

Q Okay. And when you measure that numerator

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 44 of 334

that is the volume of space that is the pores, you do not include the volume of the walls in that measurement, correct?

A A wall -- yeah you -- you -- you get a volume, which is the open space and that's what you use in the numerator, but, you know, it's not clear to me that the technical value porosity, you know, defines what is a pore, right. You still have to have a wall to have that porosity.

Q Did you review the patent owner's discretionary denial brief or preliminary response that was filed in this IPR?

A I do not recall doing that. I think that it was -- it may have been -- may have been provided to me. I don't -- and I may have looked at it, but I don't recall spending any time thinking about it.

Q I've got a little bit over an hour with you, do you want to take a five, 10 minute break? I don't know how long a break you like to take or if you have somewhere you are trying to get this evening?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 45 of 334

A I will take a five minute break.

MR. COX: Okay, we'll go off the record.

(Recess, 10:05 a.m. to 10:10 a.m.)

Q Dr. Gido, did you speak to anyone during the break?

A No.

Q And I will ask you during future breaks, if you do talk to anyone during your break, will you tell me that when you come back from the break?

A I will.

Q Thank you.

Could you review paper -- paper number 6 and paper number 7?

(Exhibit paper number 6 and 7 discussed.)

A Paper number 6 and 7, you are talking about Honda.

Q No, paper number 6 and paper number 7.

A Oh, oh, oh, oh, oh.

Q Yeah. So those are the briefs filed, not the exhibits?

A Patent owners discretionary denial brief,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 46 of 334

okay. And number 7. I'm closing some of these, we can reopen them if you want to come back to them but I'm just -- just closing some of these.

So -- okay, so I have both of those open.

Q And my question is, have -- have you previously seen or reviewed these documents?

A I think that they were provided to me. I don't recall, you know, reviewing them in any detail.

Q Okay. And then if you could open paper number 8?

(Exhibit paper 8 discussed.)

A Right, yes.

Q This is petitioner's response to patent owner's discretionary denial brief. Do you see that?

A Yes.

Q And my question is, did you review or assist with the preparation of this brief?

A I did not. So let me try and see what this is. So this is like the legal document that went in referencing my declaration?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 47 of 334

Q It is.
A Or was it before?
Q I will say it's the second one. So the petition itself, which is paper number 2, is the original document that went in with your declaration.
A Right.
Q And then paper number 8, which I was just showing you, was responding to a brief that Amperex had filed.
A Right.
Q If that jogs your memory.
A Yeah, no I -- I -- I really did not -- was not involved in drafting this and it may have been provided to me but I -- I don't recall, you know, studying it. You know, these are a lot of references to case law. There may be some technical stuff in there, which they got from me, but mostly these are legal arguments referencing case law and, you know, that's not my expertise.
Q Yeah, and my question is really more about pages 18 to 31 of paper number 8, which is more

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 48 of 334

about the merits of the petition, the technical merits. And my question is, if you reviewed that and if you agree with it or if you have never seen it before?

A It -- it appears to me to be kind of a condensed version maybe of some opinions that I had in my declaration. I don't specifically recall looking at this particular version of this particular document.

Q Okay. If you go to page 26 of paper number 8.

A Page 26. At the bottom of the page or on the PDF?

Q Bottom of the page, so PDF page 34?

A Okay.

Q Can you see the annotated figure here from the prior art reference Beard?

A I do.

Q And is this an annotation that you created yourself or did counsel create this annotation?

A I don't recall. I mean, I often do a lot of these things myself, I draw a lot of these

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 49 of 334

figures. I don't remember whether I did this one or, you know, whether this was created by counsel, you know, in consultation with me, you know, after we discussed -- we discussed it.

Q And in your opinion, is the area annotated in blue correctly what you contend is the pore in Beard?

A Roughly -- roughly yes. I mean there's a little bit of the pore wall on the left side that for whatever reason is not actually included in this, but, yeah, it includes the open space and the -- and the wall.

Q The pore wall on the left that is not mostly blue, is that wall shared between the pore on the left and the pore on the right?

A It is.

Q And so what portion of it is the left pore and what portion of it is the right pore in your opinion?

A I don't -- I don't think that a POSITA would make that kind of distinction. I mean, basically a porous structure is an entire

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 50 of 334

structure that includes voids and walls and the -- the voids and the walls together constitute the pores. And I don't know of any POSITA that goes around trying to assign a wall to one pore or the other.

Q And -- and that's because the pore is the void interstitial space between the walls, right?

MR. STEIN: Objection, asked and answered.

A No, the -- the pore is the -- the entire structure that includes a void and a wall but yeah -- but pores kind of fuse together, so, you know, they can share a wall but it's still part of the pore.

Q How do you measure a pore's diameter?

A You would -- well, I mean the -- the various prior art talks about a technique maybe where you take a SEM image and electron microscope image. In some cases they fill the pore up with something, I think, so it's easier to see and they measure diameters of the pore in one direction or another.

Q From what point to what point do you

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 51 of 334

measure the diameter?

A I would tend to measure the diameter from the middle of the wall to the middle of the wall. The walls in these things are often quite thin, so you know, it's really just a line anyway. It's a little hard to parse, it's so tight that, you know, we're trying to do the inner part of the wall or the outer part of the wall, it's just kind of like the wall to the wall.

Q And Beard measures from the inner wall to the inner wall, correct, looking at Figure 1?

A I'm not sure what they're doing there.

Q Do you see a measurement pore diameter 102 in Figure 1?

A Yes.

Q And that does not go from the middle of the wall to the middle of the wall, correct?

A Well, it looks to me like maybe on the right side it does kind of go to the middle of the wall, but then on the left side it -- it doesn't. So it's a little hard to say.

Q Let -- let's go to Exhibit 1010, because I

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 52 of 334

think the figure is a little clearer in the -- in the original exhibit.

A Exhibit 1010.

Q Exhibit 1010.

A Right.

(Exhibit 1010 discussed.)

Q And that will allow you to zoom in.

A Okay.

Q So the pore diameter 102 is being measured from the inner surface of the wall where the wall contacts the pore to the same structure on the opposing side of the pore, correct?

A It appears to be.

Q Did you provide any examples in your declaration of a pore diameter being calculated by anyone in the prior art by measuring from the middle of the wall to the middle of the wall?

A I didn't talk in my declaration, I don't believe, about actually measuring it. I -- various prior art give various ranges that they claim or they teach and I quoted those ranges. You know, they weren't, I don't know necessarily

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 53 of 334

-- I mean, the ranges are not even a measurement, they're just teaching something.

Q When Beard measures pore diameter, it measures the diameter of the void itself only, correct?

A I don't know about that. That's what this -- you know, this figure is showing that, but I don't know that that necessarily applies to any numbers that might be quoted in -- in Beard, but that's what the figure shows.

Q Can you identify anywhere in Beard where it suggests that the pore diameter is measured in a different way?

A I don't think Beard -- well, I think maybe if you go to Figure 2, which is an SEM image, it -- it labels a pore diameter and it looks to me like -- I mean, figures is a little bit -- it's a little hard to see, but it looks to me like that is going into the middle of the pore wall. It's a little hard to tell where the pore wall is. I think the pore wall might be that bright edge given the way the contrast in SEM works that sort

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 54 of 334

of bright line or bright edge is the pore wall.

And first of all, it's thin enough that sort of the difference between say the middle of it and the inside of it is kind of not even measurable on this scale, but it looks to me like it's measuring to the middle of it.

So it -- so, you know, I don't think Beard -- Beard didn't think about this, you know, in -- in that kind of depth. Beard just looked at these images and measured the wall thickness from bright edge to bright edge.

Q Is Figure 2 the same embodiment as Figure 1?

A Figure 2 is an embodiment. Figure 1 is an illustration, so it's kind of a general embodiment. Figure 2 actually has that wall in site fiber in it, so, you know, it's -- it's an embodiment that's different in that sense. Although, I think that the pore structure that's not impacted by that fiber is similar to -- to what's illustrated in Figure 1.

Q An SEM image is -- is kind of a -- a image

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 55 of 334

of a three-dimensional structure; is that correct?
A Yes. Well, it's an image of a surface but it -- it's particularly the contrast is generated by the surface topography so the three-dimensional height and edges and so forth and also to a certain degree by -- by composition.
So for instance, you could see in there particles which are bright spots, and they may be bright because they're sticking up, but they also may be bright because they're --
Q They're --
A -- titanium oxide and the titanium being a heavier element scatters electrons more basically. So -- so some of both.
Q And that's in contrast to a transmission electron microscope where you're looking at more of a cross-sectional image, correct?
A Yes. Well, I mean, in -- in TEM you're projecting electrons through, so you're actually looking at like a projection through your material rather than looking at the surface.
Q Not unlike -- I'm sorry, I thought you

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 56 of 334

were done, go ahead.

A No, I'm done.

Q Not unlike, you know, for the lay observer, the way an x-ray machine works, right, like you pass -- you know, instead of photons, you pass electrons through a material and you view the kind of result at the other side, right?

A Yes, yes, approximately yeah, like -- like an x-ray or maybe also just like a traditional transmission optical microscope where you shine light through a thin sample is TEM.

Q Figure 1 measures pore diameter and cell wall and wall thickness separately, right?

A I don't know that they're measuring it. They are -- they are putting a label on there to -- to, you know, draw the reader's eye to, you know, these features.

Q Right, well, and they're explaining how they will define the dimensions of a porous membrane for the purposes of their patent application, right?

A I don't know whether they specifically

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 57 of 334

state it like that, but certainly, you know, one would draw the inference that if they're talking about a pore diameter or a pore wall that -- that these notations, you know, indicate that.

Q Well, if you look at paragraph 17, it says that embodiment 100 is used to define the various dimensions of a porous membrane, right?

A Well, let me -- let me go there. I don't have these things memorized, so this is 17.

Q That's right, yeah, and I'm not suggesting you do. I'm directing you to paragraph 17.

A Yeah, yeah, yeah. So a schematic diagram showing a cross section that may have filler material embodiment 100 is not to scale, but is used to define the various dimensions of a porous membrane.

That's what it says.

Q Okay. And so Figure 100 defines how pore diameter and wall thickness are measured in a porous membrane, right, for Beard?

MR. STEIN: Objection, asked and answered.

A Let me see. Well, it defines the various

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 58 of 334

dimensions. It doesn't really measure -- it doesn't talk about a measurement process, but it does say that those are the dimensions that they are talking about.

It also says it's not to scale though, so I mean I think that in Figure 1, the walls seem thicker relative to the open space relative to what you see in the SEM image below where I said basically you have that bright line which is the wall and it seems to be pretty thin. I mean it's -- it's basically as thin as the annotation marks that are, you know, pointing to it that say "pore diameter" so, yeah.

Q And --

A But, yeah, it's a guide.

Q Yes, so Figure 1 is not to scale, right, we can agree on that?

A That's what the -- the specification says.

Q And you see there's a number of particles in Figure 1 that are represented as identically sized circles?

A I see that.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 59 of 334

Q And in practice, in the real world the particles are not typically identically sized, correct?

A It depends. There are different types of fillers and particles that are made in specific ways where they could be identically sized or at least as identical as, you know, is measurable or detectable. However, you know in most of these applications, the particles are not identical in size.

Q Right. And typically particle sizes have a distribution, correct?

A Yes.

Q And you're familiar with different ways of measuring those distributions?

A Yes.

Q And what -- what are some of those different ways that particle size distributions are -- let's not say measured, reported?

A Okay. All right. So they're typically reported -- you can report a whole distribution of particle sizes, right, so you just list maybe the

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 60 of 334

frequency of occurrence of particles at various diameters for instance. Oftentimes they're -- the distribution is given sort of on a volume basis or a cumulative volume basis, right, so you might have a whole lot of particles but they're very, very small, so their volume doesn't add up to as much as a few of the larger particles in the distribution.

And then you do these averages, like -- or these parameters like D10, D50 and D90 and they can be done on like a weight basis, they can be done on a volume basis, they can be done on a just sort of a count basis. So yeah, there's lots of different ways you can do this.

Q But the ways you can report it can vary even if you're using the same technique to measure the literal sizes, correct?

A It actually is -- is tricky. So the -- the most common technique and probably the best technique to measure sizes is laser diffraction, which gives you -- inherently gives you distributions and values based on volume because

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 61 of 334

that's what it's basically sensitive to is the volume of the particles.

Converting those -- converting a volume distribution to a mass distribution or a mass distribution to a volume distribution is non-trivial. And it requires other knowledge about the shape of the particles and other things. You know, some art reports these values on a mass basis, which makes it then difficult if one wants to try and convert that to a volume basis to compare the other art. So -- so yeah, this is a whole -- whole big ball of wax.

Q And even if laser diffraction is -- have you used laser diffraction techniques in -- in your lab, Dr. Gido?

A Yes.

Q What machines do you use to do your laser diffraction?

A I don't know what it's -- what it's called. It's just a, you know, particle size analyzer machine. And we use laser diffraction for other things as well, other kinds of

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 62 of 334

structural determinations, it's common technique.

Q Do you know what brand your particle size analyzer that uses laser diffraction is?

MR. STEIN: Objection, relevance.

A Not off the top of my head, because it's not in my lab in particular, it's just a university facility.

Q So you share this particle size analyzer with other labs, other professors?

A Yes, and -- and departments and so forth, yes. It's in a central facility that's not -- not in our building.

Q And like you share the TEM and SEM with others and you have to book the time on it?

A That -- that's correct.

MR. STEIN: Objection, relevance.

Q Looking at Figure 1, do you interpret this as a teaching from Beard that the particle sizes should be identical?

A Not necessarily.

Q Does Beard say that it's better to have identical or nearly identically sized particles?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 63 of 334

A I would have to look and see what Beard says. You know, again, I don't have this memorized.

Q Do you know what the ranges are of particle sizes in Beard?

A I think it's like .00 -- I mean, I'm looking now at paragraph 11 -- paragraph 11, I mean, I'm just -- I'm just -- I'm doing a search for the word -- for the term "particle size," I hope that's okay with you.

Q Sure, that's why I gave you the exhibit.

A Right. And so it says particle sizes may be on the order of .001 microns or more. It talks about it in a number of places. I think down here at 22, particle size may vary from .005 to .1 or from .001 to .2 microns.

So yeah, it -- it gives particle sizes in a couple of places and gives at least three different ranges. I'm not going to -- I think I recall that that's the main places they do it, not 100 percent sure, but yes.

Q Okay. Do you interpret Figure 1 as

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 64 of 334

requiring particles to extend from the pore wall into the pore itself?

A As requiring it? I don't know that Figure 1 requires, you know, anything in particular. It is meant to be an illustration of, you know, what -- what some embodiment of the invention may be and it -- it does show some particles extending into the -- into the open void of the pore.

Q Do you know if that's just by virtue of the fact that they have used identically sized circles and a graphic designer was just putting circles in a place or do you know if there was an intent there to illustrate particles extending into the pore itself?

MR. STEIN: Objection, calls for speculation.

A Yeah, I -- I don't know specifically what the intention is. I would believe that certainly if I were doing this and some graphic designer or patent art guy made this illustration, you know, as per my direction and then showed me a draft of it, if I believed that it was a problem, that

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 65 of 334

those -- some of those particles extend into the pore space, I would tell the artist to -- to correct that to make sure that they do not if that was -- if that was, you know, something that was important to convey via -- via this figure.

Q Is Beard -- is there anywhere in Beard where they deem it important to convey that the particles either should or should not extend into the pore?

A Here again -- I'm searching in here and it's -- certainly Beard talks about the particles being in the pore wall. I don't see where they say one way or another whether they can poke out of the pore wall in -- in the text. Certainly I do see them poking out of the pore wall in -- in Figure 2, you know, in the -- in the actual SEM image. So -- but -- I don't see text where they say one way or another.

Q And do -- do you see any text where they indicate that it's important to do it one way or the other, that the particles extend or not extended to the pore?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 66 of 334

A I don't see any text that talks about importance in that regard.

Q Anything that teaches a person that they ought to make sure that the particles extend into a pore?

A I think that basically the way you make this stuff, the way they teach you to make it, there will always be some particles that extend into the pore, just statistically randomly mixing this stuff up and forming the pore structure, you know, the way it's formed, there will be some that poke into the pore.

Q Does that depend on the thickness of the binder, the amount of binder used and the size of particles used?

A Certainly the more binder you have relative to particles, you know, the less likely -- you know, the more likely you're going to have the particles completely within a pore wall and not necessarily poking out into the pore, but generally within the ranges taught by Beard, you will have some that poke into the pore.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 67 of 334

Again, I -- Figure 1 or Figure 2 is a little bit -- the resolution is terrible, which is always the case in these patents and I've got no idea why in this day and age when it's easy to do good graphics. But whatever the case, you know, you can see in there little bright spots all over the place.

Not just the unincorporated filler particles there, which are a bunch of particles that are kind of like sitting in a pore all together, but you can see individual spots around -- around the structure and those individual spots are bumps that are protruding out, they're -- you know, they're little round spots. Those are particles. They are dark because they're protruding up out of a surface.

So, you know, you -- you are all -- you're going to generally get some if you make a film in the way that Beard is teaching.

Q Are you certain that they're dark because they are protruding up rather than deeper?

A Did I say dark? I said -- I meant to say

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 68 of 334

bright.

Q I thought -- I thought you said dark spots referring to the particles?

A Oh, no, no, no. I hope I didn't say that.

Q Let me check.

A What I meant to say was bright spots. The dark spots are holes. They're places where, you know, this is a pore structure and you've got kind of a cavity and then you've got an opening, which is in the wall, which goes to another cavity, that is why you have to have continuity of the pore space.

The pores are kind of these round cavities, but they've got like little windows or trap doors between them that connect them and you have to have that otherwise you wouldn't get ion permeability, for instance. The dark things are -- are trap doors basically.

Q Okay. So -- so it's your position that the dark spots in Figure 2, such as they are, are not particles but are instead holes or gaps?

A Yes, and -- well, you can tell that

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 69 of 334

because they're big, they're like a micron in size and they're irregular in shape. The particles are more round and they're smaller. You know, compared to the scale bar here, they're -- well, you know, they're -- they're quite a bit smaller than the -- than -- than those dark spots.

Q What's the maximum size for a filler particle in Beard?

MR. STEIN: Objection, speculation.

Q Feel free to look. It's not a memory test.

A Right. Well, at 22 they're talking about particle sizes up to .2 microns. I don't know whether they -- you know, they give ranges and they give it up to .2 microns. I don't know in here whether they say anything about it -- any other ranges or maximums, but I see that.

Q Can a particle be 40 microns in Beard?

A Well, that would certainly be above that range that is given at paragraph 22.

MR. COX: Objection, nonresponsive.

Q Can a particle be 40 microns in Beard?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 70 of 334

MR. STEIN: Objection, calls for speculation.

A I mean, Beard is teaching particles up to .2 microns, so 40 microns is above that.

Q And so would a person of skill in the art believe that they could use a embodiment with 40 micron particle sizes together with Beard?

A It depends on what they're trying to learn from Beard. They may already know what particle sizes they're going to use and they may want to -- they may be looking to learn something else from Beard. So it doesn't necessarily mean that everything has to match up when you are, you know, combining prior art.

Q What -- what are the maximum thicknesses of wall thicknesses in Beard?

A I think it's -- let's see.

Q And I can direct you to paragraph 21, but you can look anywhere.

A Okay, I -- yeah, I think that this -- yeah, so that is .01 to .05 microns or potentially up to .1 microns.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 71 of 334

Q And paragraph 28 teaches that the wall thickness should always be equal to or greater than the particle size, right?

A Well, it -- it provides some kind of exemplary ratios there, but, you know, if you look back to 22 -- 21 and 22, you can have a maximum wall size of .1 microns but you could potentially have a maximum particle size of .2 microns.

So it is possible -- you know, Beard is teaching that it's possible to have particles that are bigger than the wall, thicker than the wall. Although, you know, I think -- yeah, 28 gives a bunch of ratios that -- that are at most the particle the size of the wall, but yeah, 21 and 22 suggests that that's not always the case.

Q So it's your belief that paragraphs 21 and 22, that a person of skill in the art could pick any wall thickness and any particle size from anywhere in these ranges?

A I don't know -- I mean --

Q Sorry, go ahead.

A No, go ahead, finish your question.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 72 of 334

Q And then they wouldn't otherwise follow the ratios that Beard provides?

MR. STEIN: Objection to the form.

A I think that a POSITA reading these teachings would interpret them based on what they are trying to accomplish in their own particular application. And there may be some reasons why you would want to use, you know, this upper end of the particle size in a thinner wall and there might be other applications or reasons why you might not, but it certainly doesn't violate the -- the teachings of the patent.

Q Okay. What does unincorporated filler particles mean?

A Let me go back up to Figure 1. I mean, that's a label that the inventors have put on this figure and it's not necessarily a standard term in the art. It's what they're calling this group of filler particles that, you know, appear together here in this particular location.

Q Yeah. And you're -- and you're referring back to Figure 2 here at unincorporated --

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 73 of 334

unincorporated filler particles 206?

A Yeah, I -- I don't know that -- I guess this is mentioned in the text at some point too where they -- where they talk about this figure. You know, unincorporated means that these particles are not in the pore wall, I think.

Q Yes. So -- so if you go to paragraph 36, that's the place in the text where it discusses this. It says -- and I will just read it, a portion of the titanium oxide particles are visible as unincorporated filler particles 206. The polymer matrix has incorporated most of the titanium oxide particles.

Do you see that?

A Yeah, this is where? You said paragraph 36?

Q Paragraph 36 on page 7 of 11.

A Yeah, yeah, yeah. That's what it says.

Q And so is it true that in Beard the polymer matrix has incorporated most of the titanium oxide particle in Figure 2?

A Well, it incorporated them perhaps, but

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 74 of 334

again, that doesn't mean they don't poke out a little bit. That -- that statement doesn't mean that they're completely coated or, you know, encapsulated with no -- you know, with no contact to the -- the pore void. I mean, some are, but some aren't. Again, it's sort of just statistically, just all around in there.

I mean these unincorporated filler particles also, they're basically stuck to the inside of a pore wall, right. They're -- they're not in the pore wall, they're kind of in the pore and they're stuck to the wall, there just happen to be a lot of them together because they, for whatever reason, didn't get dispersed well.

Q Can you see in Figure 2 particles in every pore that's displayed in Figure 2?

A It's really hard -- I mean, I can pick -- aside from the unincorporated filler particles, I mentioned that there are bright dots throughout that image which are similar in size and sort of contrast to the unincorporated filler particles but are basically individuals.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 75 of 334

They're hard to see, I don't really know how many are there. Again, the -- the image resolution is absolutely terrible. I think, you know, the Patent Office has a dot matrix printer from the 1970s they keep in the basement to make these figures for no apparent reason.

But yeah, so it's a little hard to tell, but I think that there are some other particles that are, you know, sticking out of the pore walls.

Q And just because you see a bright spot in an SEM image that doesn't necessarily mean that the inorganic particle is on the surface. It could be covered by a thin layer of binder and still be scattering electrons, right?

A Yeah, but I mean basically that contrast comes from potentially the shape, so if it's just a little dome that's going to be brighter. It also comes from the -- the density basically or the atomic number of the materials. So titanium, which is in those particles is heavier, so it will also basically scatter or reflect back electrons

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 76 of 334

more, so that will make it brighter.

It's really -- I can't tell looking at this image whether those bright spots are because the particles are just sticking up or whether it's because they're sticking up and also have titanium in them.

Q And nor can you tell if they're bright spots because there is titanium but it's covered by a thin layer of polymer, right?

A Depends on how thick that layer is and it depends on the conditions under which you are running the SEM, but typically those -- the secondary electrons in the backscattered electrons that would result from the titanium might be blocked if it's covered by a layer of -- of binder. It depends on how thick it is.

What?

Q By too thick a layer, right?

A Yeah, I -- I don't know how thick it would be, you know, but yes.

Q But you cannot rule out the possibility that bright spots in an SEM image, like Figure 2,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 77 of 334

may be covered by a thin layer of binder?

A It's certainly possible that objects are bright there simply because of their topography rather than their composition.

Q Figure 3 is a different embodiment in Beard?

A Yes.

Q Now, this also has binder and filler, right?

A That's my understanding.

Q And in Figure 3 the filler is fully encapsulated, right?

A It's a little hard to say. I think it may say something about this, I'm not sure. This is basically an image, I think Beard says that this is created by kind of a heat -- a post coating heat treatment, right, that kind of melts the binder or something like that. And, you know, it's -- it's not entirely clear -- it's less clear to me what I'm looking at here than in the -- the previous image.

Certainly there is a structural change.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 78 of 334

You do see kind of a jaggedness to -- you know, when -- when you look at these types of SEMs, when you see sort of more sharp angular structures, that might be an indication of, you know, inorganic material. Inorganic particles can be more jagged but it's a little bit hard to -- hard to say.

Actually, I -- I kind of would like to take a break here for --

Q Sure.

A I mean, you can finish up -- finish up what you're doing, but then I want to take a break.

Q Sounds good.

A Just -- just for a couple of minutes.

Q Absolutely. I've just got just a couple more questions on Figure 3 here and then we'll take a break.

A Okay.

Q If you go to paragraph 50 of Beard?

A Yeah, hold on.

Q This says, the filled porous membrane 302,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 79 of 334

referring to Figure 3, shows the small bumps and protrusions of the filler material fully encapsulated by the polymer. The polymer has fully wet the titanium oxide filler, yet the microporous structure remains.

Do you see that?

A I see that's what it says, yes.

Q And so what does it mean for the filler material to be fully encapsulated and fully wet by the polymer?

A Right, well, it just means that the -- the polymer has coated the surface of -- of the particles.

Q And so how does that square with your earlier testimony that you would necessarily always have a particles extending into the pores so long as you had some binder and some inorganic filler?

A Well, this is -- that was referring to films made like Figure 2 using Beard's sort of standard process, which is mixing these things together and then like using a pore forming agent,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 80 of 334

right, that's kind of a coagulation process and then it forms this kind of a film.

Later on if you heat this thing up and basically melt the binder, it's a different process which is allowing that binder to kind of move around and coat any high energy surfaces like the surfaces of the particles and to form this different structure.

So, you know, this different structure yeah, it's not what I was referring to when I -- when I made that statement, I was referring to Figure 2.

Q So it is possible to use both binder and inorganic particles in forming a porous structure and not have the particles extend into the pore without being coated by polymer? That's possible, right?

A That's what Beard purports to show and teach here in this figure in that -- in that statement. I mean, I -- I look at this and it doesn't look very porous to me but that's -- it looks much more compact. I mean, the dark areas

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 81 of 334

are the pores and it -- it looks quite a lot more sealed up to me, but -- but yes, it -- supposedly that's all -- that's still a porous structure.

Q There is no specific level of porosity that's perfect or ideal, right?

A Well, the -- the '148 patent and the various prior art all give ranges of preferred porosity or claim porosity and -- and certainly most of them teach that it's better to have a higher porosity than a lower porosity within certain ranges. You know, if the porosity gets too high, the film becomes weak and kind of doesn't hold together that well, but to the extent that you can vary things within these ranges you want, you would like to have a higher porosity.

Q Okay. I'll let you take your break and we'll come back. You know, five minutes, 10 minutes?

A Five minutes.

Q Five, yeah, that's good for me.

(Recess, 11:05 a.m. to 11:11 a.m.)

Q Dr. Gido, the level of porosity that you

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 82 of 334

want depends on intended applications and what characteristics you're looking for in your separator, right?

A To some degree, yes, certainly within limits, yes.

Q The level of porosity that you want and can achieve also depends on the specific materials you're using, correct?

MR. STEIN: Objection, calls for speculation.

A Well, it would depend on materials and process.

Q Right. And -- and both of those would limit or affect the level of porosity that you're able to achieve, right?

MR. STEIN: Same objection.

(Zoom interruption.)

Q And both of those would limit or affect the level of porosity that you are able to achieve, right, both the materials and the process would affect that?

A Yes. And again, also ones -- you know,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 83 of 334

other issues like if -- if the porosity is too high, again the film might be weak, it might be more vulnerable to dendrite growth. I mean, there's all kinds, you know -- but, yes, certainly materials and process will be a factor that puts limits on porosity.

Q Do you know what the main limits of a lithium-ion secondary battery -- sorry, what -- do you know what the main components of a lithium-ion secondary battery are?

A You mean sort of macroscopically?

Q Macroscopically, yeah.

A Anode --

Q Electrolyte, yeah.

A Well, an anode, a separator, a cathode, in that order and a electrolyte fluid.

Q And what is typically used in the electrolyte fluid?

A Some kind of --

MR. STEIN: Objection, outside the scope.

A Well, some kind of a lithium salt, like, you know, lithium hexafluorophosphate is often

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 84 of 334

used and an organic solvent, frequently some kind carbonate material.

Q What's your experience with building or designing or manufacturing lithium-ion batteries?

A I've worked on materials for lithium-ion batteries mainly in conjunction. I had a grant some years back with Japanese company Kureha that makes such materials. And I had a student that was sent from that company who worked in my lab for a number of years and we worked on some -- some things.

Q Is it fair to characterize your experience, and I don't want to speak out of turn, as more directed to experience with polymers and less experience with electrolyte solutions and -- and materials for cathodes and anodes?

A Certainly my expertise and, you know, what I've worked on has been directed towards, you know, different polymer chemistries and approaches to the polymers. Certainly, you know, I -- I have been involved in the cathodes and anodes but not -- not making them myself in the lab working with

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 85 of 334

the collaborators the company.

Q So would you say you have years of experience with energy storage devices and lithium-ion battery technology?

A Yeah, yes, again, with respect to mainly with the different materials that are used, the polymer materials. And, you know, their applications in -- in the batteries.

Q Do you have experience in characterizing the performance of a battery?

A I have worked on materials that have been used in batteries where the performance has been characterized but not by me, by the company that sponsored me.

Q So you don't have experience yourself characterizing battery performance?

A I would say that, you know, professors rarely do things with their own hands in the lab anymore any way. And to the extent I worked on projects where batteries were made and were characterized using materials that came from my lab, I have -- I have experience at that level.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 86 of 334

Q But certainly in -- in your pre professor life, your education and your training and your work experience, you have not built and tested lithium-ion batteries, correct?

A No.

Q Okay. Have you built or tested any electrochemical energy storage device?

A I have had students who have built fuel cells, which is another electrochemical storage device, which at least in the embodiment we were working with, uses protons, hydrogen cations as opposed to lithium cations as the ion that moved, but they still have anodes and cathodes and separators and so forth. So we did -- we did build those in our lab.

Q But -- so you -- have you ever built or tested a lithium-ion battery, you or your students?

A Like I said, when we worked on materials for batteries, that was with a company that -- that is kind of more involved in the battery business and they're the ones that did that.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 87 of 334

Q And so -- so that's a no? You prepared the separator but they prepared the battery?

A That's correct.

Q Okay. Do you have knowledge of what different types of separators were in use in lithium-ion batteries as of the date of invention of the '148 patent?

A Yeah, I mean, I -- in general, yes.

Q And what -- what different types of separators were in use as of the date of the invention?

A Right. Well, so sort of the nominal separator is a polyolefin film, typically polyethylene or polypropylene which has little microscopic pores in it which are produced by typically some kind of stretching process, sometimes a leaching and stretching process.

And those can be used directly, but that leads to sort of various problems with short-circuits and safety and -- and so forth. And so typically these days these ceramic binder coatings are put on that polyolefin substrate.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 88 of 334

It's also possible to use other sort of substrates like non-woven materials of various kind of high temperature polymers and -- and things like that, but that's sort of the general gist of things.

Q And I want to stick -- instead -- instead of these days, I want to make sure for these questions and others that I'm sticking to as of the date of invention of the '148 patent?

A Right.

Q Right. So we're going back to 2018 now?

A Right.

Q If that's okay? And --

A Yes.

Q -- is your answer still the same there?

A Yeah, my answer is still the same. People were putting ceramic coatings on these separators going back, you know, at least until about 2010 or maybe even a little earlier than that.

Q And so --

A So.

Q How do these different types of separators

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 89 of 334

differ from one another?

A What do you mean these different types of separators?

Q So you mentioned, you know, the polyolefin can be made with polyethylene, it can be made with propylene. You mentioned that it can be using other substrates like non-woven materials and --

A Right.

Q -- hydroelectric polymers and other things. Some of them can be ceramic coated, ceramic binder coated, put that on the substrate. What -- how are these different from each other in terms of their properties or uses?

A Right. Well, so for instance, one type of property you might want is a shutdown property if the battery starts to overheat. And so in order to do that, you want that polyolefin layer to kind of partially melt and close-up its pores. And polyethylene and polypropylene do that at somewhat different temperatures. So polyethylene does that at a little bit lower temperature like about 140 and polypropylene is more like about 160. And so

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 90 of 334

depending on, you know, what kind of temperature shutdown characteristic you want, you might use those different materials.

You might also want to use a multilayer structure that has polyethylene and polypropylene layers -- separate layers so that maybe the polyethylene shuts down and, you know, melts and closes down but the polypropylene maintains its mechanical structure to keep the -- the layer from collapsing basically and causing a short-circuit.

And then you can put again, various types of coatings on there with, for instance, ceramic particles to increase the -- the temperature resistance. You may want to increase the adhesion of the separator to one of the electrodes and that can be done with this particle and binder layer, although it's the binder that's causing the -- you know, the giving the adhesion property in that particular case.

Yeah. So -- so, yeah, there's -- there's different approaches and different configurations.

Q Which type of separator is the best type

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 91 of 334

of separator?

A I don't really have an opinion on that. I mean, I think that -- that certainly a trilayer of polypropylene -- polyethylene and polypropylene with, you know, a ceramic coating on it will provide good safety for short-circuits.

People are also interested in like this nail penetration test, so what happens if you puncture a battery. But, here again, using polyolefins that have certain kind of ductility properties can help with that, and ceramic coatings can help with that. So I think that's -- that's sort of a good -- good approach.

Q And so it is fair to say that what type of separator is best depends on your intended application and your goals for the separator?

A Yes, correct, and I mean, cost is an issue too. I mean, you can make --

Q Sure.

A -- something that is, you know, really super robust and super safe, but it might be prohibitively expensive.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 92 of 334

Q Can there be downsides to using ceramic coating?

A Yeah. I mean, certainly especially with like making the batteries, you can have issues where the -- the coatings are too brittle to be able to undergo the winding process if you're rolling this up into a cylinder. Particles may fall off during this process and then end up from that ceramic coating layer and then may end up kind of gouging the electrodes during winding. So there's -- you know, there's -- there's downsides.

Q Having particles extend or protrude into the pore itself as opposed to being fully encapsulated by binder, increases the likelihood of this falling off that you're mentioning?

A I wouldn't necessarily interpret the inorganic particles that you see kind of sitting in a pore. Like for instance, in the '148 patent they're not rattling around in there. You know, they -- they are stuck to the pore wall, they can be stuck to the bottom of the pore, which is the pore wall. They're usually stuck there, although

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 93 of 334

not necessarily, they do sometimes fall off and you do have this issue.

Q So they're usually stuck there except for the ones that are not, right?

A Well, you want -- you want to try and minimize that if you can, but yes.

Q And so I'm going to rattle off a list of design considerations that I think you have to consider when creating a separator for lithium-ion batteries and I want you to tell me if any of them are wrong or not design considerations that you consider when creating a separator. Is that okay?

A Sure.

Q And would you prefer that I list the whole list or I do them one at a time and you say yes or no to each one?

A I -- I don't -- I don't know. I mean, I don't know exactly how -- you know, I'm not quite sure what you're referring to, so it's going to be -- yeah, I don't know. Just -- why don't you just start.

Q Yeah, I'll just start and you've got

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 94 of 334

scratch paper if you need it, but are these all design considerations that you have to consider when creating a separator for a lithium-ion battery?

Porosity, relative amount of binder, type of binder used, type of particles used, method of solidification, particle size distribution, width of pore walls.

A Slow down a little bit. I am --

Q Sure.

A -- jotting these down on my paper and I can't write that fast. So I have porosity, relative amount of binder, type of binder, type of particles, and then what's next on the list?

Q The method of solidification.

A Yeah, okay.

Q Particle size distribution, average particle Size, width of pore walls, pore diameter other components besides binder and overall separator thickness?

A Right.

MR. STEIN: Object to the form of this

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 95 of 334

question and it also calls for speculation, facts not in evidence.

A Yeah, so let me -- let me again read these back. So porosity, relative amounts of binder, type of binder, type of particles, method of solidification, particle size distribution, average particle size, width of pore walls and then again, I got too far behind, so there were a couple of more.

Q Yeah, pore diameter.

A Pore diameter. Yes?

Q Other components besides binder and overall separator thickness.

MR. STEIN: Same objections.

A So yeah, I'm looking at this list and I mean these are all different design considerations that, you know, one could consider in designing a separator or process to make a separator. They -- there -- some of them are coupled to one another so they're not all sort of mutually variable independent of one another, right, you know, but they are certainly all parameters that one could

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 96 of 334

consider. And a POSITA would -- would certainly consider these things and be interested in these things.

Q How do you determine or test how effective a separator is?

A Well, I mean there is a number of different things one could do. So you can do a air permeability test, right, there is Gurley G-u-r-l-y or e-y, G-u-r-l-y I think it is, test which is basically how long it takes for 100 CCs of air at a standard pressure to go through film, in this case a separator but it's actually a -- it's a test that's used for all kinds of porous materials.

You may look at adhesion or mechanical strength of the separator, right, you might actually stretch it until it breaks. You might put it on some kind of a surface like the surface of an electrode and then peel it off and see how much force is required to peel it off. You could do a nail penetration test to see whether when you penetrate a nail through a cell that's made with

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 97 of 334

that separator or whether it basically overheats and catches on fire. And you can just test like battery capacity.

So for instance, like you can test the amount of energy that you get when you discharge the battery and compare that when the battery and the separator are new and then after they have been used, recycled, you know, some number of times. So those are some -- some different approaches that one might use.

Q Why are SEM images used to characterize battery separators?

A Well, they provide an image which, you know, is a certain type of information which is useful to understand things. I mean, there are other techniques -- experimental techniques that one can use like various spectroscopies that tell you about the chemical composition of things or -- let's see, or, you know, maybe some sort of a scattering technique like x-ray scattering which, you know, tells you some kind of structural information about materials, but it's very useful

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 98 of 334

to be able to just see how things are sort of arranged and configured in the separator.

And because the -- at least some of the features are so small, they're smaller than you can see with visible light, so you actually need to use an electron microscope which is capable of looking at objects that are so small that -- that they're smaller than the wavelength of light so you can't see them with light, so that's why you use an electron microscope.

Q If you're making a -- a new separator, a new type of separator, maybe you're using a new polymer, maybe you're using a new particle, maybe you're using a different method of production, would you or your students know exactly how that structure is without looking at it by image?

MR. STEIN: Objection to the form.

A Well, I would say first of all, we don't make -- we're usually not making something in a vacuum, right. We're -- we're varying some component or some feature of component, maybe we're changing the composition of the binder

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 99 of 334

polymer a little bit. And so we have some experience with what happened previously and, you know, we're -- we're -- we're changing some variable and we expect it to be similar, but maybe different in a -- in a small way that we can understand by doing that particular experiment.

Certainly looking at things with imaging is helpful. But also looking at things like, you know, the Gurley number or FTIR spectroscopy x-ray scattering can be helpful as well. So yeah, I mean we use all those thing.

Q But until you do some type of imaging, you don't necessarily know what the structure is, right, you wouldn't know what the pore diameter is, you wouldn't know what the cell width is, you wouldn't know necessarily if the particles had distributed in the way that you hoped without somehow looking at it, right?

MR. STEIN: Objection to the form of the question.

A I mean, I think to the degree that we really want to look at things, and see exactly

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 100 of 334

where they are, then taking an image is helpful. Sometimes we don't necessarily need to know that. I mean, we -- if we are making something that has a high amount of particles relative to binder, like Murakami example 1, we know going in that we're going to have something that -- where the pore walls or the pore structure, you know, evolves the particles to a -- to a greater extent than something that is 50 percent binder.

Q And when you say Murakami Exhibit 1, just to be clear --

A Example -- example. Did I say exhibit? I -- I meant to say example.

Q You did, so I just want to be clear if you were talking about Figure 1 or example 1? And so it sounds like you're talking about example 1.

A Example 1. Sorry about that.

Q No worries.

You'll agree that it was known in the art to adjust pore size and porosity to improve permeability and ion conductivity?

A It was known that pore size and porosity,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 101 of 334

yeah -- would -- you would want to optimize those to get good ion conductivity within -- within some limits, because if you make the pores too big or the porosity too high you can have other problems with the separator.

Q And you're referring, at least in part, to like mechanical strength issues?

A Among other things, yes.

Q And similarly, decreasing the porosity or permeability can also be a problem if taken too far, right?

A Yes.

Q And what -- what problems or issues do you run into if you decrease the porosity too much?

A Well, then the ion conductivity is -- is too low.

Q And what does that result in terms of the user experience for the battery?

A Well, like the rate performance, for instance, could be quite -- quite poor.

Q And slow charging as well?

A Yeah -- yes. Slow charging, slow

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 102 of 334

discharging for instance.

Q And -- and it may be that in some applications both of those may be desirable, right?

A Potentially.

Q But it depends on the application?

A Yes.

Q Is it true that some separators use high particle loadings up to as much as 90 percent by weight or more of particles?

MR. STEIN: Objection, calls for speculation, assumes facts not in evidence.

A I mean, in -- in the porous layer in the -- in the coating layer on the -- on the polyolefin, yes, sure.

Q And so I'm going to refer to high particle loading separators as ones that are 90 percent or more particle; is that okay?

A Yes, 90 percent or more by mass or by volume?

Q By weight?

A Okay. All right.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 103 of 334

Q We will stay on earth. Mass is fine too.
A Well, mass and weight are yeah, pretty much the same at sea level but anyway, yes, go ahead.
Q Okay. So in high particle loading separators, would you agree that there -- the binder is there as a glue to hold the particles together but the structure of the layer is dominated by the particles?
MR. STEIN: Same objections.
A I would say that in those type of separators, the binder is a glue that holds the particles together. The term dominated, I'm not sure what that means. I mean, again, the structure particles would fall apart if it didn't have the binder to hold it together, so, you know, maybe, maybe -- mayne the particles are dominated by the binder, maybe the binder is dominated by the particles, it's hard to tell who is dominating who. They -- they really need to work together to -- to make this structure.
Q So you would not agree in those high

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 104 of 334

particle loading ceramic coated separator layers that the structure of the layer is dominated by the particles?

MR. STEIN: Same objections.

A I -- I -- again, I -- the word dominated, I'm not sure what -- what dominated means. The -- the -- most of the interior of the pore surface would be particle rather than binder because there's just a lot more particle there, you know, in that particular case. I don't know whether that's what you mean.

Q And in those high particle loading ceramic coated separators, would you agree that the porosity is a result of the interstitial cavities between the particles?

MR. STEIN: Same objections.

A It is largely that, I mean, to some degree even a little bit of binder at the narrow points of the, you know, contacts between the particles, you know, is still important and there may be actually pores within that binder in those narrow gaps where it's holding particles together, but

certainly the dominant factor will be interstitial particle space.

Q And so in that case, those interstitial spaces are defined by the positions of the particles more than they are defined by the positions of the binder, correct?

MR. STEIN: Same objections.

A Again, not necessarily, you can't really separate these things, right. The positions of the particles are held where they are by the binder. So certainly the -- the -- the side of a particle may be forming the wall of a pore, but it's only held there because -- in that position by the binder.

Q And are you in a room surrounded by drywall right now, Dr. Gido?

A Yes, largely.

Q You -- there -- there's some other holes, right, like doorways and things?

A Yes -- yes, sure.

Q And those -- those drywall panels are held in place by nails, correct?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 106 of 334

MR. STEIN: Objection, relevance.
A I'm not sure how they're held together. I mean, this is an institutional building, they may be held together by some sort of little -- but yes, they're held together by some sort of fasteners.
Q And would -- would you say that the dimensions of your room are defined by the positions of the drywall or defined by the positions of the fasteners?
MR. STEIN: Same objection.
A I would say that they both play a role. If you took out the fasteners the drywall would fall down.
Q Okay.
A Actually I'm going to ask for another break so...
MR. COX: Sure. You want to take your lunch break now?
THE WITNESS: Yeah, why don't I just take -- why don't we just take the lunch break? So -- yeah, if that's okay.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 107 of 334

MR. COX: That's okay. We can do that here.

THE WITNESS: Why don't we --

MR. COX: You want 40 minutes?

THE WITNESS: 40 minutes would be good. I don't want to go too long. You know, I want to plow through this expeditiously.

MR. COX: I always feel like 30 is a little fast to ask a witness to do lunch in so...

THE WITNESS: Right, I mean, I have -- I have stuff with me. I'm not going out.

MR. COX: We can go off the record.

(Recess, 11:46 a.m. to 12:26 p.m.)

Q Dr. Gido, before lunch, you recall we were talking about high particle loading separators, those separators that have a percentage of particles by mass over 90 percent?

A Yes.

Q Okay. And it's true that there are other separators that have been deployed in the prior art in which the amount of polymer binder in the particle containing layer is significantly

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 108 of 334

greater, right?
A Correct.
MR. STEIN: Objection.
Q And in fact, there's other separators that include separators with amounts of binder that exceed 50 percent?
MR. STEIN: Same objections.
A Yes, I mean, you're -- you're not talking about the whole separator, you're talking again about this coating layer that's typically put onto a porous substrate, but yes.
Q Yeah, talking about the ceramic particle containing layer?
A Right.
Q Okay. And so there are other separators in which that layer -- the amount of polymer binder in the layer exceeds 50 percent, right?
MR. STEIN: Same objections.
A Yes.
Q And in those types of separators, which have more binder than filler, the particles are generally separated from one another and

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 109 of 334

surrounded by binder, right?

MR. STEIN: Same objections.

A Not necessarily. I mean, it also sort of depends on the relative size of the pore wall and the particles. So even if there is more binder, if the particles are big and they don't fit in the pore walls, they're still going to be sticking out into the pores. I mean, the '148 patent is a little bit like that. I forget the composition in the '148 patent in the, you know, SEM images, but certainly had more binder and the particles are still sticking out of the wall.

Q Again, I'm putting ourselves in the -- in the prior art as it existed as of the time of the invention of the '148 patent, not --

A Right.

Q -- including '148 patent's invention.

A Right.

Q And so would you agree that in those cases where the amount of binder exceeds 50 percent that the particles are generally separated from one another and surrounded by binder?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 110 of 334

MR. STEIN: Same objections, asked and answered.

A Yeah, not -- not necessarily. It depends on the size of the particles relative to the pore walls. We were just talking about Beard, which was an example where, you know, while the particles could be larger than the pore walls they generally were not. And that's not always the case. These things are independently variable, so it's possible to have particles that are not completely surrounded by the binder even in cases where there's a lot of binder.

Q So you disagree with that statement?

MR. STEIN: Same objections.

A Yeah, will you repeat the statement for me, please?

Q Sure. In those types of separators where the amount of polymer binder exceeds 50 percent, the particles are generally separated from one another and surrounded by binder?

MR. STEIN: Same objections.

Q Would you disagree with that statement?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 111 of 334

A I would say the particles would generally be separated from one another and they may or may not be surrounded by binder completely. They may be partially surrounded by binder, so it's complicated. I agree with parts of it and not with other parts.

Q In -- in those types of separators, where the amount of binder exceeds 50 percent, is it true that it is necessary to generate porosity in the binder polymer itself?

MR. STEIN: Same objections.

A Generally in these cases where there is a lot of binder, you do use a process that generates porosity in the binder itself, yes, that is -- that is the case.

Q And that contrasts from situations that are a higher particle load where the percentage of particles is over 90 percent where you're not generating porosity in the binder polymer itself?

A In those cases where there's a lot more particle, you don't -- you can generate the porosity without using, say a coagulation process

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 112 of 334

of the binder itself, but you don't -- but you could still do a coagulation process. You -- you could still use that same type of process and it might enhance porosity, but you could make the porosity just based on having all those particles there, that's correct.

Q And so do you use the same process to create porosity in a high particle load separator as compared to a greater than 50 percent binder separator?

MR. STEIN: Objection to the form, calls for facts not in evidence.

A Right. Well, I mean greater than 50 percent, again, you probably need to use some kind of phase separation process when there is a lot less binder, like 90 percent particles or more you can get away without using that coagulation process, but you are not precluded from using that coagulation process.

Q Would you open Exhibit 2031?

(Exhibit 2031 discussed.)

Q And while you're opening that I have just

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 113 of 334

a couple of follow-up questions that are unrelated to the exhibit. So just let me know when it's open and we'll -- we'll turn to in a minute.

A Yeah, I'm looking 2031, oh here it is, okay. 2030 -- wait a minute. So this --

Q This is the declaration for a different IPR.

A This thing is 500 pages long. I was going to say what the heck.

Q Yeah, it has all of your appendices.

A Right.

Q But we'll -- we'll get to that in a minute. I have just a couple follow ups on what we were just discussing about coagulation.

A Okay.

Q So is there a required amount of binder needed for a coagulation process to work?

MR. STEIN: Same objections.

A I have not kind of -- you know, I've not done a study of that but certainly the way this coagulation process works, is it just related to the phase behavior of a polymer solution. I

actually teach that in polymer physical chemistry this -- in the fall. I'm teaching it now.

And, you know, it depends on the quality of the solvent, it depends on the amount of the polymer. It is certainly easier to get the separation to occur if there is more polymer present in the solution, but, you know, it also depends on the quality of the solvent. If it's a really bad solvent, you can get separation of even a small amount of polymer.

Q Would it work with like 1 percent polymer?

A It could. I mean, I haven't tried that, I don't know, but potentially.

Q Would a person of skill in the art know that it would work?

A I'm not sure that a person of skill in the art would -- I mean, I -- I think that they might be curious and they might try it if they needed to, you know, it becomes less and less likely as the amount of polymer gets smaller and smaller, certainly.

Q And -- and what ratios of polymer do you

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 115 of 334

believe this might become problematic that a POSITA would recognize it might become problematic?

A What would become problematic?

Q The ability to coagulate.

A I see.

Q The porosity.

A I -- I don't know. I mean, certainly at high amounts of polymer like 50/50 percent, they would certainly know that it would occur. At 1 percent, they might be concerned but they might try it. I don't know. You know somewhere in between, you would have to try it.

Q Okay. Let's go back to Exhibit 2031 that I had you open.

A Yes.

Q And do you recognize this document as a declaration that you filed in a different IPR petition IPR2023-00587?

A Yes. So -- so -- well this was from 2023 and so it's been some time, so I don't recall the details necessarily, but this looks like something

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 116 of 334

that -- this does ring some bells I suppose.

Q And that was another IPR where you filed the declaration in support of CosMX challenging one of Amperex's patents, correct?

A Again, I don't -- I don't remember the details but I'm looking at the -- the title page or the cover page of this thing and that -- that does seem to be the case.

Q Okay. If you can go to paragraph 52, which is at page 39 of 512, PDF page 39. It says 30 in the center page number.

A Okay, hold on a second. I'm getting a little confused here, let me see. PDF page 39.

Q That's right.

A Page 30 at the bottom, it has got like a figure at the top.

Q Yeah, and then it's paragraph 52.

A Yes.

Q Do you see that?

A Yes.

Q And do you see where it says in 52 some separators, such as those described in the patents

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 117 of 334

in Appendices L-N and Exhibit 1009, use high particle loadings up to as much as 90 percent by weight, or more?

A That's what it says, yes.

Q And that was your testimony, right, you're the one who signed this declaration?

A I believe so.

Q And you said in those types of ceramic coated separator layers, the binder is there as a glue to hold the particles together, but the structure of the layer is dominated by the particles, correct?

A That's what it says.

Q And when you were challenging me -- my use of "dominated by the particles" earlier, does this refresh your recollection as to whether that is true or not?

A Well, I mean I use that language there. I guess, you know, I wanted to know what you meant by it and now you want to know what I mean by it I -- I suppose. But yeah, that's what I wrote.

Q But you said the structure of the layer is

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 118 of 334

dominated by the particles in these high particle loading ceramic coated separator layers where the particles are set 90 percent by weight?

A That's -- that's what I wrote, yes.

Q And is that true?

A It is true in the -- in the way I meant it there, yes.

Q And you also say, the porosity is a result of the interstitial cavities between the relatively tightly packed particles, right?

A That's what it says, yes.

Q And is it true?

A Yes.

Q And then you say, other separators have been developed in which the amount of polymer binder in the ceramic particle containing layer is significantly greater, perhaps more than 50 percent, right?

A That's what it says, yes.

Q And then you say, for those types of structures, the particles are generally separated from one another and surrounded by binder, right?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 119 of 334

A That's what it says.
Q And is it true?
A Yeah, I mean it -- it's true. It doesn't preclude them from being in the cavity of the pore but -- but they are, you know, separated from one another and surrounded by binder.
Q And in those cases you said, it is necessary to generate porosity in the binder polymer itself, correct?
A That's what it says, yes.
Q And that's in contrast to the high particle loading layers, right?
A That would appear to be the contrast that I am drawing or emphasizing in this paragraph.
Q And so there is a difference between pores that are created by particles and pores that are created by binder, isn't there?
A Again, the -- when -- when you have a lot of particles, even though the particles may be dominating the pore structure, it's -- the particles themselves are not completely creating a pore structure, they need to be held in place with

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 120 of 334

the binder to make the pore structure. So the pore is -- the pores are still defined by the binder as well.

Q If you go back to Exhibit 1003, your declaration in this IPR, could you go to paragraph 33 of that?

A Okay. Let me -- I've just got to close some of these. 1003 you say, right?

Q 1003.

A Okay. And where do you want me to go?

Q Paragraph 33, it is on PDF pages 19 to 20.

A Yeah, okay.

Q And you see that figure that we've been talking about earlier?

A Yes, yes.

Q Is it true that in this illustration you have drawn, the ceramic filler particles are separated from one another and surrounded by binder as you've drawn them?

A Well, the particles are impinging one another. There seems to be binder there. Again, I think we are reading a lot into, you know, a

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 121 of 334

general figure where basically all I did was say, make the outer boundary of those jagged particles I drew, I said make it thick. Now, you know, I've put an arrow to that and said "binder" so that's on me, but yeah, I wouldn't -- I wouldn't read too much detail into that, that wasn't the intent.

Q Right, because that's just a general figure that you said intended to convey an idea but not intended to actually detail exactly where the boundaries of the particle and exactly where the boundaries of the binder are, right?

A Well, this was a general -- I mean, I'm not illustrating a particular embodiment here or a particular invention. So in this case, it's -- it's just very general.

Q Right. And so in that case it's not so different from Beard Figure 1 that we were talking about, which was just a general illustration but not actually identifying a real embodiment?

A Well, I would say that Beard Figure 1, in that particular case Beard is trying to illustrate some things about a particular invention, right.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 122 of 334

I'm not illustrating any particular invention, this is just separators in general. So Beard is a bit more specific than this.

Q For high particle load layers where the percentage of particles is more than 90 percent, generally the pores are defined as the gaps between the edges of the particles, right?

A Yes, as held together by the binder.

Q Right. But -- withdrawn.

And the structure that you're depicting in paragraph 33 of Exhibit 1003, is not a greater than 90 percent particle type of separator, correct, greater than 90 percent particles?

A I don't know what I -- you know, I would -- I would have to see the separator structure.

So here this is a very general discussion, so I'm not specifying -- I'm not specifying either of those extremes or, you know, anything in particular. I'm just indicating that there is a ceramic coating on a polyolefin substrate and that ceramic coating has binder and ceramic particles

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 123 of 334

and pores, of course.

Q Going back to 2031, Exhibit 2031.

A Okay. Hold on, I think I've closed that.

Q Oh, okay, sorry about that.

A Crap, now what I have done?

Q I just leave everything open until forever until Adobe tells me I need to close.

A Well, no, I understand that, but the problem is when you get too many of them stacked up, it doesn't list the whole -- it only has the first part of the thing and then I can't tell which one is which because the numbers are further towards the end. So anyway, so it's 2030 --

Q One.

A -- 1. Oh, here, it is yes. Okay, all right.

Q If you go to paragraph 53, which is on PDF page 40.

A Okay.

Q And you say at the bottom of what you can see on page 40, kind of the middle of paragraph 53, as explained above, those in the art

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 124 of 334

recognized, do you see the sentence that begins that way?

A This is on page 40.

Q Yes, PDF page 40, so in the center it's 31.

A Yeah in the center, so -- so -- as it --

Q You see --

A Explains -- go ahead.

Q Go ahead. Do you see where there is some orange and pink and orange words towards the bottom there?

A That's toward the bottom, yes.

Q Yeah. And so do you see right before the last orange word, as explained above those in the art recognized --

A Oh, okay, all right, all right, yeah. I thought you were directing me towards the middle of this page. But, okay, that's fine.

Q Middle of 53.

A Okay, all right.

Q As explained above, those in the art recognized that a polymer binder is non-conducting

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 125 of 334

and can be formed to be porous while the addition of inorganic particles improves both mechanical strength and high temperature stability.

Do you see that?

A I see that.

Q And so is it true that people skilled in art knew that a binder could be formed to be porous?

A Yes.

Q And you removed that language from this paragraph, kind of essentially the same paragraph in your recent declaration. That's true, right?

A Let me see. Hold on here, it's a little bit hard. I'm going to have to -- I need to look at these things side-by-side. Okay.

Q In your recent declaration you say, a polymer -- polymer binder can be porous. In your prior declaration, you said a polymer binder can be formed to be porous. Do you see the difference there?

A Well, I mean if it is porous it was obviously formed, you know, it somehow became

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 126 of 334

porous. I'm not sure that, you know, any minor difference in wording, you know, was intended by me to convey anything in particular. I mean, I -- I think to some degree this is a background section, and I kind of cloned the background section and why some words may have come out a little differently, I -- I don't think that was intentional.

Q Yeah, so my question was really going to be why did you remove the "formed to," if you recall?

A Can be porous or can be formed to be porous. I don't recall why that got dropped. I mean, I -- you know, I -- I certainly don't dispute in this -- in this matter that the '148 patent and various art involves processes that form the binder to be porous.

Q And in a situation where the binder is instead acting like little dots of glue, as you have said, the binder itself is not porous, correct?

A I think that the -- let me -- let me take

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 127 of 334

a look at the claim language to see what is -- because it's not clear that, you know the -- the -- does the claim actually say that the binder was porous let's see. The porous film comprises pores.

Well, the -- so what the claim language says is the porous film comprises pores formed by the binder, that doesn't necessarily say that the binder itself is porous. Although, as I said, even with a very small amount of binder mostly acting to connect these particles, that is not to say that there is not a place where these particles are close together and there's a little window of polymer holding them together and there is a hole in that little window of polymer.

But in general, even if these are just dots holding things together, this -- this claim is not saying that the binder needs to be porous. It's saying that the film needs to comprise pores formed by the binder so that could be a little bit of a distinction.

MR. COX: I'm going to object to that as

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 128 of 334

nonresponsive.

Q I wasn't asking about the claim. My question was in a situation where the binder is instead acting like little dots of glue, as you have said, the binder itself is not porous, correct?

MR. STEIN: Objection.

A Well, yeah, I -- I actually -- I guess I said -- basically in these -- in these chemical and material systems, everything that can possibly happen does happen to some degree. And I -- there will be some places where even that little dot of glue may have a pore in it, but additionally, in this matter, I've been asked to, you know, form opinions based on -- based on these claims, and so it is relevant what the claim says. I -- I don't want to be kind of speculating without the framework of the claim around -- around my answer.

Q Okay. In a situation where the binder is acting as little dots of glue, and those dots do not themselves have pores within them, would you characterize the binder as porous?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 129 of 334

A I suppose not.
Q Thank you.
Let's go to Exhibit 1005.
A Okay, let me see. Okay. All right.
Q Do you recognize this exhibit?
A This is the patent application we've been calling Murakami.
Q And this is another piece of prior art that you rely on as one of the grounds?
A It is.
Q Okay. And is it correct that Murakami discloses both a drying process and an optional solvent substitution process?
A That's correct.
Q Okay. And if you go to examples 1 and 2, which begin at paragraph 135.
A Okay, let me go there. Okay.
Q These examples -- examples 1 and 2, only use the drying process and do not use the optional solvent substitution process, correct?
A Let me look in detail here again to refresh my memory.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 130 of 334

Q For sure.
A Yes, so for example 1 it talks about drying. Example 2 -- example 2 is the same as example 1 so that would be drying.
Q And neither uses solvent substitution, correct?
A I do not see that mentioned in those examples.
Q Okay. Example 3 does use solvent substitution, correct?
A It does.
Q Okay. And do you know if -- if both solvent substitution and drying are used, do you know in what order those occur?
A Of course.
Q And what's the order?
A Well, you do the solvent substitution and when you're done with the solvent substitution, the remaining liquid in the pore space between the coagulated polymer is now the pore solvent and then you still have to dry that out. So you would dry it afterwards.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 131 of 334

Q And in Murakami, the solvent is generally removed with the drying method, correct?

A What do you mean?

Q In general, that's the default is you use the drying method?

A Well, you use the drying method whether you do substitution -- solvent substitution or not, we just discussed that. So you always end up drying, it's just whether you dry the film from a good solvent or whether you dry the film from a bad solvent after the substitution, but you're always drying.

Q And what do you mean when you say good solvent and bad solvent?

A Well, there -- there is a whole field of physical chemistry or polymer physical chemistry involving an interaction energy of different types of solvents with the different types of polymers that are characterized by, you know, an energy parameter. And sometimes that energy parameter is favorable to mixing, sometime it's unfavorable to mixing.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 132 of 334

And in the '148 patent, for instance, what they call solvent 3, is an unfavorable solvent, something that doesn't really -- doesn't dissolve the polymer well. In Murakami solvent X is something that doesn't dissolve the polymer well.

So -- so yeah, I mean, there's just -- you know, there's a whole science of, you know, solubility and, you know, there's something they call a solubility parameter, for instance, that measures that, so...

Q When we talk about drying in the context of Murakami, we're talking about things like air drying, blow drying, drying by heating, or drying under reduced pressure, correct?

A In general, yeah, I don't know -- there's probably somewhere in here where they describe -- there's probably some paragraph where they describe all the different possible methods of drying. Certainly in the examples that we just looked at, 1 and 2, they just say it's dried.

I mean typically you would -- you know, these things are dried by maybe exposure to kind

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 133 of 334

of modest heating, right, not so hot that you melt the polymer or something like that, but, you know, warm air basically.

Q Yeah, and -- and some of those options are discussed in paragraph 87 of Murakami, correct?

A Well, let me go to 87. I know 87, that's the -- the solvent X paragraph, but I think yeah, probably in here.

Q It's right at the top.

A Yes, drying method can be any methods. Air drying, air blow drying, drying with heat, drying reduced pressure. Yeah, so it is -- in fact -- in fact the question that you asked me recited exactly that, so yes.

Q And then alternatively, it continues, you can carry out drying after the solvent has been substituted by another solvent, right?

A Yes.

Q And so -- but in all of Murakami's examples, you either do just drying or you do solvent substitution and then drying, correct?

A That's -- yeah, I believe so, certainly in

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 134 of 334

1 and 2 and 3.

Q Are you aware of any other way in which solvent is removed in Murakami?

A I am not.

Q And the way solvent substitution works is the coating liquid is substituted by another solvent that does not dissolve the resin in the coating liquid, right?

A Yes, but that is -- that can be accomplished in a number of ways, right. And so the '148 patent and a number of these different prior art references are basically describing a coagulation process that involves changing the quality of the solvent such that it goes from being a good solvent to a bad solvent, which causes the polymer to coagulate out.

And that could be accomplished in a number of ways, including changing one solvent for another by, you know, dipping the film into a bath that has a different solvent in it, is -- is one way.

Q In Murakami's example 1 that is in

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 135 of 334

paragraphs 135 to 156, and I'm going to direct you particularly to Layer B that starts at 139.

A Right.

Q Is Layer B the porous layer that you point to as the claimed porous film of the '148 patent?

A It is.

Q Okay. And do you agree that paragraphs 140 and 141 are the paragraphs that explain how Layer B is prepared for example 1?

A It explains how the slurry is prepared. It doesn't actually -- the coating process and drying and all of that kind of stuff is kind of in the next section.

Q And these paragraphs explain how you prepare coating liquid 1 which is what's used to prepare Layer B?

A Yes.

Q You see that reference for alumina has D10, D50 and D90 values?

A I see that.

Q And what -- what do those values refer to?

A They refer to Dv10, Dv50 and Dv90. So

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 136 of 334

they are cumulative -- it's the size at that cumulative percent of the total volume distribution, right. So at 10 percent of the total volume distribution, for instance, particle size is .22 microns. And similarly for 50 percent and 90 percent. And those are based on volume because that is, I believe, taught someplace else further up in the patent.

Q Can you tell me what you're referring to and feel free to search if you need to?

A Yeah, well, paragraph 18, the porous layer of the present invention preferably contains a filler in which, in terms of average particle diameter obtained based on volume. And then it gives the D10, D50 and D90 ranges.

Q D10, D50 and D90 can be used to refer to cumulative number based particle sized distributions, correct?

A They -- they -- they can be, so typically you might put a little subscript on the D, so, you know, D10 might be Dv10. And if it's number based maybe it's Dn -- Dn10. If it's mass based or

weight based, it might be DW10 or DM10. Or people just do this, you know, maybe more commonly, they just use D10 and -- but they state somewhere in their publication that they're basing it on volume or basing it on mass.

I mean, another thing you can look for is that somewhere in most documents they tell you how they measure these things and if they measure them using laser diffraction, then the numbers that they get out of that are Dv -- are Dvs. And so you can -- you know, you would know that the numbers that they're reporting are based on volume, if they -- if they disclose that method of -- of measuring them.

Q Now, there is a difference between calculating particle sizes based on volumetric methods like laser defraction and there is a difference between using volume to measure the size versus reporting the distribution using volume. You will agree that?

MR. STEIN: Objection to the form.

A That was a little bit convoluted let's --

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 138 of 334

can you -- could you go through that? Let's break that down into -- into the -- into its component.

Q Yeah, I'm happy to do that.

So you can measure particle size in a number of different ways, correct?

A Yes.

Q There are different methods that people of skill in the art know you can use to measure particle size?

A Yes.

Q And some of those are more two-dimensional methods like image analysis and others more three-dimensional like laser defraction, correct?

A Yes.

Q And both of those, whether they're done two-dimensionally or three-dimensionally can be used to measure particle size or measure a particle diameter, correct?

A Well, the particle diameter is typically what people are referring to when they are talking about particle size.

Q And that -- that is true even though these

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 139 of 334

particles are not perfectly spherical, right?
A That's correct.
Q But my question was two-dimensional methods and three-dimensional methods can both be used to measure the particle diameter?
A They can.
Q Okay. And once you have those measurements of particle diameters, you mentioned that there are a number of different ways to report that distribution, correct?
A Yes.
Q And for example, one way you could -- you could report a histogram, right, that had a distribution of how many particles fit within particular sizes, correct?
A Yes, with -- at a particular diameter size, yes.
Q Yeah, and when I say sizes, I will be referring generally to diameters unless you tell me I should be doing something else; is that fair?
A Right, sure.
Q Okay. And for example, if you go to

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 140 of 334

Exhibit 2029 and let me know when you're there.

(Exhibit 2029 discussed.)

A Okay. Hold on, I'm clicking the wrong thing here, let's see. 2029, okay.

Q And is this a document you have seen before?

A It is.

Q Okay. And do you see on page 3 of that document on the left-hand column, there are a couple of histograms?

A I do.

Q And they're reporting particle sizes or the frequency of particle diameters?

A That's what it says.

Q And this is one example of a particle size distribution, correct?

A Yes.

Q And this is a -- on the Y axis is the frequency, right?

A That's what it says.

Q That's an indication of a number of particles?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 141 of 334

A Yeah, that would -- that would be my understanding. I mean, I don't know what these people are doing, but yes, that -- that -- that would be the -- what a POSITA would infer from that.

Q And then on the X axis is the particle diameter, correct?

A Yes, that's what it says.

Q And so this particle size distribution that's being reported here is showing a number base or count based distribution of particles within various diameters, correct?

A Yes.

Q And it's not a volumetric or a cumulative volume percentage, right?

A It is not.

Q And do you know how this -- these particle sizes were measured?

A I don't -- I don't know. I mean, this -- this is this starburst machine brochure and maybe it says in here somewhere how they did this measurement but yeah, I -- I don't know.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 142 of 334

Q Is laser diffraction one of the most common ways of measuring particle sizes?

A Laser diffraction is the most common way of measuring particle sizes.

Q And -- sorry, go ahead.

A Well, it -- it would typically give you a distribution instead of frequency or number of particles, it would tell you the volume of the particles at that particular size.

Q Are you certain that that's true for every laser diffraction analyzer?

A Not necessarily. You may be able to set it to do frequency. I mean I think it -- the way it works it naturally is -- is getting a result based on volume, but it could be converted to frequency, sure.

Q And a person of skill in the art could report either depending on which was important to them, right?

A Potentially, yeah.

Q Have you ever used a high pressure dispersion machine?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 143 of 334

A Not like this, no.
Q Okay. And so you've never done pulverizing or crushing or dispersion of these inorganic particles?
A Well, we've -- we've mixed them, we've dispersed them. I've not pulverized them.
Q Okay. And so when you say you have mixed them, you just -- you're just talking about by hand, right?
A Well, no, with a, you know, mechanical mixing machine. I think Murakami or somebody somewhere they mentioned something called a Tri-Motor, I think that's also in Murakami.

I didn't know what a Tri-Motor was, so I looked it up and it's basically just an impeller on a motor that you stick in something and you mix it. It just happens to be a Japanese brand of that.

I mean, we -- that's a common laboratory mixing device. That -- Tri-Motor just happens to be a particular Japanese brand. But yeah, you don't necessarily need to use that Star Burst

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 144 of 334

machine.

MR. COX: Objection, nonresponsive.

A Well, what -- what was the question?

Q The question was when you say you mixed them, you are just talking about by hand and then kind of went into Murakami.

A Well, I'm saying We don't mix them by -- you don't mix these things by hand, you have a machine. It's not this high pressure Star Burst machine, but it's like an impeller mechanical mixing machine, right.

Q And that occurs at atmospheric pressure?

A Yes.

Q You understand that Murakami used this Sugino Star Burst machine that's depicted in Exhibit 2029?

A They say they used the Sugino Star Burst machine, I don't know, you know, whether it's exactly as depicted here. I think that they talk in this brochure about different types of, you know, configurations and chambers and stuff, so I don't know whether it's exactly what's configured

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 145 of 334

here, but they said they used this machine.

Q Do you know what the goal of high pressure dispersion is?

A Well, if you look on page 4 of this brochure, you can see that there are four different potential goals. This is on the right-hand side. There is dispersion, multiplication, pulverization and exfoliation and these appear to be separate modes of operation.

And in fact, there is a single nozzle chamber, which is one of the options for the chamber which is part of that device that you can switch out basically. That can't pulverize, it just disperses or exfoliates.

So -- so yeah, you can use this machine to pulverize, but you can also use it to disperse without pulverizing.

Q And what is exfoliation in the context of inorganic particles?

A Exfoliation is if you have some kind of a mineral, like for instance graphite, which is a bunch of layers like the pages of a book,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 146 of 334

exfoliation sort of strips those layers apart and makes individual sheets. I think, you know, actually this company has a website that has illustrations showing all of these different modes, dispersion, pulverization, emulsification and exfoliation shows what they do and -- and they're all different.

Q And it gives some examples of materials that you could use in the single nozzle chamber, right?

A I don't know where it says that.

Q So it's right below where you pointed to.

A Oh, I see. Yeah, yeah, alright.

Q You see the single nozzle chamber?

A Yeah, sure.

Q It provides effective materials, effective materials as high aspect ratio materials such as graphite, mica and montmorillonite?

A Montmorillonite.

Q Just like it sounds.

A Well, yeah, and those -- those seem to me to be -- those are all layered minerals. And so

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 147 of 334

that seems to be referring specifically to exfoliation. They probably aren't bothering to list effective materials for dispersion, because dispersion is just mixing. You can basically do that with anything.

Q Whereas abrasive materials, one example of that is alumina, right?

A Well, I mean alumina could be used as a abrasive if you want to use it that way, you know, but the thing here with this single nozzle chamber is you aren't doing any colliding. These particles are abrasive on one another in the various configurations where you're directing two beams of particles into one another and smashing them together.

The single nozzle chamber is different, it's just shooting them into a single nozzle which kind of shears them at a high shear and mixes them up but doesn't -- doesn't smash them into one another.

Q Do you see at the bottom left of page 3 in the section where it says, we highly recommend

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 148 of 334

using Star Burst for and it lists four kinds of materials?

A Yes.

Q One of those four is abrasive materials, correct?

A Yes.

Q And that lists alumina, silica and cerium oxide, right?

A It does.

Q Okay. And then for alumina, is therefore listed as one of the effective materials for the oblique collision type chamber, correct, on the next page?

A Sure, if you -- if you want to pulverize your particles but Murakami obviously did not want to pulverize their particles because they were doing studies specifically on different particle size distributions, they list that in their table of results, they're correlating their battery performance to these different particle size distributions. They wouldn't want to then pulverize and smash up those particles so they're

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 149 of 334

all .2 microns or whatever the heck the, you know, final result is. That would completely negate the whole point of doing all their studies.

So, you know, they say that they are using that machine to disperse and I think, I am and a POSITA would take them at their word that they're using it to disperse. They're not using it to pulverize, which is a different procedure.

And just because the machine says you can pulverize alumina or the brochure says you can pulverize alumina, doesn't mean that everybody wants to pulverize it if it's alumina.

MR. COX: Objection, nonresponsive and move to strike everything after "sure, if you want to pulverize your particles."

Q Murakami did, in fact, use the Sugino high pressure dispersion device for three passes at 100 megapascals, correct?

A That's what it says.

Q Okay. And the tendency of doing that would be to narrow the size distribution and reduce the sizes, correct?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 150 of 334

A Not at all. They're doing it to disperse. That's a different mode from pulverization. They probably were even using a different chamber, although they didn't specify.

Q What leads you to believe that that's true from Murakami's disclosure?

A Because they said that they're using it to disperse. If they were using it to grind and pulverize they would, A, have said that and, B, once again, what is the point of doing all of these examples with different particle size distributions if you then change those particle size distributions and make them all the same narrow particle size distribution in the end. It obviates doing all those examples. Nobody would do that.

Q Does Murakami use the Sugino Star Burst in every example?

A Let me -- I need to -- let me see, okay. I believe this is Murakami.

Well, I know that they don't in every example. No, that's wrong. I'm just looking for

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 151 of 334

Murakami, do I -- I don't even have Murakami open. Or do I?

Q Exhibit 1005.

A Yeah, no -- yeah, again, because these tabs don't extend all the way to the number at the end, I can't tell what's what.

Well, I know that they don't use that machine in every example, because some of the examples don't even have particles in them. So yeah, I mean they -- they use it in some of their examples, but they don't use it in all of their examples.

Q Example 2 generally follows the preparation method of example 1 except as otherwise specified in paragraphs 157 to 169, correct?

A Yes.

Q Is graphite an organic or inorganic material?

A It's -- well, I guess it's inorganic, but it's sort of on the borderline, because carbon is, you know, sort of the basis of all organic

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 152 of 334

chemistry. So, you know, for instance, you might functionalize the carbon nanotube with organic functionalities, for instance, and so then what is it, I'm not sure. But generally graphite is considered to be inorganic carbon.

Q Use of high pressure will tend to cause some particles to break or become smaller, correct?

A Only if you're using it in that pulverization mode.

Q I'm sorry, were you going to continue or...

A No, no, no.

Q Okay. I wasn't sure if that "um" was a pause.

How do you know that?

A In any of these -- in any patent when you read the patent or the patent application, basically what you have to go on is what it says in the specification and the understanding of a person of skill in the art. I don't know what was in these people's minds, I don't know necessarily

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 153 of 334

what was in their lab. I know what it says in this application and I am interpreting that from the point of view of a POSITA at the time. And it says dispersed with a high pressure dispersion machine.

I know that that -- if I looked up that high pressure dispersion machine and it says, this machine always pulverizes when it disperses, then okay, that's -- that would be the case. But it doesn't, I look up that machine and it can either disperse or pulverize or both but it can disperse independently and not pulverize.

So why would I read into this that is changing the particle size when it is clearly the intent of the inventors to use this to disperse and not change the particle size because they are specifically doing studies that depend on different particle sizes.

Q How high is 100 megapascals of pressure?

A I think it is pretty high pressure. I'm not -- not quite sure, you know, if you will permit me I can search for conversion of

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 154 of 334

megapascals to atmospheres and then we'll know.

Q Sure, I'll allow it.

A It says 100 megapascals is like almost 1,000 atmospheres, so it's quite high pressure. Did I -- did I do that right.

Q That is the number I've got as well. So 100 megapascals is about 100 times atmospheric pressure?

A It's 987, but yeah, about 1,000 times.

Q Which is kind of the pressures you use in heavy industrial applications like high pressure reactors and forging?

A Okay.

Q And it's your belief that applying 1,000 times atmospheric pressure to a set of particles or a slurry of particles will not cause them to run into each other, shrink or change their size distribution in any way?

A Well, first of all, I don't know that. I mean, I haven't looked into and I haven't really, you know, studied the effect. It also depends on what that -- exactly what that measure means. I

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 155 of 334

think that that means that these particles are being launched out of a nozzle at that pressure and they're, you know, flying off into that chamber. And so that's kind of the initial pressure when they're launched and it falls throughout the chamber.

So I really don't know what that's going to do to a particle. I mean, these particles are very, very tiny also, so it's sort of hard to -- you know, for -- for forces to get any purchase on them to sort of rip them apart just by, you know, projecting them out into space at high pressure.

If they're smashing into one another, if you have two different jets of them that are opposing one another and they run into each other, yeah, I -- that certainly would smash them up and that -- and that's what those dispersion modes are, but I -- I really have no idea what that high pressure does just shooting a single nozzle out into space.

Q And it's not being shot out into space, right? You're doing three passes at 100

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 156 of 334

megapascals?

A It's being shot into a little chamber and then, I guess, it gets collected and, you know, goes through some of that piping that you see in that machine and gets pressurized again and shot again.

Q Is it going to bounce around in that chamber?

A I think the whole idea, you know, there are versions of the chamber. There is a version of that chamber -- the ball chamber where there's like a -- you know, you intentionally hit the inside of the chamber in the form of some sort of a, you know, object that's put there. In the absence of that, certainly a few particles might hit something, but, you know, they're mostly going into -- I'm looking at the picture here and they're mostly just going in a stream.

Q And which chip -- chamber are you looking at?

A Single nozzle chamber the one that does --

Q Well, you --

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 157 of 334

A Go ahead.
Q Go ahead.
A No, you ask your question.
Q What leads you to believe that the single nozzle chamber is what was used?
A Because that's the one that does dispersion only. And these people -- the Murakami people, they say they do dispersion. And again, they would specifically be trying to avoid changing their particle size distribution since they went to all this trouble to do all these studies where they varied between some of them. Nothing but the particle size distribution, right. So why would you want to change it.
Q All of these chambers do dispersion, right?
A They all do dispersion, that's what it says.
Q Would exfoliation be a problem in this application?
MR. STEIN: Objection, form.
Q Exfoliating the polymer?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 158 of 334

MR. STEIN: Objection, calls for speculation.

A A polymer -- well, a polymer is not something that exfoliates, right. I mean a polymer is a -- exfoliation refers to a sheet like mineral like graphite or mica, and you're just peeling off those sheets from a stack of paper, for instance, and making them into individual sheets of paper and throwing them around randomly. That's what exfoliation is.

There is nothing in this slurry of particles and polymer that can be exfoliated. They don't have a structure that can be exfoliated.

Q So your -- your basis for claiming that Murakami would use Sugino's single nozzle chamber and not any of the other chambers is based, if I understand you correctly, entirely on the claim that Murakami would not want to pulverize its material?

MR. STEIN: Objection to the form and misstates prior testimony.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 159 of 334

A Well, it's true that Murakami would not want to change its particle size distribution as I have said, but the other thing is that, again, a POSITA reading this has to take the inventors at their word for what they're teaching with the language that they wrote there and they said they dispersed. They didn't say they pulverized. And I could see that there are -- there are ways that you can run this device to just disperse and not pulverize.

It's not even entirely clear to me, by the way, that these other chambers, you know, oblique collision or ball chamber or whatever that say dispersion and pulverization, you know, whether those are separate modes or whether they automatically in this necessarily occur together. I -- I don't know. But I do know that at least one of these configurations disperses -- only disperses and doesn't pulverize.

It also may exfoliate, but that's not relevant. And so I think the logical conclusion would be, from reading the disclosure in Murakami,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 160 of 334

is that they either use the chamber that only disperses or they use the device with some other configuration but only did it in dispersion mode because it doesn't tell you otherwise.

You shouldn't be reading -- I don't think a POSITA would read pulverization into a teaching that says dispersion.

Q All four of the other chambers are used for pulverization, correct, according to this brochure?

A Or they can be. Again, I don't know whether it necessarily happens or whether that's a possibility for those chambers.

Q Okay. Looking at the text under each of them, the oblique collision type chamber says, the pressurized particles collide obliquely with each other to achieve powerful pulverization, correct?

A That's what it says.

Q And it says an effective material for that is a highly abrasive material, correct?

A Yeah, I mean if you -- if you want to change the particle size distribution of your

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 161 of 334

highly abrasive material you could do that.

Q And in fact, it would change the particle size distribution, correct?

A Well, at least if you ran it in the dispersion mode. Again, I don't know whether that is a separate mode for that chamber or whether it always happens.

Q The ball pipe chamber says it achieves powerful pulverization by colliding pressurized particles with decentered ceramic balls, correct?

A That is what it says.

Q And that would result in a change in the particle size distribution, correct?

A Yeah, if you use that chamber, that's what you wanted to do, you wanted to pulverize, you could do it that way.

Q And the separate type chamber says that raw materials are mixed and collided immediately after the pressurized solvent is injected, correct?

A That's what it says.

Q And that collision would result in

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 162 of 334

pulverization, right?

MR. STEIN: Objection, calls for speculation.

A I'm not exactly sure what -- what they're describing there. Mixed and collided immediately after the pressurized solvent is injected. I guess that one would assume that the collision would be what's doing the pulverization.

Q And the ultra fine slit chamber says, pressurized materials are passed through a diamond slit where the resulting immense shear force achieves powerful emulsification and dispersion.

Do you see that?

A Yes.

Q That would change the particle size distribution as well, correct?

MR. STEIN: Objection, calls for speculation.

A Again, I have never worked with this particular device and beyond looking at this diagram here and reading this description, don't know what it does, but it seems to be a little bit

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 163 of 334

of inconsistency in this particular -- in this particular case. It says it achieves powerful emulsification and dispersion, it doesn't say anything about pulverization, however, pulverization is highlighted.

So I'm not sure, you know, why that is or what that -- what, if anything, that means. But yeah, they're talking about immense shear forces. I think the whole point of that is that these are shear forces that are higher than the single nozzle chamber. The single nozzle chamber may be doing something with some shear forces as well for mixing, but they're not immense shear forces. If you want to -- if you want that you need to go to this ultrafine slit chamber.

Q What is the reason Murakami performs three passes at 100 megapascals?

MR. STEIN: Objection, calls for speculation.

A I -- I -- I don't know why they need three passes, but the whole point of this is to mix things or disperse things. And so I guess, you

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 164 of 334

know, they may have tried this and found that they got the degree of mixing, the degree of uniformity that they needed by doing three passes.

Q Does -- first they -- if you go to paragraph 141 of Murakami.

A Yeah.

Q They obtain an alumina dispersion, correct?

A Well, it says, there is -- there is some -- I wouldn't want to say it's redundancy. I mean, they say they -- basically they mix these things together and they, you know, mix them by hand or mix them with some kind of a more simple mechanical mixing method to obtain a dispersion. And then they say the obtained dispersion was dispersed. So they seem to think that they want to -- they want a better dispersion, a better mix, they want it more uniformly mixed, so they use this thing.

Q But first, they say they obtain an alumina dispersion, right? It says, thus an alumina dispersion was obtained?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 165 of 334

A That's what it says.
Q Okay. So what is an alumina dispersion?
A Well, what they mean is -- I think, is that you have this liquid, this coating slurry and it's got polymer binder in it, CMC. It's got alumina, it's got a solvent and which is actually a mixture of water and isopropyl alcohol and you mix that up. And you mix it up until it kind of looks uniform.

And that's an initial dispersion, but it could be that at a microscopic level and probably at a microscopic level just mixing it by hand, you know, some of those alumina particles are clumped together. And so in order to break them up into their individual particles, the -- you know, you might want to do a further more intensive dispersion -- dispersing step which is this machine.

Q And so the intense dispersion step would break them up?
A It -- well, if you look at this company's website it actually shows a cartoon of what they

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 166 of 334

mean by dispersion. And it shows little particles that are individual separate particles, but they are kind of stuck together in little clumps and then when you, you know, use the dispersing mode of this machine, they're individually floating around free in the medium.

So my understanding is that that's what is going on here, that's why they're doing this.

Q By the "company" are you referring to Sugino or Murakami?

A Yes.

Q Okay.

A Sugino.

Q Okay. Thank you.

MR. STEIN: If you folks want to take a break?

MR. COX: Yeah, probably a good time to take one here. It's been about an hour and a half.

THE WITNESS: Yeah, that's fine.

(Recess, 1:52 p.m. to 1:58 p.m.)

Q Dr. Gido, the Microtrac measurement device

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 167 of 334

is a laser diffraction measurement device, right, for analyzing particle sizes?

MR. STEIN: Objection to the scope.

A I believe so, yeah.

Q And that -- that measures particle sizes in a sample of the particles not in the finished porous layer as they exist in that layer, correct?

MR. STEIN: Objection to the scope, calls for speculation.

A Yeah, it has to measure particle sizes in a solution, so yes, it -- it's not a solid layer.

Q The claim of the '148 patent is asking about particle sizes as they exist in the layer, correct?

A Well, first of all, let me bring up the --

Q Okay.

A -- patent again.

Q Yeah, 1001.

A Yeah, I got it right here.

It -- you know, the claim says what it says. And I -- it's my belief that a POSITA would -- you know, would rely on particle sizes that

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 168 of 334

they measured outside, you know, before incorporating them necessarily into a layer, at least in most cases, because it's just so difficult. How do you measure them in the layer.

You know, the only way is some kind of SEM thing, which is incredibly laborious and the statistics are terrible, right. And one of those diffraction machines you're measuring, you know, a billion particles. And in an SEM image you're measuring, you know, 20 or 100, you know, and you would have to take many, many images. You're never going to get good statistics.

So -- so yeah, I mean, the claim says what the claim says. I don't think it was the inventor's intention, you know, I don't think that they measured them in the -- in their film. They measure what they put in the film like everybody else does. But the claim says what it says and so, you know, we can have this discussion.

Q There are methods of manufacture that do not significantly alter the size distribution of the particle sizes, correct?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 169 of 334

A Yes, and that's basically what people are generally counting on.

Q And there are methods of manufacture that do alter the distribution of those particle sizes, correct?

MR. STEIN: Objection, calls for speculation.

A Well, yeah, I mean, I -- certainly I'm aware of some art, not going to quote it off the top my head, but I've certainly seen plenty of, you know, discussions of like ball -- ball milling the particles with the binder in there, right. So you -- you are pulverizing the particles with steel balls in some kind of a chamber and you're also mixing it with the binder at the same time.

That's sometimes done and then if you do that, nobody is going to -- nobody is going to think that you didn't change the particle size distribution by doing that. I mean, there that's the whole point.

Q Right. And so the measurement of particle size distribution, if taken before that ball

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 170 of 334

milling or before pulverization, would not apply to the particle sizes in the porous film, correct?

A Right, yes, people who are doing that they're -- they're doing it that way for whatever reason that they have and they may have some way of examining those particle sizes. They probably do, they may -- they may mix that slurry up with those -- in that ball mill and grind it up and then they can take some of that out and dilute it down and -- and keep it in the solution state and still do the particle size distribution on it with the diffraction machine. And then the rest of it that they can cast into a film.

So, you know, it's not that because you used this ball milling pulverizing while you were mixing the particle size just becomes an unknowable thing, you know, they still can find it out.

Q And Murakami does say to use a ball mill, correct?

A I believe that that may be -- you know, there is a section in Murakami that's sort of

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 171 of 334

general -- that's sort of general, right.

Again, let me -- I don't know whether I closed the Murakami, hold on a second. That's 105. Here we go, 105. Yes, paragraph 64, the wet grinding device is roughly classified into stirring type and medium type such as ball mill, yeah, so, optional grinding device.

So, you know, this is -- this is a section where they're talking about, I think, if you're going to make your own particles, right. So a lot of these patents have sections where they discuss making your own particles from scratch, making your own polyolefin base film from scratch. This seems to be that, about making your own particles.

Q And then in paragraph 140 talking about Layer B, you have a filler that has a certain size distribution, correct?

A Yes.

Q Okay. And that size distribution is before any of the other steps that happen in 141, correct?

A It doesn't say that explicitly although

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 172 of 334

it -- you know, it's listed above so you can -- you know, you can read into that as you would. You know, my -- you know, my guess and my supposition and what a POSITA would probably assume is that, you know, regardless of all this ambitious talk about ball mills and stuff, they just bought this stuff. You can buy this and it -- they tell you it comes with this analysis of what the particle size distributions are and they just bought it and they mixed it in.

Q Right. And then if there was pulverization or other grinding or other changes to the particles as a result of the later steps, and I'm not saying that you agree that there are, but if that were true, that particle size distribution would not apply to the particles as they exist in the porous film, correct?

A If you change them they would be changed.

Q Murakami talks about a difference between D10 and D90 in paragraph 66?

A Okay. Let me go back up to paragraph 66. Yeah, all right. So moreover the difference

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 173 of 334

between D10 and D90 is preferably 2.5 microns or less, more preferably -- particularly preferably that's what you're talking about, right?

Q That's right.

A Okay.

Q And so Murakami identifies as increased preferability to have less and less difference between D90 and D10, correct?

A Well, I mean, it -- it -- it specifies a range, so it's specifying a fairly narrow range. It doesn't say necessarily that -- you know, the narrower the better. It just says, you know, preferably less than 2 and a half or particularly preferably less than 1, right. So, you know, it's saying that it's preferable, but it's not -- it's not saying that the narrower you make it, the better. In fact, if you make it too narrow you could run into some problems as well.

Q It does say that it's preferable for the difference between D10 and D90 to be 2.5 microns or less, right?

A Yes.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 174 of 334

Q And more preferably 2 microns or less, correct?

A That's what it says.

Q And particularly preferably 1 micron or less?

A Yes.

Q Right? So its increased order of preference from 2.5 microns in difference to 1 micron in difference is a narrower particle size distribution, correct?

A The particle size distributions are getting narrower, yes.

Q Does pulverization have the effect of narrowing a particle size distribution?

A Not necessarily, it depends on how you do it. I think the aforementioned ball milling may broaden it, for instance. So, you know, I think the -- that Star Burst machine, you know, you showed me a histogram of it narrowing it in pulverization mode but, you know...

Q So if it were more preferable to have a narrower distribution use of Sugino for

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 175 of 334

pulverization might be a desirable thing to do, right?

MR. STEIN: Objection, calls for speculation.

A Yeah, it's not entirely clear to me that you need to go to that extreme to -- to achieve what's taught here. You know, for instance, you could buy the particles off-the-shelf, which is, I think, probably what they did in examples 1 and 2 and they satisfy that. So I'm not sure that you would necessarily need to -- would -- would need to pulverize them with this machine, right.

For example 1, D90 is 1.03 and D10 is .22, right, so the difference between the two is -- is less than 1 micron. So it -- it's in -- just comes like that.

Q If you look at example 2, the difference between D10 and D90 is greater than 1 micron, right?

A Yeah, let me -- let me go there. It is, but it's less than 1.5, so, you know, not everything has to be the most preferred

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 176 of 334

embodiment, so -- and that might actually teach against using some kind of a pulverization machine in that they're showing you an example where, you know, if you use that Star Burst machine it's always going to be really narrow, at least according to their brochure.

Q And example 2 does use the Star Burst machine, right?

A It does.

Q And so --

A I think so, because it says it did the same thing as example 1, so I believe so.

Q And so if it was most preferable to have a difference between D10 and D90 of being less than 1 micron, use of the Star Burst machine to narrow the particle size distribution shown in paragraph 161 would be desired -- more desirable, right?

MR. STEIN: Objection, form, calls for speculation.

A Yeah, I don't know why they -- they're showing different examples here and, you know, one of the reasons why you show examples is to show,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 177 of 334

for instance -- to show that you practiced the -- you know, that you have, for instance, written description of the full scope of your claims.

So if all of the particle size distributions were less than 1, for instance, or as narrow as you can make it with that machine, which is actually like just a fraction, you know, it's like .1 or .2 microns that difference, then you wouldn't be showing the -- you know, you wouldn't be showing the full range. I don't know what they -- is there a claim in -- I don't know whether there's a claim in Murakami about this D90 minus D10. It might not even be a claim, but presumably they're interested in -- in -- in exploring the range that they teach.

Right, so if you always just go to the narrowest you can make, that's not exploring the range.

Q Does Murakami say anywhere that the difference between D10 and D90 should not be too low?

A They don't say that. That was -- I was --

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 178 of 334

I was discussing that with you before when we were talking about, you know, you were sort of implying that if it says less than 1.5 or less than 1 it's implying that the narrower it is the better, but it could be that it could be too low at some point.

In fact, there are some issues with the formation of the pore structure, and the strength of the film and the packing of the particles that it's -- you may not want it to be extremely narrow, you may not want particle size to be almost monodispersed, which is what this machine is doing. And so -- so I don't know, but I -- but I -- Murakami does not say anything about a minimum of -- of that difference.

Q But -- but you contend that a person implementing Murakami would know that having too narrow a size distribution, too narrow a -- too small a number between D10 and D90 would be undesirable for Murakami?

MR. STEIN: Objection, form.

A I don't necessarily know that. I'm just

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 179 of 334

saying that Murakami doesn't teach anything about that. And, you know, they teach that it should be narrower than 1 micron or that or -- or that -- or that one micron is preferable -- most preferable. It doesn't even -- but it doesn't say anything about a lower limit.

Q The particle sizes in Beard are smaller, correct, than those used in Murakami?

MR. STEIN: Objection to the form.

A I mean, in a -- in a -- in a general sense, yes. I mean, Beard does not give sort of distribution information D10, whatever, just gives a size or an average size, just one size and those sizes are pretty small.

Q And are -- are you interpreting that size in paragraph 22 of Beard as average size or the total range of possible sizes in Beard?

A I think that that's probably the average size, maybe like Dv50. The reason -- it's not 100 percent clear, but the reason why is that it says the particle size. It doesn't say the particle sizes may vary, right. So if it were the range of

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 180 of 334

all the sizes, it might say the particle sizes may vary.

If you say the particle size, then, you know, it -- it's typically an average. And it does say down here, you know, some embodiments may measure particle size by average or medium particle size, so -- so it's -- it's Dv50. It could also be a maximum, so that's what it says.

Q And so the difference between D10 and D90 is not going to exceed .2 microns for Beard, correct?

MR. STEIN: Objection, calls for speculation.

A I -- I could -- I could construct a particle size distribution that, you know, had a pretty broad -- you know, that had a pretty broad difference between D90 and D10, but still had an average of .2 but it probably would be kind of an unusual or contrived distribution. So, yeah, in general -- give me the number again, what -- what -- what was the exact numbers you recited?

Q So I said that the difference between D10

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 181 of 334

and D90 in Beard cannot exceed .2 microns, right?

A I'm not sure about that. You know, I have to think that. You know, if -- if .2 is -- you know, if you interpret that in one way that Beard says, the particle size may be measured as the maximum size, then obviously D90 minus D10 can't exceed .2 because the biggest particle is .2 and everything needs to be smaller than that, right.

But if .2 is the average or medium particle size, if it's Dv50, then you could have some particles D90 that are, you know, quite a bit bigger and some that are -- D10 are quite a bit smaller. And it can still average out to .2, and the difference might be bigger than .2. I -- you know, that -- that's certainly possible. So --

Q Is it possible --

A -- hard to say. Hard to say.

Q Is it possible that Beard is referring to identically sized particles where every particle is the same size?

A It's unlikely given, you know, further disclosures in terms of the kinds of particles

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 182 of 334

and, you know, how they're -- how they're produced and made. I mean, it's very, very hard to get particles that are exactly the same size. They could be a very, very narrow distribution and -- but yeah, I don't -- I don't think that they would -- they could be exactly the same size.

Q If someone only provides a average particle size without otherwise specifying the distribution, is the assumption that the particles are closely distributed to that average?

MR. STEIN: Objection, calls for speculation.

Q I'm sorry. I didn't hear you answer Dr. Gido?

A I was waiting. I jumped the gun. I needed to let Mr. Stein make his objection and I'm not sure he finished making his objection, so I guess he did.

So in all that kerfuffle I've forgotten the exact wording of your question, so please ask it again.

Q No worries. And I think you said not

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 183 of 334

necessarily, but my question was, if someone only provides an average particle size without otherwise specifying the distribution, is the assumption that the particles are closely distributed to that average?

MR. STEIN: Same objection.

A Not necessarily. Some people are just -- some people are just, I don't know -- you know, I don't know, some people just give less information, I don't know why. Maybe they have less information, maybe they don't think it's important, but it doesn't -- you shouldn't read too much into it.

Q Is it possible that Beard was not concerned with the distribution of particle sizes?

MR. STEIN: Same objection.

A Well, yeah, again, I can't -- I can't read into their intents or why they did what they did, you know. They -- they list what they list and certainly they -- they weren't concerned enough about it to report in their document, but I -- you know, again, I can't speculate on their thinking

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 184 of 334

on this.

Q If Beard wanted a wider ranges of particle sizes, do you think he would have provided a wider range of particle sizes in Figure 1?

MR. STEIN: Same objection.

A Not necessarily. I mean, you know, Figure 1 is they drew what they drew. I don't think -- you know, they weren't trying to necessarily illustrate anything about the particle size there. They were trying to illustrate something about particles being in pore walls. And it becomes quite difficult to draw a figure like this and make all the particles different from one another in a realistic way.

You showed a figure that I drew in various declarations that I've given where I drew particles and I actually drew like all those individual particles and they're all different, or not exactly. I cloned them a little bit, but still, I basically drew all these different particles that have different shapes and sizes.

That's a -- you know, that's something of

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 185 of 334

an undertaking which not everybody is -- necessarily wants to do. I don't blame people for not doing it and, you know, so I wouldn't necessarily read anything into it.

Q Nothing in Beard refers to particle sizes, right, it only talks about a particle size 106?

A So I search for sizes and I don't see sizes. I see -- I see size 33 times. So...

Q Paragraph 11.

A They use -- they use -- they use particle size.

Were you directing me to a different paragraph?

Q Paragraph 11, for example, says, particle size.

A Yes.

Q And then 27 and 28 talk about a ratio of pore diameter to particle size, correct?

A Yes.

Q And nothing in Murakami suggests a distribution of particle sizes, correct?

A You just said Murakami.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 186 of 334

Q Sorry.
A Are we talking about Murakami?
Q Nothing in Beard suggests a distribution of particle sizes?
A I don't see any talk of a particle size distribution in -- in Beard, which is why we, you know, why I have not relied on it for that in fact, so yes.
Q And -- and so there is no reason to believe that Beard wanted anything other than identical or near identical particle sizes, correct?
MR. STEIN: Objection, calls for speculation.
A I don't -- I don't know what Beard wanted. Beard wanted particles generally in -- in this size range and I think a POSITA would understand and the inventors would understand and they do understand that these particles are never monodispersed. They always have a distribution.
They seem to be less concerned about the details of that distribution, but these particles

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 187 of 334

always have a distribution. I mean, you're talking about dolomite, TI02, yeah, I'm just looking at some of the types of particles that they use. And yeah, those are -- they're not going to be monodispersed, there's always a distribution.

Q Okay. If the particles are all identically sized, Dv10 will not be less than Dv50, right?

MR. STEIN: Same objection.

A Yeah. I mean basically the only way that those claim limitations in claim 1 of the '148 patent that say Dv10 is less than Dv50 and Dv50 is less than Dv90, the only way that those could ever not be true is if all the particles were exactly the same size, or at least the exactly the same size up to 90 percent by volume.

Q Right. And Beard depicts its particles as having identical sizes, correct, in Figure 1?

MR. STEIN: Objection, asked and answered.

A Beard has drawn Figure 1 with -- with those little circles in it, yes.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 188 of 334

Q And those are depicted as having identical sizes, correct?

MR. STEIN: Same objection.

A They are circles which appear to be the same.

Q And if they were, in fact, the same size, the Dv10, Dv50, Dv90 limitations of the '148 patent would not be met, correct?

MR. STEIN: Same objection.

A Yeah, I mean, they -- they -- sure, they -- they would be -- the distribution would be one spike and all the -- all the averages would be the same.

Q Can we go back to Beard for a bit?

A Beard? We're on Beard.

Q I'm looking at Murakami.

What is the minimum wall thickness Beard discloses?

A Let me take a look.

Q I'm looking at paragraph 21.

A Wall thickness may vary from .01 to .05 microns, but may vary from .001 to .1 microns in

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 189 of 334

some areas. Okay, yeah.

Q So the minimum thickness is .001 microns?

A Right.

Q And the maximum thickness is .1 microns?

A Yes.

Q When they have --

A Yes, go ahead.

Q Can a half a micron wide particle fit within a .1 micron thick wall?

A No, it would -- it would stick out.

Q And the same is true of a particle that is .22 microns or .44 microns?

A It would stick out.

Q And that's not what Beard is attempting to do with its cell walls, correct?

MR. STEIN: Objection, calls for speculation.

A I don't know what Beard is attempting to do. Beard is showing a composite pore structure with particles in cell walls. You know, in Figure 1 those particles happen to be small relative to the cell walls. It's possible that the particles

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 190 of 334

could be -- at least by the ranges of Beard, I believe about twice as thick or twice as wide as the cell walls.

That -- those are -- you know, those are the teachings of Beard, but -- but yeah, I mean, it -- it's -- you know the particles could -- could stick out of the cell walls in Beard. I mean they do in Figure 1, but they could be big enough that they stick out on both sides, at least by what Beard is teaching.

Q Does Beard teach anywhere having a particle size that is greater than the cell wall?

A Beard teaches ranges of cell wall thickness and particle thickness and the particles could be up to .2 microns and the wall thickness could be up to .1 micron, so the natural conclusion of that is that you could have particles that stick out of the pore walls.

Q Every claim of Beard requires the pore wall thickness to be greater than the maximum filler size, correct?

MR. STEIN: Objection, calls for a legal

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 191 of 334

conclusion.

A Well it says in claim 1 there -- there's an element -- the last element that says that and to the extent, let's see, how -- how is the claim structure here, claim 2 depends from 1, claim 3 depends from 1, all the way up to claim 5. Claim 6 depends on 5, 5 from 6, 6 to 7, blah, blah, blah, blah.

Q The independents are 1, 13 and 16 if that helps.

A Yeah, no, I'm looking at it, okay, and they all -- yeah, they all say that. So -- so wall thickness greater than the maximum filler size, that's what it says. Although, you know, from a legal -- you know, again, I am not giving legal opinions so I don't know exactly how learning from prior art -- you know, if the specification teaches something and you can learn from that as a POSITA, does that constitute prior art even though that thing is not claimed.

I think that a legal distinction that may be beyond me, but I can certainly read -- you

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 192 of 334

know, read what is stated there in specification of Beard and it seems possible that the particles are bigger than the wall thickness.

Q Beard teaches using densely packed filler material within the pore walls, right?

And you can go to paragraph 3.

A Okay. Right, that's what it says, but it says that the pore walls may be less than .02 microns and densely filled material may have an average diameter of -- although, these seem to be really low and I don't know why they're saying this. First of all, they're saying "may," so that doesn't mean it's necessarily required. And obviously it isn't because both wall thicknesses and particle sizes are bigger, you know, elsewhere in -- in -- in the document including, I think, in for instance the SEM images. And -- but yeah, it says that there.

Q If you go to paragraph 25 says, smaller fibrous particles may be captured inside the polymer binder 108, right?

A Yes.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 193 of 334

Q And then in a second optional embodiment, it says larger fibrous particles may extend through across or between the pores creating a porous fibrous network independent of the fillers, correct?

A That's what it says.

Q And so, those are a different type of particles, those larger fibrous particles that are depicted in Figure 1, right?

A Well -- oh yeah, that are depicted in Figure 1, yes.

Q Talking about particles that extend through, across or between the pores creating a porous fiber network independent of the fillers within the walls?

A Yeah, that's what it says.

Q And those are a different type of particle that are not the fillers that we've been talking about for your inorganic alumina, right?

MR. STEIN: Objection, asked and answered.

A That's -- that's -- yeah, I'm not sure that -- that Beard is alumina. Beard is using

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 194 of 334

titanium, maybe -- maybe they're also using alumina, but no that's -- that's something different, right. It's a different kind of, it can either be some kind of a mineral that's naturally fibrous, right, so wollastonite -- wollastonite, for instance they give that example that's in -- in Figure 2. Some kind of fibrous mineral kind of similar to asbestos. So that's what they're talking about. So yeah, that seems to be a different -- a different thing, a different option.

Q And you're not relying on those fibrous particles for anything, correct?

A On, no, I -- we -- you know, I discuss those and they also are particles that may compromise part of the pore so they be in the pore. If they're going through the pore as described there, then they're in the pore. They may -- if they're going through the structure as described there, then they're both in the pore walls and the pore, because they're just kind of going through everything.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 195 of 334

Q Would inclusion of those particles affect the particle size distribution Dv10 and Dv90 and the ratios there between?

A Well, yeah -- yeah, of course, those particles are -- are really big. If you look at -- yeah, they're big.

Q And if they're more than half the volume then it would significantly impact the difference between D90 and Dv50 and Dv10, right?

MR. STEIN: Objection, calls for speculation.

A I mean, yeah, I guess, you know, it depends on how many are there. I mean, to look at Figure 2, I only see one of these there. And so we've got this particle size distribution, and if most of the particles are sort of smaller titanium particles and you've got a few of these giant fibers, they're going to -- they're going to have an impact on that distribution, but actually D10, D50 and D90 are all going to be smaller.

They're all going -- you know, they're all going to be in the -- part of the distribution

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 196 of 334

that's above D90. You know, they're going to pull D90 a bit higher, but they're all going to be in that part distribution that is above D90.

Q Even if it is cumulative by volume?

A I mean, it depends on how much of them are in there. I mean, I'm looking at that and it looks to me like there is only one and I don't know how many are in there. If there's just a few, it will -- it will pull -- it will pull the distribution numbers higher and influence them, but it depends on how many are there.

If it's -- if it's a lot of that, sure, it will -- it will change those -- those D numbers substantially. I haven't really thought about what it would do to those distributions.

Q Do you rely on Figure 2 of Beard in any of your opinions in your declaration.

A I don't believe I did.

Q But looking at paragraph 29 of Beard, it talks about the ratio of volume of filler to the total volume of the membrane. Do you see that?

A 29 of Beard, yeah.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 197 of 334

Q And here it says the volume of filler to the total volume of the membrane may be greater than 10 percent or in some cases -- some cases greater than 20 percent.

Do you see that?

A Yeah.

Q Would you characterize Beard as a high particle filler separator or a high polymer separator?

A Well, what's being described there, first of all, looking at the part you're talking about, the first few sentences, those percentages include porosity, right, so --

Q Right.

A -- it's 70 percent voids. So of the 30 percent that's left, basically one-third -- let's see, total membrane, let's see, the total filler, it would be greater than 10 percent. An example might be 20 percent solid particles and 10 percent binder. So in this case there would be twice as much particles as binder by volume, right, so it would be like 67 percent, two-thirds of particles

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 198 of 334

and 33 percent binder in the solid part of the -- of the material. So it would be -- it would be the ratio down below of 2 to 1.

Q Not including the pores, right?

A What?

Q Not including the pores, right?

A Not including the pores. So they give those ratios down below and that particular example corresponds to the 2:1 ratio.

Q And are there other ratios in there 1:1, 1:2.

A Yes.

Q 1:1.5, 1.5:1.

A Right.

Q And those all kind of rotate around 33 percent filler, and 67 percent binder to the inverse, 33 percent binder and 67 percent filler, right, and kind of there between, the ratios that they're showing --

A Yeah, yes.

Q -- in that range?

A Yes.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 199 of 334

Q So there's nothing here illustrating using 90 percent filler to 10 percent binder or greater, right?

A Not here.

Q And is there anywhere in Murakami that suggests doing that? And Murakami would work with that ratio -- sorry, of Beard -- sorry I'm mixing my references.

MR. STEIN: Objection.

A Right.

Q I will -- I will ask a clear question, sorry.

Is there anything in Beard that suggests using 90 percent filler and 10 percent binder in any of its embodiments?

A My reading of Beard is that -- that it is like what is recited here in paragraph 29, that -- that it's in this range.

Q So -- so that's a no. There's nothing that suggests using 90 percent filler anywhere in Beard?

A Not that I recall.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 200 of 334

Q If you -- if you go to paragraph 86 of Beard, let me know when you get there.

A Yeah.

Q Beard teaches that good results may be achieved when the solid particles are contained exclusively or largely within the pore walls, correct?

A That's what that says.

Q And also teaches that good results can be achieved when an open continuous pore structure is provided through -- through the film, right?

A It says that.

Q Too much filler, having a higher proportion of filler, may block the pore pathways, correct?

MR. STEIN: Objection, calls for speculation, lacks evidence.

A It doesn't say too much filler. It just says when filler additives are allowed to block the pore pathways, you know, you get these negative impacts, but it -- it doesn't indicate why the fillers are allowed to block the pore

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 201 of 334

pathways.

Q How can you prevent fillers from blocking the pore pathways?

A Well, you know, as -- as you're saying, you know, one way is to have less filler. You know, it could also be related to if you're using that coagulation process, right, the various art -- it may be in Beard, it's certainly in -- somewhere in this art, you know, by -- by choosing different characteristics of the particles and the -- and the -- the non-solvent the bad solvent, the solvent 3, you can influence the pore structure to be like a bigger pore structure or a looser pore structure, or smaller pore structure, thicker walls, thinner walls all of these different things.

You know, even if you had more particles you might be able to prevent them from blocking the pore structure if you made bigger, looser pores by tuning the face separation process. So, you know, there's all kinds of different knobs you can turn to, you know, to address this.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 202 of 334

Q Would the coagulation process you just described be able to create the types of pores that you previously described as interstitial cavities between particles?

MR. STEIN: Objection to the form.

A If you did that type of coagulation process, for instance in Murakami, which Murakami calls solvent X, you could do that in the case where you had, you know, 93 percent by volume particles and 7 percent by volume binder and you could still get that face separation by a coagulation process, which would cause the binder to come out of solution and stick the particles together.

So although that pore space would be defined largely by -- by particle walls, you are still creating those pores and defining those cavities by solidifying the binder.

Q You're -- you're saying one could do that for 93 percent by volume particles, but Murakami never did that, correct?

MR. STEIN: Objection, misstates the

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 203 of 334

testimony.

A Not in the examples that I saw there.

Q Does particle size affect pore size?

A It can in a number of senses, right. If you have that high particle kind of variant, right, where the pore walls are -- you know, a big part of the pore wall is the sides of these particles, then certainly the particle size has an influence -- particle size and the particle size distribution has an influence on that pore geometry.

Also, at least some of the prior art, I forget which one, I would have to look for it but it discusses in the non-solvent separation process, might even be the '148 patent, that basically like the non-solvent will penetrate into the film better along the boundaries of particles. And if the particles are bigger, it goes in faster so it makes bigger pores. And so also in the high binder variant, the particle size could influence the pore size.

Q So fair to say that the particle size

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 204 of 334

distribution influences both pore size and porosity, correct?

A It can, yes. I mean, it's certainly one of -- one of the factors involved. You know, you read me that list of all those different parameters earlier, and a lot of them kind of interact with one another. So it's not a simple 1:1 relationship, for instance, but yes, particle size would influence pore size and porosity.

Q If you changed the particle sizes in Beard, that would change Beard's pore sizes, correct?

MR. STEIN: Objection, assumes facts not in evidence.

A I don't know, not necessarily. It could. You know, if you did everything all the same and all you changed was the particle size, I don't know what in these various examples might happen. I mean, it depends on, you know, exactly the system you're working with.

You know, this issue of the non-solvent going along the particle surface depends on, you

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 205 of 334

know, what kind of non-solvent, what kind of particle surface, whether they like each other or they don't like each other and some do and some don't. I'm not sure that that example was from Beard, I don't know. So yeah, it might.

It's also possible that you could do something -- you know, if you increased the particle size in Beard maybe that would make the pores bigger or the porosity higher, but maybe you also then change something about the way you -- the non-solvent you used or the amount of binder you used or something. So, you know, you can move this parameter space all over the place and get different pore sizes and different porosities for all kinds of different reasons.

Q And your answer would be the same if I asked if you changed the particle sizes in Beard that would change Beard's porosity, correct? My first question was about pore sizes, now I'm asking about porosity, same answer?

MR. STEIN: Objection.

A Yeah, I -- I was kind of answering both of

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 206 of 334

them together, so yes.

Q Yeah. And Beard is trying to achieve consistent pore sizes, correct?

MR. STEIN: Objection, calls for speculation.

A Why don't you -- I'm sure there is someplace in there where Beard talks about this, why don't you direct me to it.

Q So you -- you can look anywhere from the background to paragraph 2 or paragraph 3 talks about the kind of goal of the invention, a summary of the invention as developing a porous membrane with consistent pore size.

A Consistent pore size, so -- all right. And what is your question vis-a-vis consistent pore size?

Q That is a goal of Beard's invention, right, is developing a porous membrane with consistent pore size?

A Well, it seems they're saying that that's a good thing. And I'm not sure what consistent means, you know, I guess it means not too widely

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 207 of 334

distributed, right. There is this pore size distribution coefficient, which is claimed in the '148 patent. Beard doesn't teach anything about that.

I guess if they're saying consistent pore size distribution, that would mean that they would prefer to have a relatively low pore size distribution coefficient, but they don't say that as far as I remember or -- or give any specifics on that.

Q Another goal of Beard is good tortuosity, correct?

A Yeah, I don't know. I don't know what good tortuosity means. Good -- you know, good is a -- a word that in this context is unclear what it means. I mean, you know, tortuosity is sort of the contour length of a path divided by how far in a straight line it takes you through the separator. And I don't know -- I don't know what they mean by good tortuosity. Does that mean higher tortuosity, lower tortuosity, a mid range of tortuosity?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 208 of 334

Q Well, paragraph 3 and in the abstract they define as high tortuosity if that makes it better?

A Okay, all right.

Q And so -- okay. So a goal of Beard is achieving a high tortuosity, correct?

A Okay. And there -- and there, you know, are good reasons why they might want to do that.

Q And if a filler is blocking the pore pathways, would that create lower or higher tortuosity?

MR. STEIN: Objection, assumes facts not in evidence.

A Well, I mean -- I think some -- again, some of this art talks about not blocking the pore space with the filler and -- but that wouldn't be tortuosity, that would just be blocked. You don't want to block these things because you need ion transport for the battery to work, but you might want the ions to have to take a tortuous path rather than going directly through the separator and I think that's what they're -- what they're talking about.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 209 of 334

Q Higher tortuosity should mean smoother pore walls as compared to rougher or more irregular pore walls?

A No, not necessarily. It's kind of the opposite. I mean, these things are kind of like some kind of a worm hole, go -- it's also branching all over the place, and actually the more irregular and jagged and crazy the -- the -- the worm hole is, the higher the tortuosity.

So I don't know what you mean by smooth, whether that, if smooth means sort of a pipe going right through the separator, that's sort of the highest smooth less, that's also the lowest tortuosity.

Q I'm referring I guess to --

A You don't want that.

Q -- to a twisty worm hole with -- with smooth walls as opposed to bumpy walls is what I'm talking about, the smooth versus bumpy?

MR. STEIN: Same objection.

A I don't think that matters, I don't think that's what they're saying. I mean, tortuosity is

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 210 of 334

just the -- you know, again the diffusive path of an ion, you know, how far it has to go through all the twists and turns to get through the separator divided by the actual straight line thickness of the separator. And whether or not it was encountering a smoother rough surface while it was going through that twisty, turny worm hole. I don't think that the patent is teaching anything about that.

Q Okay. Does it affect pore structure or pore size if I use the solvent substitution method to coagulate binder before drawing, as compared to skipping right to drying? Is that going to affect my pore structure or pore size?

MR. STEIN: Same objection.

A Yeah, well, certainly it could, especially in a situation where you have a lot of binder where you have mostly binder or, you know, a significant amount of binder. You know, I mean basically if you have enough binder to fill in those interstitial spaces between the particles and you dry it out slowly, it's going to fill up

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 211 of 334

those interstitial spaces between the particles and you're going to get just kind of a solid polymer with particles dispersed in it but without porosity.

But -- which is why the -- you know, in all the cases where there was a significant amount of binder, you know, 30 percent binder or more for instance, something like that, they do one of these non-solvent processes, because it coagulates the binder and forms this porosity.

The way that polymer separates out of solution when it's precipitating due to a bad solvent interaction, it's a process called spinodal decomposition. It actually inherently produces a sort of spongy or porous structure. And, you know, can be used in lots of different fields to make that kind of structure, not just battery separators.

Q Doing just straight drying without going through the solvent substitution process is going to give you different results in terms of pore size and pore distribution?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 212 of 334

MR. STEIN: Same objection.

A In cases where, you know, the system, the process is kind of controlled by the binder is mostly -- it has mostly binder or has a lot of binder, then yes.

Q Are there other variables in the manufacturing process that I haven't mentioned that affect pore structure or pore creation?

A I haven't been keeping --

MR. STEIN: Objection.

A I have not been keeping a running total of everything that we've talked about. We've talked about a lot of stuff and I mean, nothing -- I'm not sitting here saying oh, he missed this, he missed this, so nothing comes directly to mind.

Q Which porous layer is better for use in a lithium-ion battery separator, Murakami's porous layer or Beard's porous layer?

MR. STEIN: Objection, calls for speculation.

A I really don't know. I mean, different manufacturers do this in different ways. And I

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 213 of 334

have not done a survey of, you know, the different -- different separator types and their performance and their characteristics. So yeah, I -- I -- I'm not sure. It depends on what your sort of figure of merit is. Is it, you know, discharge performance, is it nail test, is it thermal runaway, I mean, you know, it's always some balance amongst all those kinds of criteria. I don't know.

Q Can we go to paragraph 85 of Beard?

A Okay.

Q Beard says, the two combinations that will provide the most optimized pore structure are Cases 2 and 4, correct?

A That's what it says. I don't know off the top of my head what Cases 2 and 4 are, but, okay.

Q And it's shown in the table above if that helps.

A Detail these combinations of the three component systems use a solvent/polymer system that has repulsive characteristics of liquid in the polymer. Yeah, this feature allows for

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 214 of 334

creation of high levels of porosity.

So -- so basically, yeah, they're just referring to this figure -- this table, which is kind of a qualitative thing that just talks about the -- the interaction energy they call it like wetting. Wets means that there's a positive interaction energy, repels means that there's a negative interaction energy and yeah, that just relates to this coagulation process and the kind of pore structures that they form.

Q And Cases 2 and 4 have high sizes of pores, right compared to Cases 1, 3 and 5?

A Yes, big and medium, yes.

Q Yeah, and they both have a high void percentage, correct?

A That's -- yeah, that's what it shows.

Q And both of them have a high level of filler loading, correct?

A I can't tell from this table what the filler loading is. It -- it says that the filler -- let's see, size rating, tensile rating, void percentage, where does it -- where does it

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 215 of 334

say, where does -- where does it say -- is the filler loading in here?

Q I'm looking at figure paragraph 85, sorry.

A Okay. All right, sorry, I can't look at the table and paragraph 85 at the same time.

In both cases the filler and polymer -- the filler and polymer under favorable thermodynamics and hence create the strongest possible filled polymer system.

Q It says that both Cases 2 and 4 have high levels of filler loading, right?

A Where is that? Is that --

Q The first sentence in paragraph 25.

A Oh, 25, I thought we were at 85.

Q Sorry, sorry, 85. You're right. Sorry. The first sentence in 85 says the two combinations --

A Oh, oh, yes along with high levels of filler loading. Okay, so I -- I don't know what they mean by high levels. I mean, you know, high levels of -- from the point of view of Beard might be, I don't know, 2:1 particles to binder,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 216 of 334

that's -- you know, I don't know. Those are probably examples so we could look. Yeah, I mean, okay, high levels of -- of filler loading, that's what it says so what -- what do you want to ask me?

Q So my question is, why do Cases 2 and 4 have what Beard calls the most optimized pore structure?

MR. STEIN: Objection, calls for speculation.

A I think the main -- when I read this, the main takeaway I took out of it didn't have anything to do particularly with the amount of filler, but rather the fact that the liquid wetting of the polymers is -- repels. That is the -- the liquid is a pore solvent for the polymer. By repel it means it pushes it out in solution and makes it precipitate or coagulate. And that is precisely the type of process that creates this -- this pore structure, this more open pore structure with thinner walls, spinodal decomposition I called it. Dr. Wheeler says it

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 217 of 334

looks like spider webs.

Yeah, that -- that -- I think that's the whole point of this figure and this whole part of it is -- I mean this table, is this correlation between the polymer interaction with the solvent is repels. Those are the two that are good.

Q When Beard talks about a filled polymer system in paragraph 85, where it talks about creating the strongest possible filled polymer system, by filled polymer system, is it talking about polymer walls that are filled with inorganic particles?

A Where does it say the strongest -- does it say Strongest polymer?

Q In the middle of 85. In both cases the filler and the polymer --

A Oh, yeah.

Q There you go.

A And hence create the strongest possible filled polymer system.

I don't know what they --

Q That question --

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 218 of 334

A I don't know what they mean by that, whether they mean -- I don't know whether that means like mechanical strength, you know, some kind of tensile strength or -- I don't know what they -- I don't know what they mean by -- by that.

Q You don't think filled?

A In the strongest possible filled polymer system. You know, probably mechanical strength I suppose. You know, that doesn't -- I'm not sure how that correlates one way or the other with this repels polymer liquid, large voids, big pores. I -- yeah, I'm not -- you know, they may be -- like I said, these parameters, you know, they kind of influence one another but they're also kind of separately variable to some degree.

MR. COX: Objection, nonresponsive.

Q So my question isn't about what does it mean to be the strongest possible, my question is what is a filled polymer system. Does that refer to particles within the polymer walls? Is that a filled polymer system?

A A filled polymer system is any system that

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 219 of 334

is a composite of polymers and particles or any other kind of filler. It could be sawdust, it could be glass, you know, fiberglass is a filled polymer system. It could be porous like this, it doesn't necessarily have to be porous. Particles could be in the walls, particles don't need to be in the walls. They could be anywhere, it's just -- just a filled polymer system.

Q And in both Cases 2 and 4 it says, the filler and the polymer coat/wet/bond to create that strongest possible filled polymer system, correct?

A Coat/wet/bond and hence create the strongest filled polymer system.

That's what it says.

Q And what does it mean when it's talking about in the context of the filler and polymer, the word "coat"?

A That would mean that the polymer is sticking to the particle surface. I mean, you could see that in the table, right. It says, the first two -- well, the first two columns after the

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 220 of 334

numbers, are the action of the liquid towards the filler and the polymers. The next column, the third column, is the action of the polymer towards the filler. Does the polymer wet the filler. Wetting means it sticks to it, so it wets.

Q And by -- by wets, it also means coats, right?

A Wetting would be a thermodynamic driving force to coat or spread on the surface to the extent that it does that more or less or completely everywhere, I don't know, but it certainly provides a -- a thermodynamic drive to do that.

Q And that's due to just chemical interactions between the polymer and the filler particle?

A Yeah, that's --

Q That -- that result?

A Yeah.

Q And there are interactions between certain polymers and certain fillers that will cause the polymer to kind of extend over or creep over the

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 221 of 334

surface of the particle, thereby wetting it or coating it, correct?

MR. STEIN: Objection, form.

A That's what's implied by wetting in the table. And for number 5, where it says repels, that would imply that that's the opposite, right, so it can be either, but yes, that's what wetting means.

Q Can we go back to paragraph 64?

A Yeah, okay.

Q Do you agree with Beard that having extremely small particles blended into a polymer melt or solvent solution, with both a polymer and a liquid, allows a POSITA to carefully control the creation of pores and the bonding of the solids to the polymer during formation?

A I mean, that -- that's what it says there and that -- that can certainly be true in -- in some embodiment, sure.

Q And so having the particles, extremely small particles blended into the polymer, allows careful control of the creation of pores, right?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 222 of 334

MR. STEIN: Objection, asked and answered.

A Well, let me -- let me -- let me think about this a little bit. So I'm not sure whether there is like causality implied there between those two sentences.

It's basically saying, okay, in order to form a highly porous material, extremely small particles may be blended into a polymer melt or solvent solution with both a polymer and a liquid. During formation, the creation of the pores and the bonding of the solids to the polymer can be carefully controlled for good results.

So those are two statements. I'm not sure that one is necessarily saying that it causes the other, they're just statements I think about the kind of process or result that -- that Beard -- now I'm doing the same thing -- that Beard desires.

Q So to carefully control the creation of pores and the bonding of the solids to the polymer, is it easier to do that with small particle sizes or large particle sizes?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 223 of 334

MR. STEIN: Objection, calls for speculation, facts not in evidence.

A I mean, it -- it depends on what you -- you know, what you're saying is hard or easy. I mean, it -- it can be harder to deal with smaller particles because they're harder to disperse, for instance.

So I'm not sure that -- again, I'm not sure that there's any causality here. They're just stating a couple of features of some of their embodiments and some of the features that they want to get in their results, but I'm not sure that -- that, you know, the fact that these particles in the first sentence are small is what is responsible for carefully controlling the bonding or good results. You can get bonding of big particles to binder or bonding of small particles to binder. It depends on the interaction energy of the particles and the binder as in that table we were just looking at.

I'm not sure how -- you know, whether the particles are big or small or not is -- is one of

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 224 of 334

the main factors and like I said, it could be more difficult to disperse very small particles.

MR. STEIN: Brady, do you folks want to take a break?

MR. COX: Yeah, I was just about to ask the same question.

MR. STEIN: Okay. Yeah, I could use one.

(Recess, 3:28 p.m. to 3:34 p.m.)

Q Dr. Gido, let's move on to Akiike, that is how I've been pronouncing it? Does that pronunciation work for you?

A That works for me. I -- I have -- well, I took a little bit of Japanese in graduate school and I also have some Japanese colleagues who I asked. So I think it's actually pronounced Akiike, but we all call it Akiike so let's just call it Akiike, that's fine.

Q Akiike. Okay, I -- I can work with Akiike.

A Yeah, whatever. We all -- we'll all know what -- what you're talking about so...

Q When Ms. Klinger writes it down, I think

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 225 of 334

we're good.

So could you pull up Exhibit 1011?

A Yes.

(Exhibit 1011 discussed.)

Q You recognize Exhibit 1011 as the Akiike brief reference?

A I do.

Q And I -- I want to direct you to paragraphs 31, 32, and 33.

A Right.

Q And these paragraphs define kind of the preferred values for D10, D50 and D90 in Akiike, right?

A Right.

Q And what is the most preferable range of values for D10, for example?

A Well, I guess it's .3 microns or more and .4 microns or less for D10. For D50, it's .7 microns or more and .9 microns or less. And for D90, it is 1.2 microns or more and 1.5 microns or less. That's what it says.

Q And -- and those are the -- the most

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 226 of 334

preferable D10, D50, D90 values, right?

A Yeah, I picked -- again, they give -- they give a number of values and I picked the -- the most preferable ones.

Q We talked about this a bit earlier, but are -- are there ways that can describe a particle size distribution without providing D10, D50 and D90 values?

A Yes. So -- well, I mean, there are different ratios and differences, all of which somehow sometimes get called span, so you might see D90 minus D10 called the span, you might see D90 minus D10 divided by D50 called the span, you might see D90 divided by D10 called the span.

These are all sort of parameters that a POSITA could use and commonly might use to characterize a distribution.

Q And you mentioned there's -- there's the difference between D90 and D10 and there's the ratio between D90 and D10. And those are two different ways of measuring the kind of extent of the distribution, right?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 227 of 334

A Yes.

Q And those do not result in the same matter -- sorry, in the same number, correct?

A Not -- not necessarily. I think Dr. Wheeler had some examples where he could drive them to have the same number sometimes and not, they can have the same number but they don't necessarily. And certainly for the -- yeah, I mean, yeah, they're -- they're different things, but they're all common things that one would look at.

Q And if you're trying to convey that all the particles in your separator layer should be between a very narrow minimum and maximum value but you don't care what the specific D10 or D90 is, how would you convey that?

A Well, I mean, you could convey that as D90 divided by D10, you could do D90 minus D10 divided by D50, those are all relative measures. You know, D90 -- D90 minus D10 without dividing that by something like D50 or, you know, some scale, you know, gives you not a relative number but an

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 228 of 334

absolute number. You could still get some information about that as to whether it's a broad distribution or not in some sense. So yeah, all of these things are -- are potentially useful and they're not necessarily mutually exclusive. A POSITA would look at all of them, you know, they're trivial to calculate.

Q Is it also -- can you just provide a minimum size and a maximum size and just provide that?

MR. STEIN: Objection, calls for speculation.

Q Essentially a D0 and a D100?

A One does sometimes see, you know, literature art where people describe a range of particle sizes, right, which would presumably be from the smallest to the largest. You know, that is a little bit tricky because, you know, this is all kind of based on statistics. So, you know, you may not actually pickup the absolute smallest particle there or the absolute largest particle there, but at least in some statistical sense you

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 229 of 334

can know that, you know, most or almost all the particles are within some range.

Q In paragraph 94 of Akiike, do you see where it talks about the space between the non-conductive particles in the porous membrane?

A Yeah, I see that.

Q And my question is, are the spaces between the non-conductive particles in Akiike's porous membrane pores?

A Well, I mean, this is basically the same thing as Murakami. The particulate particle of Akiike is probably like a latex particle, right, so just a little -- little bead of polymer or tiny little microscopic bead of polymer it's -- and some of those little microscopic beads of polymer can stick the particles together just like the binder in Murakami did and it forms pores that have the particles forming a large part of the walls. You know, a large part of the pore is the interstitial space of these particles.

So yes, it -- it's a similar situation to Murakami's example 1 and 2 for instance.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 230 of 334

Q These particulate polymers that you're referring to, are they conductive or non-conductive?

A You mean like an electrically, like, electron conductive sense or --

Q Yes, like an electrical sense?

A No, I mean, they're -- I think in Akiike they're mainly like acrylates. I would have to look at the list where they talk about what they are, but I'm pretty sure that they tend to be like acrylic kind of polymers, let's see.

Particulate -- oh, wait, thickeners, no we don't want thickeners, particulate polymer. Yeah, well, it's the mixing -- I see somewhere in here it talks about mixing of the non-conductive particles in the particulate polymer. So it's obviously non-conductive because you -- you don't want the separator to be electrically conductive.

Q Okay. So the reference to particulate polymer, that's different from the binder that we've been looking at in other types of separators, correct?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 231 of 334

A No, it is -- it is exactly the binder that you're talking about in other -- other references. It is -- it is a polymer binder, it just happens to be in the form of a latex. For instance, polyvinylidene fluoride, which is a polymer binder that you see discussed a lot, is generally made by a polymerization process involving a suspension or a latex. So it -- they are little beads of polymer.

I think that one of the examples in -- I think it's Murakami, one of the ones that's like -- that maybe has no particles in it, I'm not sure, but the binder there is a particulate polymer. It's some kind of a latex.

So the particulate polymer is the binder. And the binders in a lot of these battery components, also in like electrodes, the polyvinylidene fluoride that is used in cathodes and anodes, typically a latex which would then be called a particulate polymer. Most people don't single it out like these people do, like -- like Akiike does, but it often is.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 232 of 334

Q When Akiike refers to non-conductive particles, that's referring to all of the non-conductive particles, correct?

A Well, I mean it's referring -- yeah, well, I mean what do you mean by all of them? Do you mean like all of them in the size distribution? Do you mean all of the different kinds that are talked about? What -- what do you mean?

Q I mean, when it's talking about a -- you know, for example, in Table 1, which you will find on PDF page 20.

A Yes.

Q You see there is a table and it lists non-conductive particles and then has a whole bunch of things below it, right?

A Okay, let me -- let me -- let me go there. You're talking about the table here?

Q Right. So you have a list of non-conductive particles in there on the left-hand side?

A Yeah, I'm looking. Where does it --

Q Table 1.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 233 of 334

A Oh, oh, way up at the top, oh.
Q Yes.
A Yeah, it says non-conductive -- oh, I see. Yeah, yeah, yeah, sure, okay. I was looking down at all these things and I wasn't looking up at the heading. Okay. Sure.
Q Everything below it is the non-conductive particles?
A Well, these are all -- I mean, there's some, you know, I found this table, you know, tedious, it -- it's listing -- yeah, it's listing different components. And actually in there it is not all the -- I don't know why it says non-conductive particles like everything in that column is the non-conductive particles.
The non-conductive particles I think are, you know, this -- this is talking about the first one, two, three, four, five, maybe six rows are specifically about the non-conductive polymers -- I mean non-conductive particles.
And then below that, you know, you're talking about a type of particulate polymer,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 234 of 334

that's not the non-conductive polymer -- I mean particle, that's the -- that's the latex amount of particulate polymer. Type of water soluble polymer, right. And then the type of surfactant, amount of surfactant, so -- so -- so the non-conductive particle things, as far as I can tell, is just the top of this, the first one, two, three, four -- one, two, three, four, five, maybe six rows.

Q If you go to paragraph 38 of Akiike, it teaches that Akiike's non-conductive particles can be inorganic particles and/or organic particles, right?

A Well, let me get there, but I -- I do seem to recall something along those lines, so I wouldn't be surprised if that's what it says. You say 38?

Q Yes.

A Yes, all right.

Q And so when Akiike refers to non-conductive particles, it's referring to all non-conductive particles, both inorganic and

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 235 of 334

organic particles, correct?

A It is -- yeah, it discusses both possibilities, I mean, it does I think say that the inorganic particles are preferable, but it certainly -- from such a viewpoint, non-conductive particles, electrochemically stable materials are preferable from this viewpoint, preferably examples of inorganic particles, I think are preferable for some -- for some particular goals. I do see that the inorganic ones are preferable, but then they do specify that it could also be organic ones, yes.

Q So the distribution of sizes for non-conductive particles is the distribution of sizes for all particles, not just the inorganic particles, correct?

A Well, to the extent that Akiike may have examples where they mix both organic and inorganic particles, that may be the case. I would have to look at the examples to see whether they have any mixed examples. You know, are there any examples here where they have used a mixture of organic and

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 236 of 334

inorganic particles, I -- I think there might be.
Q I'm not sure if you're asking yourself or asking me, Dr. Gido?
A I'm asking you.
Q Okay.
A I'm looking through this to try to see.
Q Certainly --
A If you want to point me to an example where there are both organic and inorganic particles in the same layer that would be useful.
Q Polymer particles are organic particles, correct?
A You mean the particulate polymer?
Q I call it polymer particles?
A Well, there -- there are two different --
MR. STEIN: Objection, form.
A Yeah, there's two different things in here. The -- there's polymer filler, which are organic particles, which are typically things like heavily cross linked resins that kind of they get ground up, they grind them up, you know, maybe like a phenolic resin or something like that.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 237 of 334

It's basically like polymer rock and they grind it up and treat it just like they're treating the other ceramic particles which are kind of like actual rock.

And that can be mixed in here and used as a filler just like the inorganic particles, but then there's also particulate polymer which a binder. It's things like vinylidene fluoride, for instance, or an acrylate polymer, which is latex and is like kind of little sticky beads of polymer.

Q When I'm talking about the polymer filler -- I'm -- that's what -- for now that's what I'm referring to when I am talking about polymer particles. Is that okay?

A Sure.

Q And then the polymer particles are organic particles, correct?

A The -- the polymer filler organic particles are -- yeah, they're organic polymers or organic particles that are similar, in some ways at least, to the inorganic polymers, right.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 238 of 334

They're basically carbon-based analogs of little ground up ceramic rock.

Q And they are non-conductive particles?

A They are non-conductive.

Q As is alumina and other inorganic particles that are being discussed, right?

A They are also non-conductive.

Q And alumina is an example of an inorganic particle, correct?

A Yes.

Q Okay. And so when the size distribution of non-conductive particles is provided, that is providing the distribution of all non-conductive particles, including inorganic particles such as alumina and including organic particles such as polymer particles, correct?

A It could be. I would have to look -- let's see, in the claims non-conductive particles. That would -- so reading in, for instance, claim 2, I would interpret that to be all the non-conductive particles that are in there. So if they have a mixture of organic ones and inorganic

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 239 of 334

ones, that would apply I suppose to -- to both.

If you happen to have examples where they're mixed and I think that there may be some examples where they're mixed and there may be some example where they have all of one or all of the other.

Q In -- for example, there's nothing mandating or requiring that the organic particles and the inorganic particles, both of which are non-conductive particles, that those two types of non-conductive particles themselves have the same sized distribution, correct?

MR. STEIN: Objection, form.

A Yeah, no, I -- I don't -- I don't think that -- they would not necessarily have the same size distribution, no.

Q In fact, it would be surprising if they did, right?

A I would not -- I'm not sure it would be surprising, but, you know, it would be -- if you asked me whether they're likely to have the same size distribution, I would say probably --

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 240 of 334

probably not, unless you specifically went out of your way to pick particles that did.

Q Going -- going back to paragraph 94 of Akiike.

A Yeah, yeah, yeah. I went to 194, I got to go to '94. Yeah, okay.

Q Okay. Do you recall earlier we talked about the space between the non-conductive particles in the porous membrane can be made large and thus the porosity of the porous membrane can be large?

A Wait, let me see. Yeah, that's what it says.

Q And pores are formed in the space between the non-conductive particles in Akiike, right?

A Again, I said this is the same as Murakami, the -- the particles connected together by the binder, which in this case is a particulate polymer, define the walls of the pores. So the pores are -- yeah, defined by the volume between these particles and the walls of the pores are largely the walls or the sides of the particles

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 241 of 334

with binder in there as well holding the whole thing in place.

Q In paragraph 150, Akiike teaches that in its porous membrane, pores are formed in the space between the non-conductive particles, correct?

MR. STEIN: Objection, asked and answered.

MR. COX: I moved to paragraph 150.

MR. STEIN: Sorry, withdrawn.

A Yeah, in the -- in the porous membranes thus obtained, pores are formed in the space between the non-conductive particles, thus the porous membrane has a porous structure.

That's what it says.

Q And here it says pores are formed between the non-conductive particles. It doesn't say pores are formed in the space between the non-conductive particles and the particulate polymer, correct?

A It says what it says. I mean, you know, that's not necessarily my opinion, it's just what this says.

Q How does a particulate polymer bind to the

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 242 of 334

non-conductive particles in Akiike?

A It -- the particulate polymer is a latex particle or a -- like a emulsion polymerization particle which is similar to latex particle. It is a little microscopic bead of polymer. It's kind of sticky and, I mean, if you use latex paint, you know, like to paint a wall, it's exactly the same thing. It just doesn't have the filler in it, or in fact, if it's white paint it might have Ti02 in it so it might have the filler in it. And these little sticky balls of polymer are suspended in solvent, oftentimes water, and -- but they're -- they're kind of sticky so they -- you know, they will stick to each other and they'll stick to other things.

And so in some sense they behave quite similarly to a solution of like freely dissolved individual polymer chains in a -- in a liquid, right. And as far as acting as a binder or forming a layer or whatever, it's very similar except instead of being individual free floating molecules, they're tiny, tiny little balls of

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 243 of 334

particle -- of polymer that stick together and this was basically developed as a way of making organic materials that would typically not be soluble in water or similar solvents soluble in water. So that's why people do this.

Q Are you okay if I use this kind of like sticky jelly beans analogy? Have you heard that or --

A I'm fine.

Q -- did you use that earlier?

A I -- I didn't use that, but that's not -- not necessarily bad.

Q So -- so basically, in Akiike and Murakami, both of which have high ratios of filler to binder, correct?

A Well, I mean, Murakami again teaches ratios of filler to binder by volume of, you know, 1 to 99 percent or 90 -- or 5 to 95 percent, it teaches all -- a broad range. You know if you're specifically talking about examples 1 and 2, then it's -- you know, it's high. I forget what Akiike specifically claims. I do know that I think in

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 244 of 334

their examples, at least, tends to be high -- high particle content.

Q Is it fair to characterize these separator layers that have a high ratio of filler and a small amount of particulate polymer holding them together as kind of sticky little jelly beans or dots of glue that are holding everything in place but not coating anything?

MR. STEIN: Objection to the form.

A It's not entirely clear, you know, whether they're coating anything. It seems that there's probably not enough of that material around to put these fears all over the surface and completely cover the surface of the particles, so they probably are -- are to a large extent, acting more as, you know, as binder at contact areas.

Q Is Beard's porous layer or Akiike's porous layer better for using in an lithium-ion battery separator?

MR. STEIN: Objection, calls for speculation.

A I don't -- yeah, I don't -- I haven't

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 245 of 334

really given that any thought. They're different approaches, both approaches are widely used. They give somewhat different characteristics and properties, you know, and -- yeah, I'm not sure one is better than the other.

Q In paragraph 94 of Akiike it says, that the particulate polymer can function as a binder in the porous membrane, correct?

A That's what it says.

Q And does that mean that the particulate polymer is not itself binder, but it's just functioning as a binder?

A No, I mean, I think that's a distinction without a difference. The -- you know, if it's functioning as a binder, it is a binder. And as I said, these particulate polymers are commonly used as binders. These latexes are -- are suspension polymerization materials are commonly used as binders for separators and electrodes.

Q And because the particulate polymer is formed in a particulate shape, Akiike says, it is bound to the non-conductive particles, not through

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 246 of 334

a face contact, but through a point contact. Can you explain the difference there between a face contact and a point contact vis-a-vis the particulate polymers acting as -- as a particle?

MR. STEIN: Objection, form.

THE WITNESS: Sorry, sorry, James, did you --

MR. STEIN: I just made an objection to the form of the question.

THE WITNESS: Right, I need to -- I need to pause a little bit more, sorry.

A So yeah, I'm not -- I mean, of course I read that and I'm not quite sure what they mean. It could mean a couple of different things. First of all, I'm not sure which face they're talking about. The face of the polymer particle or the particulate polymer, which is a little tiny sphere, or the face of the, you know, inorganic particle or I guess in this case the non-conductive particle.

And, you know, I -- I -- I don't know. One way to look at this would be that if this were

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 247 of 334

a polymer which wasn't a latex which was dispersed in solution, and that polymer absorbed to or stuck to the surface of the particle, it would just sort of spread molecularly on the surface. It would be kind of like a -- a piece of string or a snake or something just -- or a piece of spaghetti slapped up against that surface of the particle -- of the -- of the inorganic or the non-conductive particle.

But it could mean that this is basically like a little -- this little sticky sphere or little sticky jelly bean. They do tend to be quite spherical, so, you know, it's not -- it's not like in a random shape like a jelly bean. It's like a little sphere and maybe that little sphere is just sitting there and it's, you know, got a point of -- it's stuck there and it's got a point of contact, so it's a point on the -- on the -- the particulate polymer.

They could also be talking about a point of contact between the -- you know, it could be sticking to a point of the -- of the inorganic

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 248 of 334

particle. I mean, I think, you know -- you know, I'm not sure, for instance. I -- you know, I think what you're getting at is like this is a little sticky jelly bean at a place where two points of sharp particles kind of come together point to point and there is this jelly beans and they're sticking them together.

And it might mean that and certainly stuff like that happens, but I think it might mean that latex particle, when it comes into contact with a ceramic particle, for instance, is not the -- the -- the polymer chains are not spreading out and uncoiling and covering the surface. It's just a little ball of stuff that's sitting there at one -- with one point of contact. So it could mean either, hard to say.

Q Is it possible that face contact is talking about a non-particle polymer, but just a kind of more traditional melted on kind of polymer that coats the surface or coats the face of non-conductive particle?

MR. STEIN: Objection, calls for

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 249 of 334

speculation, facts not in evidence.

A Right. Well, that is kind of what I was saying was that the -- a contrast would be that the polymer chain is somehow just spread out on the surface, which would be coating the surface. I mean, this -- you know, so yeah.

Q Right. And what wasn't clear to me is if that, that you were describing, is what you would characterize as a face contact?

A Again, it is not clear to me. This is not sort of standard language in the field. Like, I'm looking at this and saying, yeah, oh, this is, you know, this is -- this is not D10 or D90. This is not some -- you know, this is, you know, probably translated from Japanese and who knows, you know. I'm giving my best guess as to what they mean.

And again, it could mean a couple of things, but you know, I think we're not disagreeing about the possibilities.

Q We will agree, though, that point contact is definitely not referring to the situation where the polymer coats the non-conductive particle?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 250 of 334

A Yeah, I would say that -- that either the polymer is only coating the non-conductive particle at various points where they're connecting together, right, yeah.

Q And face contact may, but you're not sure is referring to that?

A Well, that -- that might be some kind of more spread interaction.

Q Is Akiike's porous layer or Murakami's porous layer better for use in a lithium-ion battery separator?

MR. STEIN: Objection, calls for speculation.

A Again, I don't know. You keep asking me this question. I -- I am not a battery company. I don't really know, you know, when I pickup my phone exactly what the optimum configuration that they have used. You know, that might even be proprietary. You know, I'm familiar with the materials and I'm familiar with a lot of the art, but I don't know what is best in some objective sense.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 251 of 334

I do know that, again, they can be optimized for different things and different -- different criteria, you know, require different approaches. Murakami and Akiike actually are at least in the embodiments that, you know, like the -- the examples, are quite similar.

Q And would you say Beard is quite different from Murakami and Akiike?

A Well, it has similarities and it has differences. It -- at least in the embodiments, you know, in some of the embodiments may be using more polymer although those higher amounts of polymer are, you know, possible in Murakami. Yeah, I mean, certainly -- certainly there are differences and a POSITA would want to look at different things to get, you know, different ideas for practicing the invention.

Q We can go ahead and turn to Exhibit 1007.

(Exhibit 1007 discussed.)

Q That should be, I believe, the Honda reference.

A Okay. Give me a second here, okay.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 252 of 334

Q Do you recognize this reference?
A I do.
Q Can you go to paragraph 45 of Honda?
A Yeah, okay.
Q Here it talks about in the present disclosure a thickness of a partition wall constituting a honeycomb structure is, for example, .1 to 2 microns, correct?
A Yes, that is what it says.
Q What is a partition wall in Honda?
A Well, that is the wall between the voids of the pore structure, of the honeycomb structure.
Q And what are the partition walls in Honda made out of?
A I believe Honda uses polyvinylidene fluoride polymer and also can include a filler, which can be a inorganic particle.
Q And Figure 1 of Honda depicts this honeycomb structure with partition walls?
A Yeah, it does.
Q And what are the partition walls in Figure 1?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 253 of 334

A My understanding of the partition walls are the basically, like, the white structures, right. To some degree they also would include the bottoms of those things, right.

Q Right.

A And, you know, and you can see like little black areas in the bottoms, which I would interpret as the micropores to which they refer that connect one pore another pore. And there is probably similar connections through the sidewalls through those, you know, walls that are coming out at you, but you can't see those because it is -- you know, it is coming out at you, so...

Q And what type of image are we looking at in Figure 1?

A I believe it is a scanning electron microscope image. I would have to go look, but you know, in my experience that looks like an SEM.

Q And we're looking at essentially a cross-section of this partition or honeycomb structure, correct?

A No, I don't -- no, I mean I think that is

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 254 of 334

a free surface. I mean, you -- you -- you coat this thing on to some kind of a substrate. You again, do a coagulation process, dry it out and you get this. And this is what you see when you look directly down on it.

Q So you don't believe --

A You don't cut --

Q You don't believe that there is any cut here is my question?

A Well, let's see what it says. I don't want to, you know, misspeak here. It has got to be somewhere in here where they -- let me search for Figure -- Figure 1.

Yes, brief descriptions of drawings, paragraph 11. An image obtained by observing a separator of example A1 using a scanning electron microscope from a direction perpendicular to the surface. So there is nothing cut there. That is just the free surface after they made it.

Q And does Honda's -- well, is Figure 1 an example or an image of example A1 that is described in paragraph 118?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 255 of 334

A I think it says that so I mean, that is what it said in what I just read to you.

Q Can you see any inorganic particles in Figure 1?

A It is hard to tell, because again the image quality is so poor, but nothing -- you know, there is nothing in that image, that -- that -- I guess there is -- I mean there is a couple of little bright spots that could be, but it is just a couple of them. So it -- you know, it doesn't look like any, you know, particular, you know, content of inorganic particles.

And let me see, what paragraph is that again, where it is describing --

Q 118, 118?

A 118, because, yeah, I went back up to the image and then I lost it. So yeah, it doesn't say that they put any particles in there, so that -- that would be consistent.

Q And then going to paragraph 64 talking about the surfactant. Do you see that?

A Yes.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 256 of 334

Q What -- what is a surfactant?
A Well, it is -- it is -- I mean, soap is a surfactant, right? It is a molecule that has kind of a dual character that allows it to compatiblize, say, a kind of an oil -- oily kind of chemistry with an aqueous chemistry.
Q And you have kind of described -- but I mean, like, if you had to explain to a layperson what a surfactant is, like, what makes it a surfactant and not just describing what its properties are, what makes a material a surfactant?
A Well, it is a molecule, oftentimes a fairly small molecule. They're all polymeric surfactants that have kind of like two different halves; one-half, which is chemically like oil and one-half that is typically charged, electrically charged, and you know, was more compatible with water, and similar chemicals to water. And so it tends to go to interfaces between oil and water.
One of the reasons why it is used as soap is because it allows you to basically disperse oil

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 257 of 334

in water and get rid of it.

Q In the context of these separator layers, what are some advantages and disadvantages of using a surfactant?

MR. STEIN: Objection, calls for speculation.

A So I think, for instance, looking at example A1 at 118, let's see. Did they talk about -- do they put a surfactant in there? Maybe not, but basically what they're doing here is they are using a kind of a solvent/non-solvent separation process with a mixed solvent of acetone and water, and water is the non-solvent.

And what the surfactant is going to kind of do is it is going to allow the tuning of the interfacial energy, the interfacial tension of the vinylidene fluoride -- polyvinylidene fluoride component as it's separating out during the precipitation and that can allow you to tune the size of those pores, for instance.

So you know, it is another knob that you can dial, I believe, in this case to control that

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 258 of 334

pore structure and make it come out the way you want it, the wall thickness, the pore size and so forth. One aspect that can influence that would be whether or not you have the surfactant there and how much and what kind.

Q And so it is fair to say that use of a surfactant affects things like pore structure, pore size, pore creation, correct?

A It can. You know -- you know, again, in particular in a case where you are doing this sort of solvent/non-solvent kind of process, coagulation process, and, you know, especially when like the non-solvent is something like water or something else that is influenced, you know, influenced by a surfactant.

Q If we can go to paragraphs 57 through 62. I guess before I get there, I'm just thinking on your last answer.

Do you have to test a surfactant to know what effect it will have on your pore creation and pore structures?

A Well, I mean, you know, you might

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 259 of 334

hypothesize that it is going to tend to make the pores bigger, for instance, all things being equal, because it decreases surface tensions. But you know, a POSITA would need to, you know, do some tests, make some sample materials and investigate them to see how that works out, right. You don't necessarily know how much to add and you know, there is different kinds of surfactants, you don't know which one to use and so forth.

Q In paragraphs 57 through 62, Honda talks about other additives and inorganic fillers, correct?

A Let's see. Yes.

Q And my question is do all embodiments of Honda use inorganic particles?

A No, they don't. I mean, we just -- we just talked about that with respect to A1.

Q And for embodiments that do use inorganic particles, what is the preferable mass percentage of those particles?

A I don't know. Does it say it here?

Q I see it in paragraph 62.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 260 of 334

A Yeah, I just found it. Well, it is 1 mass percent to 95 percent, more preferably 5 to 80 percent, further preferably 10 mass percent to 50 mass percent, so that is what it says.

Q And when inorganic particles are used, what is the preferable particle size distribution of those particles in Honda?

A That appears to be paragraph 58. The average particle size of the filler is preferably .01 microns to 10 microns, a lower limit of .1 microns is more preferable and an upper limit of 5 microns is -- or less is more preferable.

Q Particle size distribution that they're talking about is a weight cumulative particle size distribution, correct?

A You know, this is a little bit funny, because they say in paragraph 59 it is a weight cumulative particle size distribution, but then they say they measure it using a laser diffraction instrument, which actually measures a volume based distribution.

And in order to go from a volume to a mass

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 261 of 334

based distribution, you need to know something about the particle shape. You need a sort of an independent model where, you know -- you need to know -- you need to know what the particle shape is basically.

So maybe if you assume they're spherical particles you can make that conversion, but --

Q And so --

A -- I am wondering whether, for instance, this is, you know, some kind of a mistake either on the part of the inventors or the translator because it doesn't make that much sense to measure something with a device that measures volume and then say we're doing it based on mass, but you could. I would be interested to see what the original Japanese says, but okay.

Q If you want to pull it, it is Exhibit 1006.

A What do I know from Japanese, do you read Japanese?

Q I thought you just mentioned you did.

A No, no, no. What, for the -- for the --

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 262 of 334

for the pronunciation of Akiike?

Q Yes.

A I took -- I took introductory Japanese at MIT in my first year of graduate studies for about two weeks until I realized I was either going to learn Japanese or I was going to get a Ph.D. but not both. And so I learned enough to know how to say Akiike, but that is about it.

Q Certainly Honda reports its distribution of particle sizes as a weight cumulative particle size distribution, correct?

A That is what it says there.

Q And even though it measures particle sizes with a laser diffraction type particle size distribution measurement device, correct?

A That's what it says.

Q And so Honda at least seems to indicate that even using laser diffraction devices to measure particle sizes, you can report particle size distributions using distributions other than volume cumulative distributions, correct?

A Yeah. It is not the natural way to do it,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 263 of 334

but you could -- you could do a calculation, sure.

Q Let's go to Exhibit 1009.

(Exhibit 1009 discussed.)

A Okay.

Q And do you recognize 1009 as the English translation of the Tanaka reference?

A I do.

Q And this is another piece of prior art that you relied on in forming your opinions?

A Yes.

Q Could you go to the abstract on the first page shown as item number 57?

A Yes.

Q It defines the problem as to provide a polyolefin porous sintered compact that can ensure high water absorption performance, has little pressure loss and has excellent durability. Do you see that?

A I see that, yes.

Q What is -- compact?

A You kind of cutout a little bit, what did you say?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 264 of 334

Q I'm sorry, what is a sintered compact?

A It is a piece of material that is -- you know, a solid piece of material that is produced by a process called sintering.

Q And what is sintering?

A Sintering is taking little particles of something, like little grains of something and -- and bonding them together. Oftentimes maybe by heating them so that their outer surfaces kind of melt enough just to stick together. Could also be done by compressing them even in the absence of heat, so that the outer layers kind of meld or merge into one another and they stick together.

Q Why would a POSITA want to ensure high water absorption performance?

A You know, the main -- one of the main applications of this thing is that they want to use these things as filters or maybe separators for biomedical kind of applications that may involve, you know, putting an aqueous solution through them to separate out a protein or something like that.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 265 of 334

Q Is the separator in Tanaka a composite separator?

A The separator in Tanaka, which they do say can also be used as a battery separator by the way. I mean, they talk mostly about these biochemical and filtering kind of things, but they do say it is also a battery separator. My understanding of it is that it is made out of polyolefin.

Q I'm sorry, where do you believe it says that it can be used as a battery separator?

A Paragraph 69.

Q Where it is referring to --

A The middle. The separator for a lithium-ion secondary cell or a lead storage cell with like a fuel cell, carrier for a solid electrolyte.

Q Is high water absorption relevant to its use as a battery separator in a lithium-ion secondary cell?

A Only in that it would indicate potential good porosity for ion transport. So for the same

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 266 of 334

reason that people measure Gurley number values for air permeability of separators to get an idea of how permeable they would be to ions as a battery separator, water permeability in this case would indicate that you have good permeability that -- if you used it in a battery, but in the battery itself there would be no water.

Q Fair to say that Tanaka's structure is different from the composite separators that we were looking at for Murakami, Beard, and Akiike, correct?

A There are certainly differences, sure.

Q And what are some of the main differences in your mind?

A Well, it doesn't have a filler. It doesn't have the inorganic particles in it.

Q Do you know --

A I'm not relying on it for -- for the filler, so just a pore size distribution coefficient.

Q Do you know if addition to a filler would impair its water absorption capabilities?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 267 of 334

A I don't think it would. You know, I think you could conceivably blend in and co-sinter at least some of the types of inorganic oxide particles with this polyolefin, make a similar structure.

Q Between Murakami, Beard, Akiike and Tanaka, which porous laser is better for use in a lithium-ion battery separator?

MR. STEIN: Objection, calls for speculation.

A It is the same question you keep asking me, and basically I don't know. They have different properties. Some of them would be good for some properties, some of them better for others. I don't actually know what commercial manufacturers are using, per se, in any of these.

Q And same question between Honda and Tanaka, which porous laser is better for use in a lithium-ion battery separator?

MR. STEIN: Same objection.

A Between Honda and Tanaka. Well, I mean certainly Honda actually constructs batteries and,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 268 of 334

you know, tests them, I believe, whereas -- Honda does. Tanaka, you know, Tanaka is mainly focused on more of these sort of filtration-type applications.

Q Are different ratios of D90 to D10 more difficult to achieve at different average particle sizes?

MR. STEIN: Objection.

A Could you repeat that, please?

Q Are different ratios -- or scratch that, I will ask a better question.

For a given ratio of D90 to D10, is it harder or easier to accomplish a desired ratio for large particle sizes?

MR. STEIN: Same objection.

A Harder or easier. I mean, I don't know, whether we're talking -- certainly within a range of kind of normal particle sizes, it is not going to matter that much. If you have, like, extremely large particles or extremely small particles, you know, it might get challenging.

But you know, if you are looking at

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 269 of 334

particles with an average size of D50 of, you know, 1 micron or something like that or half a micron, 2 microns, I don't think in that range, you know, it -- it is particularly harder or easier. I'm not even sure what harder or easier means.

Q To obtain or construct a distribution of particles that fit within that desired ratio?

A Right. Well, I mean, you know, you may grind the particles in some sort of a mill. You may -- you may try and filter out really big ones and really small ones using some kind of screens or sieves. You know, there is different ways you can do this. I mean, in my experience you buy these things and so you just look for the distributions that are available and you buy what you want.

Q In paragraph 73 Tanaka talks about some example D10 and D90 values. Do you see that?

A Paragraph --

Q 73?

A Paragraph what?

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 270 of 334

Q 73.
A 73.
Q In Tanaka.
A Right. Those are -- in this discussion we were talking about, are we talking -- maybe I got confused. Were we talking about pore sizes or are we talking about particle sizes?
Q I was talking about particle sizes, but I want to get to pore sizes here, so sorry for the confusion.
A Okay, all right. So I didn't misspeak, because I thought, you know, maybe -- yeah, okay, all right. So now we're talking about pore sizes.
Q Right. It provides a D10 of 13.8 microns and a D90 of 5.07 microns. Do you see that?
A Yes.
Q Is that possibly correct?
A Yes, because if you look -- I mean, you know, this is a little confusing. But if you look -- there is somewhere in here where they tell you that basically Tanaka has decided to look at his pore size distribution from the cumulatively, not

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 271 of 334

from the small side of the distribution, but from the large side.

So D10 is like the 10 percent largest from the large side, so it is basically the equivalent of D90. In -- you know, in -- or R90 in the '148 patent, right. I mean, these are diameters and in the patent, they talk about radiuses but, you know, because we're looking at ratios the two divides out, so it doesn't matter.

But basically this D10 over D90 as described at 73 in Tanaka, is the same thing as R90 over R10 in the patent, because they're measuring these things from the large side of the distribution. You can maybe find that someplace else in here.

Q With respect to the claims of the '148 patent that require a ratio of Dv90 to Dv10 for the inorganic particles to be within a certain range?

A Yes.

Q My question for you is for all of the other references besides Tanaka that we've been

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 272 of 334

talking about, why would a POSITA have a reason to care about the ratio between those two values as opposed to the difference between those two values?

MR. STEIN: Objection to the form of the question, calls for speculation.

A Yeah. I'm a little -- I'm a little confused here. Are we talking about particles or are we talking about pore sizes or --

Q I'm back to particles, because I'm running out of time, so sorry if I'm jumping around a bit.

A All right. So ask the question again.

Q So my question for you is for all of the other references besides Tanaka that we've been talking about, why would a POSITA have a reason to care about the ratio between those two values as opposed to the difference between those two values?

MR. STEIN: Same objections.

A Those two values being 90 -- D90 and D10.

Q That's right?

A Because these are stan -- these are all

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 273 of 334

standard measures of like the span of the distribution, how wide is it. And they are just a natural thing that a POSITA would look at, right. I mean, if you get sample particles that -- and you know what D90, D10 and D50 are, you know, you would immediately say, well, what is the -- what is the difference between D90 and D10? How broad is that distribution?

And then you might say but that is -- that is just an absolute number. How broad is it sort of relative to its -- the sizes of the particles on a relative basis and then you want some kind of ratio. So D90 over D10 is a standard ratio to take as is, you know, the quantity D90 minus D10 divided by D50. They're all just sort of versions of something called the span.

And yeah, I mean Dr. Wheeler in his declaration was talking about how, oh, a POSITA would never think of doing this, and oh, it is so unusual. No, everybody does that. It is very common. It is not like you wouldn't think of it. Everybody knows that, so, you know.

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 274 of 334

Q And do you have any evidence that you have cited to that says that everybody knows that?

A I didn't think it was -- you know, I mean this is just the knowledge of a POSITA. I mean if -- if we wanted to look for references in the literature, it may be too late. I don't know what the rules of evidence are here, but, you know, you could Google this in, you know, Google Scholar or Google Patents or whatever, and you would find plenty of it. All of these different versions, D90 minus D10, D90 over D10, D90 minus D10 divided by D50, you find lots of it.

MR. COX: Objection, nonresponsive.

Q And why would a POSITA want to optimize the ratio as opposed to optimizing the difference between Dv90 and Dv10?

MR. STEIN: Objection, calls for speculation.

A I think the POSITA would pay attention to both. Again, they're not mutually exclusive. If you have -- if you have the -- if you have the numbers to calculate D90 divided by D10, you also

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 275 of 334

have the numbers to calculate D90 minus D10, and you would be an idiot if you didn't look at both. And you would not be a POSITA if you didn't understand that both were interesting.

MR. COX: I'll pass the witness.

MR. STEIN: No questions. Thank you, Dr. Gido.

(Deposition adjourned at 5:57 p.m.)

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 276 of 334

CERTIFICATE OF SHORTHAND REPORTER

I, Susan S. Klinger, the officer before whom the foregoing deposition was taken, do hereby certify:

That SAMUEL GIDO, PH.D., the witness whose deposition is hereinbefore set forth, was duly sworn by me before the commencement of such deposition and that such deposition was taken before me and is a true record of the testimony given by such witness.

I further certify that the adverse party, ZHUHAI COSMX BATTERY CO., LTD., was represented by counsel at the deposition.

I further certify that the deposition of SAMUEL GIDO, PH.D., occurred virtually on Thursday, November 13, 2025, commencing at 10:02 AM to 5:57 PM.

I further certify that I am not related to any of the parties to this action by blood or marriage, I am not employed by or an attorney to any of the parties to this action, and that I am in no way interested, financially or otherwise, in the outcome of this matter.

IN WITNESS WHEREOF, I have herunto set my hand on the 14th of November, 2025.



Susan S. Klinger, RMR-CRR, CSR

Texas CSR 6531, Exp: 10/31/27

California CSR 14487, Exp: 11/30/26

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 277 of 334

A
a1
255:16, 255:21, 258:8, 260:17
ability
116:5
able
11:11, 29:17, 83:15, 83:19, 93:6, 99:1, 143:12, 202:18, 203:2
abnormally
18:21
above
70:19, 71:4, 124:22, 125:14, 125:21, 173:1, 197:1, 197:3, 214:17
abrasive
148:6, 148:9, 148:12, 149:4, 161:20, 162:1
absence
157:15, 265:11
absolute
11:8, 29:5, 229:1, 229:20, 229:21, 274:10
absolutely
76:3, 79:16
absorbed
248:2
absorbing
44:2
absorption
264:16, 265:15, 266:18, 267:22
abstract
209:1, 264:11
accomplish
73:6, 269:13
accomplished
135:10, 135:17
according
161:9, 177:6
accused
17:16, 17:17
acetone
258:12
achieve
83:7, 83:15, 83:20, 161:17, 176:6, 207:2, 269:6
achieved
201:5, 201:10
achieves
162:8, 163:12, 164:2
achieving
209:5
across
194:3, 194:13
acrylate
238:9
acrylates
231:8
acrylic
231:11
acting
127:19, 128:11, 129:4, 129:20, 243:19, 245:15, 247:4
action
221:1, 221:3, 277:20, 277:22
actual
43:19, 66:16, 211:4, 238:4
actually
12:18, 21:6, 34:21, 35:20, 36:10, 39:22, 50:10, 53:19, 55:16, 56:19, 61:18, 79:8, 97:12, 97:17, 99:5, 105:21, 107:16, 115:1, 122:9, 122:19, 128:3, 129:8, 136:11, 147:3, 166:6, 166:22, 177:1, 178:7, 185:17, 196:19, 210:7, 212:14, 225:15, 229:20, 234:12, 252:4, 261:20, 268:15, 268:22
add
61:6, 260:7
added
41:12
addition
126:1, 267:21
additionally
129:13
additives
201:19, 260:11
address
202:22
adhesion
91:14, 91:18, 97:15
adjourned
276:8
adjust
101:20
adobe
124:7
advantages
258:3
adverse
23:19, 277:12
advice
26:1
affect
83:14, 83:18, 83:21, 196:1, 204:3, 211:10, 211:13, 213:8
affects
259:7
aforementioned
175:16
after
50:3, 98:7, 132:11, 134:16, 150:14, 162:19, 163:6, 220:22, 255:19
afterwards
131:22
again
8:19, 13:7, 17:11, 24:19, 27:19, 29:3, 34:1, 42:10, 64:2, 66:10, 68:1, 75:1, 75:6, 76:2, 83:22, 84:2, 86:5, 91:11, 92:9, 96:3, 96:8, 104:14, 105:5, 106:8, 109:9, 110:13, 113:14, 117:5, 120:18, 121:21, 130:21, 151:10, 152:4, 157:5, 157:6, 158:8, 160:3, 161:11, 162:5, 163:19, 168:17, 172:2, 181:20, 183:21, 184:17, 184:22, 192:15, 209:13, 211:1, 224:8, 227:2, 241:16, 244:16, 250:10, 250:17, 251:14, 252:1, 255:3, 256:5, 256:14, 259:9, 273:12, 275:20
against
22:7, 22:21, 23:14, 177:2, 248:7
age
68:4
agent
80:22
ago
21:5
agree
15:6, 49:3,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 278 of 334

59:17, 101:19, 104:6, 104:22, 105:13, 110:19, 112:5, 136:7, 138:20, 173:14, 222:11, 250:20
ahead
8:13, 25:18, 31:7, 57:1, 72:21, 72:22, 104:4, 125:8, 125:9, 143:5, 158:1, 158:2, 190:7, 252:18
aids
7:8
air
43:10, 97:8, 97:11, 133:12, 134:3, 134:11, 267:2
akiike
225:9, 225:16, 225:17, 225:18, 225:19, 226:5, 226:12, 230:3, 230:12, 231:7, 232:22, 233:1, 235:10, 235:20, 236:17, 241:4, 241:15, 242:3, 243:1, 244:13, 244:21, 246:6, 246:21, 252:4, 252:8, 263:1, 263:8, 267:10, 268:6
akiike's
230:8, 235:11, 245:17, 251:9
alcohol
166:7
allow
53:7, 155:2, 258:15, 258:19
allowed
201:19, 201:22
allowing
81:5
allows
214:22, 222:14, 222:21, 257:4, 257:22
almost
155:3, 179:12, 230:1
along
16:15, 204:17, 205:22, 216:18, 235:15
alpha
37:3
already
21:7, 71:9
alright
147:13
also
5:7, 13:16, 16:10, 17:2, 22:20, 25:12, 25:15, 36:6, 38:6, 38:16, 39:12, 42:3, 56:5, 56:9, 57:9, 59:5, 75:9, 76:19, 76:22, 77:5, 78:8, 83:7, 83:22, 89:1, 91:4, 92:7, 96:1, 100:8, 102:10, 110:3, 115:7, 119:8, 144:13, 146:16, 155:21, 156:9, 160:20, 170:15, 181:8, 195:1, 195:15, 201:9, 202:6, 204:12, 204:19, 206:6, 206:10, 210:6, 210:13, 219:14, 221:6, 225:14, 229:8, 232:17, 236:11, 238:7, 239:7, 248:20, 253:16, 254:3, 265:10, 266:4, 266:7, 275:22
alston
3:14, 5:5, 5:7, 5:22
alter
169:21, 170:4
alternatively
134:15
although
11:9, 21:6, 21:8, 25:15, 29:19, 32:4, 55:19, 72:12, 91:17, 93:22, 128:9, 151:4, 172:22, 192:14, 193:10, 203:15, 252:12
alumina
37:3, 136:18, 148:7, 148:8, 149:7, 149:10, 150:10, 150:11, 150:12, 165:7, 165:20, 165:21, 166:2, 166:6, 166:13, 194:19, 194:22, 195:2, 239:5, 239:8, 239:15
always
16:12, 25:7, 25:10, 67:8, 68:3, 72:2, 72:15, 80:16, 108:8, 111:8, 132:8, 132:12, 154:8, 162:7, 177:5, 178:16, 187:20, 188:1, 188:5, 214:7
ambitious
173:6
amherst
7:1
among
102:8
amongst
214:8
amount
20:4, 67:14, 95:5, 95:13, 98:5, 101:4, 108:21, 109:16, 110:20, 111:18, 112:8, 114:16, 115:4, 115:10, 115:20, 119:15, 128:10, 206:11, 211:19, 212:6, 217:13, 235:2, 235:5, 245:5
amounts
14:2, 20:7, 96:4, 109:5, 116:9, 252:12
amperex
1:8, 5:5, 6:2, 6:5, 6:7, 9:2, 23:19, 26:8, 27:10, 27:12, 48:10
amperex's
117:4
analogs
239:1
analogy
244:7
analysis
33:9, 139:12, 173:8
analyzer
62:21, 63:3, 63:8, 143:11
analyzing
168:2
angular
79:3
annotated
41:15, 49:16, 50:5
annotation
7:9, 41:12, 41:21, 42:1, 42:16, 49:19,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 279 of 334

49:20, 59:11
anode
84:13, 84:15
anodes
85:16, 85:21, 87:13, 232:19
another
51:21, 66:13, 66:18, 69:10, 87:9, 90:1, 96:19, 96:21, 107:16, 109:22, 110:22, 111:20, 112:2, 117:2, 119:22, 120:6, 121:18, 121:21, 130:8, 134:17, 135:6, 135:19, 138:6, 148:12, 148:14, 148:20, 156:13, 156:15, 185:13, 205:7, 208:11, 219:14, 254:9, 258:21, 264:8, 265:13
answer
31:7, 89:15, 89:16, 129:18, 183:13, 206:16, 206:20, 259:18
answered
15:11, 17:8, 29:1, 29:16, 30:7, 31:1, 31:4, 31:5, 38:19, 39:3, 51:8, 58:21, 111:2, 188:20, 194:20, 223:1, 242:6
answering
206:22
any
7:4, 7:7, 7:17, 11:2, 11:3, 12:17, 23:13, 23:17, 26:1, 28:11, 28:19, 35:19, 45:16, 47:8, 51:3, 53:14, 54:8, 66:19, 67:1, 70:16, 72:18, 81:6, 86:19, 87:6, 94:10, 123:1, 127:1, 134:10, 135:2, 148:11, 153:17, 155:18, 156:10, 159:17, 172:20, 187:5, 197:16, 200:15, 208:9, 219:22, 220:1, 224:9, 236:20, 236:21, 246:1, 255:8, 256:3, 256:11, 256:18, 268:16, 275:1, 277:20, 277:22
anymore
86:19
anyone
7:2, 46:4, 46:8, 53:16
anything
7:5, 7:19, 10:11, 21:19, 25:22, 32:6, 65:4, 67:3, 70:16, 123:19, 127:3, 148:5, 164:4, 164:7, 179:14, 180:1, 180:5, 185:9, 186:4, 187:10, 195:13, 200:13, 208:3, 211:8, 217:13, 245:8, 245:11
anyway
52:5, 104:3, 124:13
anywhere
54:11, 66:6, 71:19, 72:19, 178:19, 191:11, 200:5, 200:20, 207:9, 220:7
apart
104:15, 147:1, 156:11
apparent
76:6
appeal
1:3
appear
73:19, 120:13, 146:9, 189:4
appears
9:21, 49:5, 53:13, 261:8
appendices
114:10, 118:1
application
13:15, 14:6, 14:8, 57:21, 73:7, 92:16, 103:6, 130:6, 153:18, 154:2, 158:20
applications
60:9, 73:10, 83:1, 86:8, 103:3, 155:11, 265:17, 265:19, 269:4
applied
29:13, 29:17, 39:7
applies
54:8
apply
171:1, 173:16, 240:1
applying
29:13, 155:14
approach
92:13
approaches
85:19, 91:21, 98:10, 246:2, 252:4
approximately
57:8
aqueous
257:6, 265:20
arbiter
21:11
area
50:5
areas
81:22, 190:1, 245:16, 254:7
aren't
16:13, 18:21, 20:4, 75:6, 148:2, 148:11
arguments
48:19
around
16:13, 36:15, 38:12, 41:18, 42:20, 51:4, 68:11, 68:12, 75:7, 81:6, 93:19, 129:18, 157:7, 159:9, 167:6, 199:15, 245:12, 273:11
arranged
99:2
arrow
42:21, 122:4
art
10:10, 11:12, 17:10, 17:15, 18:9, 18:22, 19:13, 19:14, 28:21, 29:4, 29:10, 29:13, 29:21, 30:20, 30:21, 31:14, 31:16, 32:1, 32:3, 32:8, 32:10, 32:12, 32:21, 35:12, 42:4, 43:16, 49:17, 51:16, 53:16, 53:20, 62:8, 62:11, 65:20, 71:5, 71:14, 72:17,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 280 of 334

73:18, 82:7, 101:19, 108:21, 110:14, 115:14, 115:17, 124:22, 125:15, 125:21, 126:7, 127:16, 130:8, 135:12, 139:8, 143:17, 153:21, 170:9, 192:17, 192:20, 202:7, 202:9, 204:12, 209:14, 229:15, 251:20, 264:8
artist
66:2
asbestos
195:8
aside
44:13, 75:18
asked
15:11, 17:8, 18:3, 24:4, 25:1, 28:9, 29:1, 29:16, 30:7, 31:1, 31:4, 38:19, 39:3, 51:8, 58:21, 111:1, 129:14, 134:13, 188:20, 194:20, 206:17, 223:1, 225:15, 240:21, 242:6
asking
6:1, 33:8, 34:1, 129:2, 168:12, 206:20, 237:2, 237:3, 237:4, 251:14, 268:11
aspect
147:17, 259:3
aspects
29:20
assign
51:4
assigned
8:11
assist
47:19
assisting
23:13
assume
163:7, 173:5, 262:6
assumes
18:1, 18:15, 19:8, 103:12, 205:13, 209:11
assumption
183:9, 184:4
atl
6:5
atlanta
3:7
atmospheres
155:1, 155:4
atmospheric
145:12, 155:7, 155:15
atomic
76:20
atoms
14:3
attached
4:6
attempting
190:14, 190:18
attention
275:19
attorney
277:21
attorneys
3:3, 3:11
automatically
160:16
available
25:16, 270:16
avenue
3:15
average
95:17, 96:7, 137:13, 180:13, 180:16, 180:18, 181:4, 181:6, 181:18, 182:9, 182:13, 183:7, 183:10, 184:2, 184:5, 193:10, 261:9, 269:6, 270:1
averages
61:9, 189:12
avoid
158:9
aware
12:18, 23:17, 26:13, 26:14, 27:19, 27:20, 135:2, 170:9
away
113:17
axis
141:18, 142:6

B

back
24:16, 31:10, 46:9, 47:2, 72:6, 73:15, 73:22, 76:22, 82:17, 85:7, 89:11, 89:18, 96:4, 116:14, 121:4, 124:2, 173:21, 189:14, 222:9, 241:3, 256:16, 273:10
background
127:4, 127:5, 207:10
backscattered
77:13
bad
24:12, 115:9, 132:11, 132:14, 135:15, 202:11, 212:12, 244:12
balance
214:8
ball
62:12, 157:11, 160:13, 162:8, 170:11, 170:22, 171:8, 171:15, 171:19, 172:6, 173:6, 175:16, 249:14
balls
162:10, 170:14, 243:11, 243:22
bar
70:4
base
142:11, 172:13
based
14:1, 35:20, 61:22, 73:5, 113:5, 129:15, 137:6, 137:14, 137:17, 137:21, 137:22, 138:1, 138:12, 138:16, 142:11, 143:15, 159:17, 229:19, 261:20, 262:1, 262:14
basement
76:5
basically
13:14, 16:12, 18:5, 19:11, 22:2, 25:13, 28:10, 36:4, 42:19, 43:11, 44:5, 50:22, 56:13, 59:9, 59:11, 62:1, 67:6, 69:18, 75:9, 75:22, 76:16, 76:19, 76:22, 78:15, 81:4, 91:10, 97:10, 98:1, 122:1, 129:9, 134:3, 135:12, 144:15, 146:13, 148:4, 153:19, 165:11, 170:1, 185:20, 188:11, 198:16, 204:16, 211:20, 215:2,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 281 of 334

223:6, 230:10, 238:1, 239:1, 244:2, 244:13, 248:10, 254:2, 257:22, 258:10, 262:5, 268:12, 271:21, 272:4, 272:10
basing
138:4, 138:5
basis
61:3, 61:4, 61:11, 61:12, 61:13, 62:9, 62:10, 152:22, 159:15, 274:12
bath
135:19
batteries
85:4, 85:6, 86:8, 86:12, 86:20, 87:4, 87:20, 88:6, 93:4, 94:10, 268:22
battery
1:5, 6:10, 34:13, 42:5, 42:6, 42:11, 84:8, 84:10, 86:4, 86:10, 86:16, 87:17, 87:21, 88:2, 90:16, 92:9, 95:4, 98:3, 98:6, 98:12, 102:18, 149:19, 209:18, 212:18, 213:17, 232:16, 245:18, 251:11, 251:15, 266:4, 266:7, 266:11, 266:19, 267:4, 267:6, 267:7, 268:8, 268:19, 277:13
bead
230:13, 230:14, 243:5
beads
230:15, 232:8, 238:10
beams
148:14
bean
248:12, 248:14, 249:4
beans
244:7, 245:6, 249:6
beard's
80:20, 205:11, 206:18, 207:17, 213:18, 245:17
became
126:22
because
9:12, 24:13, 26:18, 30:20, 31:15, 34:18, 37:5, 40:3, 51:6, 52:22, 56:9, 56:10, 61:22, 63:5, 68:15, 68:20, 70:1, 75:13, 76:11, 77:3, 77:5, 77:8, 78:3, 99:3, 102:3, 105:8, 106:13, 122:7, 124:12, 128:2, 137:7, 148:3, 149:16, 150:9, 151:7, 152:4, 152:8, 152:21, 154:16, 158:6, 161:4, 169:3, 171:14, 177:11, 182:7, 193:14, 195:21, 209:17, 212:9, 224:6, 229:18, 231:17, 246:20, 254:12, 256:5, 256:16, 257:22, 260:3, 261:17, 262:12, 271:12, 271:18, 272:8, 272:12, 273:10, 273:22
become
116:1, 116:2, 116:4, 153:7
becomes
82:12, 115:19, 171:16, 185:11
been
5:3, 6:9, 8:10, 18:3, 21:8, 23:22, 24:4, 25:1, 29:22, 45:14, 48:14, 85:18, 85:21, 86:11, 86:12, 98:8, 108:20, 116:21, 119:15, 121:13, 129:14, 130:6, 134:16, 167:18, 194:18, 213:9, 213:11, 225:10, 231:21, 272:22, 273:14
before
1:3, 2:7, 9:4, 10:1, 13:9, 20:13, 41:3, 48:2, 49:4, 108:14, 125:13, 141:6, 169:1, 170:22, 171:1, 172:20, 179:1, 211:12, 259:17, 277:3, 277:8, 277:10
begin
130:16
beginning
36:15
begins
41:5, 125:1
behalf
6:2
behave
243:16
behavior
114:22
behind
96:8
being
15:1, 34:18, 37:21, 53:9, 53:15, 56:12, 66:12, 81:16, 93:13, 120:4, 135:15, 142:10, 156:2, 156:21, 157:2, 177:14, 185:11, 198:10, 239:6, 243:21, 260:2, 273:20
belief
72:16, 155:14, 168:21
believe
23:15, 24:1, 37:4, 37:17, 53:19, 65:18, 71:6, 116:1, 118:7, 134:22, 137:7, 151:5, 151:20, 158:4, 168:4, 171:21, 177:12, 187:10, 191:2, 197:18, 252:20, 253:15, 254:16, 255:6, 255:8, 258:22, 266:10, 269:1
believed
65:22
bells
117:1
below
59:8, 147:12, 199:3, 199:8, 233:15, 234:7, 234:21
besides
7:8, 95:19, 96:12, 272:22, 273:14
best
6:16, 6:18,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 282 of 334

61:19, 91:22, 92:15, 250:16, 251:21
better
63:21, 82:9, 165:17, 174:12, 174:17, 179:4, 204:17, 209:2, 213:16, 245:18, 246:5, 251:10, 268:7, 268:14, 268:18, 269:11
between
14:10, 26:8, 36:11, 39:2, 50:14, 51:7, 55:3, 69:15, 105:15, 105:19, 116:13, 119:9, 120:15, 123:7, 131:19, 138:15, 138:18, 158:12, 173:19, 174:1, 174:8, 174:20, 176:14, 176:18, 177:14, 178:20, 179:19, 181:9, 181:17, 181:22, 194:3, 194:13, 196:3, 196:9, 199:18, 203:4, 211:21, 212:1, 218:5, 221:15, 221:20, 223:4, 227:19, 227:20, 228:14, 230:4, 230:7, 241:8, 241:14, 241:20, 242:5, 242:11, 242:14, 242:16, 247:2, 248:21, 253:11, 257:20, 268:6, 268:17, 268:21, 273:2, 273:3, 273:16, 273:17, 274:7, 275:16
beyond
163:20, 192:22
big
62:12, 70:1, 102:3, 110:6, 191:8, 196:5, 196:6, 204:6, 215:13, 219:11, 224:17, 224:22, 270:11
bigger
72:11, 182:12, 182:14, 193:3, 193:15, 202:13, 202:19, 204:18, 204:19, 206:9, 260:2
biggest
182:7
billion
22:3, 169:9
bind
242:22
binders
14:6, 232:16, 246:17, 246:19
biochemical
266:6
biomedical
265:19
bird
3:14, 5:5, 5:7, 6:1
bit
11:7, 24:10, 31:10, 34:3, 45:18, 50:9, 54:17, 68:2, 70:5, 75:2, 79:6, 90:21, 95:9, 100:1, 105:18, 110:9, 123:3, 126:14, 128:20, 138:22, 163:22, 182:11, 182:12, 185:19, 189:14, 197:2, 223:3, 225:13, 227:5, 229:18, 247:11, 261:16, 264:21, 273:11
black
254:7
blah
192:7, 192:8
blame
186:2
blank
7:10
blend
268:2
blended
222:12, 222:21, 223:8
block
201:14, 201:19, 201:22, 209:17
blocked
77:15, 209:16
blocking
202:2, 202:18, 209:8, 209:14
blood
277:20
blow
133:13, 134:11
blue
50:6, 50:14
board
1:3
boards
7:4
bond
220:10, 220:13
bonding
222:15, 223:11, 223:20, 224:16, 224:17, 265:8
book
63:14, 146:22
borderline
152:21
both
13:10, 38:12, 38:13, 47:4, 56:14, 81:13, 83:13, 83:18, 83:20, 103:3, 107:12, 126:2, 130:12, 131:12, 139:15, 140:4, 154:11, 191:9, 193:14, 195:20, 205:1, 206:22, 215:14, 215:17, 216:6, 216:10, 218:15, 220:9, 222:13, 223:9, 235:22, 236:2, 236:18, 237:9, 240:1, 240:9, 244:14, 246:2, 263:7, 275:20, 276:2, 276:4
bothering
148:2
bottom
26:18, 27:1, 27:3, 49:12, 49:14, 93:21, 117:15, 124:20, 125:11, 125:12, 148:21
bottommost
41:6
bottoms
254:4, 254:7
bought
173:7, 173:10
bounce
157:7
bound
246:22
boundaries
29:7, 29:20, 29:22, 30:5, 122:10, 122:11, 204:17
boundary
14:16, 30:12, 30:18, 122:2
bounds
11:8, 11:14, 11:17, 29:6, 30:6
brady
3:12, 5:4,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 283 of 334

5:22, 225:3
branching
210:7
brand
63:2, 144:17, 144:21
break
45:19, 45:20, 46:1, 46:5, 46:8, 46:10, 79:9, 79:13, 79:18, 82:16, 107:17, 107:19, 107:21, 139:1, 153:7, 166:14, 166:20, 167:16, 225:4
breaks
46:7, 97:17
brief
45:11, 46:22, 47:15, 47:19, 48:9, 226:6, 255:14
briefs
46:20
bright
54:21, 55:1, 55:10, 55:11, 56:8, 56:9, 56:10, 59:9, 68:6, 69:1, 69:6, 75:19, 76:11, 77:3, 77:7, 77:22, 78:3, 256:9
brighter
76:18, 77:1
bring
168:15
brittle
93:5
broad
11:6, 35:21, 36:10, 181:16, 229:2, 244:19, 274:7, 274:10
broaden
175:17
brochure
142:20, 145:20, 146:5, 150:10, 161:10, 177:6
build
87:15
building
63:12, 85:3, 107:3
built
87:3, 87:6, 87:8, 87:16
bulk
19:2
bumps
68:13, 80:1
bumpy
210:18, 210:19
bunch
68:9, 72:13, 146:22, 233:15
burst
144:22, 145:9, 145:15, 145:17, 149:1, 151:17, 175:18, 177:4, 177:7, 177:15
business
87:22
buy
173:7, 176:8, 270:14, 270:16
byrd
3:13, 5:7

C

calculate
37:4, 229:7, 275:22, 276:1
calculated
53:15
calculating
138:16
calculation
264:1
california
2:9, 277:32
call
5:18, 5:19, 11:22, 133:2, 133:9, 215:5, 225:16, 225:17, 237:14
called
22:21, 62:20, 144:12, 212:13, 217:22, 227:11, 227:12, 227:13, 227:14, 232:20, 265:4, 274:16
calling
73:18, 130:7
calls
19:9, 28:7, 29:2, 32:16, 34:7, 35:17, 39:18, 65:15, 71:1, 83:9, 96:1, 103:11, 113:11, 159:1, 163:2, 163:17, 164:18, 168:8, 170:6, 176:3, 177:18, 181:12, 183:11, 187:13, 190:16, 191:22, 196:10, 201:16, 203:8, 207:4, 213:19, 217:7, 217:9, 224:1, 229:11, 245:20, 249:22, 251:12, 258:5, 268:9, 273:6, 275:17
came
86:21
can't
32:19, 33:10, 33:11, 33:14, 37:15, 38:3, 77:2, 95:12, 99:9, 106:8, 124:11, 146:13, 152:6, 182:6, 184:17, 184:22, 215:19, 216:4, 254:12
cannot
77:21, 182:1
capabilities
267:22
capable
99:6
capacity
98:3
captured
193:20
carbon
14:1, 152:21, 153:2, 153:5
carbon-based
239:1
carbonate
85:2
carboxymethyl
37:2
care
228:15, 273:2, 273:16
careful
10:3, 222:22
carefully
222:14, 223:12, 223:19, 224:15
carrier
266:16
carry
134:16
cartoon
166:22
case
1:11, 5:10, 7:11, 8:17, 9:5, 16:12, 18:5, 18:19, 19:3, 21:1, 26:2, 26:5, 26:8, 33:20, 34:2, 38:13, 48:17, 48:20, 68:3, 68:5, 72:15, 91:19, 97:12, 105:10, 106:3, 111:9, 112:15, 117:8, 122:14,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 284 of 334

122:16, 122:21, 154:9, 164:2, 198:20, 203:8, 236:19, 241:18, 247:19, 258:22, 259:10, 267:4
cases
17:12, 20:18, 21:8, 25:4, 25:5, 25:11, 36:2, 36:4, 36:6, 51:18, 110:19, 111:11, 112:12, 112:20, 120:7, 169:3, 198:3, 212:6, 213:2, 214:14, 214:16, 215:11, 215:12, 216:6, 216:10, 217:6, 218:15, 220:9
cast
171:13
catches
98:2
cathode
84:15
cathodes
85:16, 85:21, 87:13, 232:18
cations
87:11, 87:12
causality
223:4, 224:9
cause
153:6, 155:16, 203:12, 221:21
causes
135:16, 223:14
causing
91:10, 91:17
cavities
69:14, 105:14, 119:9, 203:4, 203:18
cavity
69:9, 69:10, 120:4
ccs
97:10
cell
57:12, 97:22, 100:15, 190:15, 190:20, 190:22, 191:3, 191:7, 191:12, 191:13, 266:15, 266:16, 266:20
cells
87:9
cellulose
37:2
center
117:11, 125:4, 125:6
centimeters
34:22, 35:1
central
11:10, 63:11
ceramic
41:21, 42:15, 88:21, 89:17, 90:10, 90:11, 91:12, 92:5, 92:11, 93:1, 93:9, 105:1, 105:12, 109:12, 118:8, 119:2, 119:16, 121:17, 123:21, 123:22, 162:10, 238:3, 239:2, 249:11
cerium
149:7
certain
31:21, 56:6, 68:20, 82:11, 92:10, 98:14, 143:10, 172:16, 221:20, 221:21, 272:18
certainly
12:17, 12:18, 15:5, 19:22, 25:7, 38:20, 42:6, 44:12, 58:1, 65:18, 66:11, 66:14, 67:16, 70:19, 73:11, 78:2, 78:22, 82:8, 83:4, 84:4, 85:17, 85:20, 87:1, 92:3, 93:3, 96:22, 97:1, 100:7, 106:1, 106:11, 110:11, 114:20, 115:5, 115:21, 116:8, 116:10, 127:14, 133:19, 134:22, 156:16, 157:15, 170:8, 170:10, 182:15, 184:20, 192:22, 202:8, 204:8, 205:3, 211:16, 221:12, 222:18, 228:8, 236:5, 237:7, 249:8, 252:14, 263:9, 267:12, 268:22, 269:17
certificate
277:1
certified
2:8
certify
277:5, 277:12, 277:15, 277:19
chain
250:4
chains
243:18, 249:12
challenging
117:3, 118:14, 269:21
chamber
146:11, 146:12, 147:9, 147:14, 148:10, 148:16, 149:12, 151:3, 156:4, 156:6, 157:2, 157:8, 157:10, 157:11, 157:13, 157:19, 157:21, 158:5, 159:16, 160:13, 161:1, 161:15, 162:6, 162:8, 162:14, 162:17, 163:9, 164:11, 164:15, 170:14
chambers
145:21, 158:15, 159:17, 160:12, 161:8, 161:13
chances
34:17
change
78:22, 151:12, 154:16, 155:17, 158:14, 160:2, 161:22, 162:2, 162:12, 163:15, 170:18, 173:18, 197:13, 205:11, 206:10, 206:18
changed
173:18, 205:10, 205:17, 206:17
changes
173:12
changing
99:22, 100:3, 135:13, 135:18, 154:14, 158:10
character
257:4
characteristic
91:2
characteristics
83:2, 202:10, 214:3, 214:21, 246:3
characterize
85:12, 98:11, 129:22, 198:7, 227:17, 245:3, 250:9
characterized
86:13, 86:21,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 285 of 334

132:19
characterizing
86:9, 86:16
charged
257:17, 257:18
charging
102:21, 102:22
charts
27:15
chat
7:18
check
69:5
chemical
13:22, 98:18,
129:9, 221:14
chemically
257:16
chemicals
257:19
chemistries
85:19
chemistry
115:1, 132:16,
153:1, 257:6
chip
157:19
choosing
202:9
circles
59:21, 65:11,
65:12, 188:22,
189:4
cited
275:2
claim
10:12, 11:6,
12:8, 15:18,
17:12, 26:16,
27:15, 27:16,
27:22, 28:5,
28:20, 29:4,
29:7, 29:14,
29:20, 32:15,
34:4, 37:20,
38:16, 39:16,
40:12, 53:21,
82:8, 128:1,
128:3, 128:6,
128:17, 129:2,
129:16, 129:18,
159:18, 168:12,
168:20, 169:13,
169:14, 169:18,
178:11, 178:12,
178:13, 188:12,
191:19, 192:2,
192:4, 192:5,
192:6, 239:19
claimed
19:12, 136:5,
192:20, 208:2
claiming
159:15
claims
10:4, 10:6,
10:11, 10:21,
11:2, 11:3,
28:16, 28:17,
29:12, 31:15,
129:15, 178:3,
239:18, 244:22,
272:16
classified
172:5
clause
15:18
clear
12:4, 15:4,
17:11, 29:21,
45:7, 78:19,
101:11, 101:14,
128:2, 160:11,
176:5, 180:20,
200:11, 245:10,
250:7, 250:10
clearer
53:1
clearly
154:14
clicking
141:3
clipping
24:10
cloned
127:5, 185:19
close
121:7, 124:7,
128:13
close-up
90:18
closed
124:3, 172:3
closely
183:10, 184:4
closes
91:8
closing
47:1, 47:3
clumped
166:13
clumps
167:3
cmc
37:1, 166:5
co-sinter
268:2
coagulate
116:5, 135:16,
211:12, 217:18
coagulated
131:20
coagulates
212:9
coagulation
81:1, 112:22,
113:2, 113:17,
113:19, 114:14,
114:17, 114:21,
135:13, 202:7,
203:1, 203:6,
203:12, 215:9,
255:3, 259:12
coat
81:6, 220:10,
220:13, 220:18,
221:9, 255:1
coated
42:8, 75:3,
80:12, 81:16,
90:10, 90:11,
105:1, 105:13,
118:9, 119:2
coating
78:16, 92:5,
93:2, 93:9,
103:14, 109:10,
123:21, 123:22,
135:6, 135:8,
136:11, 136:15,
166:4, 222:2,
245:8, 245:11,
250:5, 251:2
coatings
88:22, 89:17,
91:12, 92:12,
93:5
coats
221:6, 249:20,
250:22
coefficient
208:2, 208:8,
267:20
coincidentally
26:19
collaborators
86:1
collapsing
91:10
colleague
5:6
colleagues
225:14
collected
157:3
collide
161:16
collided
162:18, 163:5
colliding
148:11, 162:9
collision
149:12, 160:13,
161:15, 162:22,
163:7
column
141:9, 221:2,
221:3, 234:15
columns
220:22
combinations
214:12, 214:19,
216:17

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 286 of 334

combining
71:14
come
46:9, 47:2, 82:17, 127:6, 203:13, 249:5, 259:1
comes
37:6, 76:17, 76:19, 173:8, 176:16, 213:15, 249:10
coming
16:15, 254:11, 254:13
commencement
277:8
commencing
277:17
commercial
268:15
common
61:19, 63:1, 143:2, 143:3, 144:19, 228:10, 274:21
commonly
138:2, 227:16, 246:16, 246:18
communication
7:18
compact
81:22, 264:15, 264:20, 265:1
companies
23:10
company
6:10, 22:4, 22:9, 22:15, 22:21, 85:7, 85:9, 86:1, 86:13, 87:20, 147:3, 167:9, 251:15
company's
166:21
comparative
18:22
compare
62:11, 98:6
compared
70:4, 113:9, 210:2, 211:12, 215:12
compatible
257:18
compatiblize
257:5
completely
16:21, 16:22, 41:20, 42:7, 42:14, 67:19, 75:3, 111:11, 112:3, 120:21, 150:2, 221:11, 245:13
complicated
112:5
component
21:22, 22:2, 22:6, 22:9, 22:11, 22:17, 22:18, 25:12, 99:21, 139:2, 214:20, 258:18
components
84:9, 95:19, 96:12, 232:17, 234:12
composed
14:16, 20:2, 30:14, 39:11
composite
190:19, 220:1, 266:1, 267:9
composition
56:6, 78:4, 98:18, 99:22, 110:9
compressing
265:11
comprise
12:2, 12:5, 12:13, 12:15, 12:21, 13:2, 17:21, 18:13, 33:16, 38:9, 38:10, 128:19
comprises
12:1, 12:10, 12:15, 15:19, 17:7, 30:2, 30:3, 128:4, 128:7
comprising
13:17, 32:11
compromise
195:16
computer
7:16
conceivably
268:2
concerned
116:11, 184:15, 184:20, 187:21
conclusion
28:8, 29:2, 33:22, 160:21, 191:17, 192:1
condensed
49:6
conditions
77:11
conductive
231:2, 231:5, 231:18
conductivity
101:21, 102:2, 102:15
confident
11:9
confidential
21:19, 26:1
configuration
161:3, 251:17
configurations
91:21, 145:21, 148:13, 160:18
configured
99:2, 145:22
confirm
8:19
conflicts
23:18
confused
117:13, 271:6, 273:8
confusing
271:19
confusion
271:10
conjunction
85:6
connect
69:15, 128:11, 254:9
connected
241:17
connecting
251:4
connection
20:19, 21:14, 28:9
connections
254:10
consider
94:9, 94:12, 95:2, 96:17, 97:1, 97:2
considerations
94:8, 94:11, 95:2, 96:16
considered
153:5
consistent
207:3, 207:13, 207:14, 207:15, 207:19, 207:21, 208:5, 256:19
constitute
43:1, 51:2, 192:19
constituting
253:7
construct
181:14, 270:7
constructs
268:22
consultation
50:3
consulting
26:2

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 287 of 334

contact
75:4, 245:16, 247:1, 247:3, 248:18, 248:21, 249:10, 249:15, 249:17, 250:9, 250:20, 251:5
contacts
53:11, 105:19
contained
201:5
containing
108:22, 109:13, 119:16
contains
137:12
contend
30:4, 50:6, 179:16
content
245:2, 256:12
context
14:5, 133:11, 146:18, 208:15, 220:17, 258:2
continue
153:11
continues
134:15
continuity
69:11
continuous
201:10
contour
16:18, 208:17
contrast
54:22, 56:3, 56:15, 75:21, 76:16, 120:11, 120:13, 250:3
contrasts
112:16
contrived
181:19
control
222:14, 222:22, 223:19, 258:22
controlled
213:3, 223:12
controlling
224:15
conversion
154:22, 262:7
convert
62:10
converted
143:15
converting
62:3
convey
66:5, 66:7, 122:8, 127:3, 228:12, 228:16, 228:17
convoluted
138:22
core
11:10
correctly
5:15, 6:16, 50:6, 159:18
correlates
219:10
correlating
149:19
correlation
218:4
corresponds
27:2, 199:9
cosmx
1:5, 5:10, 6:9, 6:13, 6:15, 6:17, 9:14, 9:16, 26:8, 26:14, 27:20, 41:1, 117:3, 277:13
cost
92:17
could
7:17, 8:18, 11:19, 13:6, 14:22, 25:18, 31:9, 36:2, 36:4, 36:6, 40:18, 46:13, 47:10, 56:7, 60:6, 71:6, 72:7, 72:17, 76:14, 96:17, 96:22, 97:7, 97:20, 102:20, 111:7, 113:2, 113:3, 113:4, 115:12, 121:5, 126:7, 128:20, 135:17, 139:1, 140:12, 140:13, 143:15, 143:17, 147:9, 148:8, 160:8, 162:1, 162:16, 166:11, 174:18, 176:8, 179:5, 181:8, 181:14, 182:10, 183:4, 183:6, 188:14, 191:1, 191:6, 191:7, 191:8, 191:15, 191:16, 191:17, 202:6, 203:8, 203:11, 203:19, 204:20, 205:15, 206:6, 211:16, 217:2, 220:2, 220:3, 220:4, 220:6, 220:7, 220:21, 225:1, 225:7, 226:2, 227:16, 228:5, 228:17, 228:18, 229:1, 236:11, 239:17, 247:14, 248:10, 248:20, 248:21, 249:15, 250:17, 256:9, 262:15, 264:1, 264:11, 265:10, 268:2, 269:9, 275:8
counsel
49:20, 50:2, 277:14
count
61:13, 142:11
counting
170:2
couple
13:8, 16:7, 32:7, 64:18, 79:15, 79:16, 96:9, 114:1, 114:13, 141:10, 224:10, 247:14, 250:17, 256:8, 256:10
coupled
96:19
course
124:1, 131:15, 196:4, 247:12
court
8:11, 21:3, 21:8, 23:14, 25:4, 25:11, 26:2, 26:5, 26:7, 26:15, 27:21
cover
117:7, 245:14
covered
76:14, 77:8, 77:15, 78:1
covering
249:13
covers
36:10
cox
3:12, 4:4, 5:4, 5:12, 5:22, 24:8, 24:10, 24:13, 24:18, 31:3, 38:14, 42:13, 46:2, 70:21, 107:18, 108:1, 108:4, 108:8, 108:12, 128:22, 145:2, 150:13, 167:17, 219:16, 225:5, 242:7, 275:13, 276:5
crap
124:5

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

crazy
210:8
create
49:20, 113:8, 203:2, 209:9, 216:8, 218:19, 220:10, 220:13
created
41:10, 41:22, 42:16, 49:19, 50:2, 78:16, 120:16, 120:17
creates
217:20
creating
94:9, 94:12, 95:3, 120:21, 194:3, 194:13, 203:17, 218:9
creation
213:8, 215:1, 222:15, 222:22, 223:10, 223:19, 259:8, 259:20
creep
221:22
criteria
214:8, 252:3
cross
58:13, 237:20
cross-section
254:20
cross-sectional
56:17
crushing
144:3
csr
1:21, 277:30, 277:31, 277:32
cumulative
61:4, 137:1, 137:2, 137:17, 142:14, 197:4, 261:14, 261:18, 263:10, 263:21
cumulatively
271:22
curious
115:18
cut
255:7, 255:8, 255:18
cutout
264:21
cylinder
93:7

D

d0
229:13
dallas
3:16
damages
22:6
dark
68:15, 68:20, 68:22, 69:2, 69:7, 69:17, 69:20, 70:6, 81:22
date
28:11, 88:6, 88:10, 89:9
day
26:5, 68:4
days
88:21, 89:7
deal
224:5
decentered
162:10
decided
271:21
declaration
9:5, 9:7, 9:21, 10:1, 10:7, 11:4, 35:13, 39:8, 40:19, 40:22, 47:22, 48:6, 49:7, 53:15, 53:18, 114:6, 116:18, 117:3, 118:6, 121:5, 126:12, 126:16, 126:18, 197:17, 274:18
declarations
22:20, 24:4, 25:1, 185:16
decomposition
212:14, 217:22
decrease
102:14
decreases
260:3
decreasing
102:9
deem
39:16, 66:7
deeper
68:21
default
132:4
defendant's
27:13
define
15:9, 15:12, 39:6, 39:10, 41:18, 57:19, 58:6, 58:15, 209:2, 226:11, 241:19
defined
106:4, 106:5, 107:8, 107:9, 121:2, 123:6, 203:16, 241:20
defines
15:13, 45:8, 58:18, 58:22, 264:14
defining
15:14, 16:9, 203:17
definitely
250:21
definiteness
29:8
definitive
29:19, 42:2, 42:10
defraction
138:17, 139:13
degree
14:11, 30:12, 56:6, 83:4, 100:21, 105:17, 127:4, 129:11, 165:2, 219:15, 254:3
dendrite
84:3
denial
45:11, 46:22, 47:15
denominator
44:15, 44:19
densely
193:4, 193:9
density
76:19
departments
63:10
depend
67:13, 83:11, 154:17
depending
91:1, 143:18
depends
60:4, 71:8, 77:10, 77:11, 77:16, 83:1, 83:7, 92:15, 103:6, 110:4, 111:3, 115:3, 115:4, 115:8, 155:21, 175:15, 192:5, 192:6, 192:7, 196:13, 197:5, 197:11, 205:19, 205:22, 214:4, 224:3, 224:18
depicted
145:15, 145:19, 189:1, 194:9, 194:10
depicting
123:10
depicts
188:18, 253:18
deployed
108:20
depo
5:20, 7:21,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 289 of 334

20:13, 21:7
deposition
1:15, 2:6, 7:8, 7:12, 276:8, 277:4, 277:7, 277:9, 277:14, 277:15
depth
55:9
describe
133:16, 133:18, 227:6, 229:15
described
117:22, 195:18, 195:20, 198:10, 203:2, 203:3, 255:22, 257:7, 272:11
describing
135:12, 163:5, 250:8, 256:14, 257:10
description
163:21, 178:3
descriptions
255:14
design
22:21, 94:8, 94:11, 95:2, 96:16
designed
42:1
designer
65:11, 65:19
designing
85:4, 96:17
desirable
103:3, 176:1, 177:17
desired
177:17, 269:13, 270:8
desires
223:18
detail
18:7, 47:9, 122:6, 122:9, 130:21, 214:19
details
43:1, 116:22, 117:6, 187:22
detectable
60:8
determinations
63:1
determine
31:14, 32:1, 44:3, 97:4
developed
119:15, 244:2
developing
207:12, 207:18
device
22:3, 22:5, 87:7, 87:10, 144:20, 146:12, 150:17, 160:9, 161:2, 163:20, 167:22, 168:1, 172:5, 172:7, 262:13, 263:15
devices
86:3, 263:18
diagram
58:12, 163:21
dial
258:22
diameter
51:14, 52:1, 52:2, 52:13, 53:9, 53:15, 54:3, 54:4, 54:12, 54:16, 57:12, 58:3, 58:19, 59:13, 95:18, 96:10, 96:11, 100:14, 137:14, 139:18, 139:19, 140:5, 140:16, 142:7, 186:18, 193:10
diameters
51:20, 61:2, 140:8, 140:19, 141:13, 142:12, 272:6
diamond
163:10
differ
90:1
difference
12:17, 55:3, 120:15, 126:19, 127:2, 138:15, 138:18, 173:19, 173:22, 174:7, 174:20, 175:8, 175:9, 176:14, 176:17, 177:14, 178:8, 178:20, 179:15, 181:9, 181:17, 181:22, 182:14, 196:8, 227:19, 246:14, 247:2, 273:3, 273:17, 274:7, 275:15
differences
227:10, 252:10, 252:15, 267:12, 267:13
different
9:17, 17:11, 27:3, 29:6, 54:13, 55:18, 60:4, 60:14, 60:18, 61:14, 64:19, 78:5, 81:4, 81:8, 81:9, 85:19, 86:6, 88:5, 88:9, 89:22, 90:2, 90:12, 90:20, 91:3, 91:21, 96:16, 97:7, 98:9, 99:14, 100:5, 114:6, 116:18, 122:17, 132:17, 132:18, 133:18, 135:11, 135:20, 139:5, 139:7, 140:9, 145:20, 146:6, 147:4, 147:7, 148:16, 149:17, 149:20, 150:8, 151:2, 151:3, 151:11, 154:18, 156:14, 177:21, 185:13, 185:18, 185:20, 185:21, 186:12, 194:7, 194:17, 195:3, 195:10, 195:11, 202:10, 202:16, 202:21, 205:5, 206:14, 206:15, 212:16, 212:21, 213:21, 213:22, 214:2, 227:10, 227:21, 228:9, 231:20, 233:7, 234:12, 237:15, 237:17, 246:1, 246:3, 247:14, 252:2, 252:3, 252:7, 252:16, 257:15, 260:8, 267:9, 268:13, 269:5, 269:6, 269:10, 270:13, 275:10
differently
127:7
difficult
11:7, 30:20, 31:14, 31:19, 62:9, 169:4, 185:12, 225:2, 269:6
diffraction
61:20, 62:13, 62:14, 62:18, 62:21, 63:3, 138:9, 143:1, 143:3, 143:11, 168:1, 169:8, 171:12, 261:19, 263:14, 263:18
diffusive
211:1
dilute
171:9

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 290 of 334

dimensions
43:18, 57:19, 58:7, 58:15, 59:1, 59:3, 107:8
dipping
135:19
direct
71:18, 136:1, 207:8, 226:8
directed
85:14, 85:18
directing
58:11, 125:17, 148:13, 186:12
direction
51:20, 65:21, 255:17
directly
88:18, 209:20, 213:15, 255:5
disadvantages
258:3
disagree
111:13, 111:22
disagreeing
250:19
discharge
98:5, 214:6
discharging
103:1
disclose
138:13
discloses
130:12, 189:18
disclosure
151:6, 160:22, 253:6
disclosures
182:22
discretionary
45:11, 46:22, 47:15
discuss
172:11, 195:14
discussed
8:15, 10:18, 25:20, 35:7, 40:21, 43:16, 46:15, 47:12, 50:4, 53:6, 113:21, 132:8, 134:5, 141:2, 226:4, 232:6, 239:6, 252:19, 264:3
discusses
74:8, 204:14, 236:2
discussing
114:14, 179:1
discussion
42:5, 123:17, 169:19, 271:4
discussions
26:12, 170:11
disperse
146:16, 150:5, 150:7, 151:1, 151:8, 154:11, 154:15, 160:9, 164:22, 224:6, 225:2, 257:22
dispersed
75:14, 144:6, 154:4, 160:7, 165:16, 212:3, 248:1
disperses
146:14, 154:8, 160:18, 160:19, 161:2
dispersing
166:17, 167:4
dispersion
143:22, 144:3, 146:3, 146:7, 147:5, 148:3, 148:4, 150:17, 154:4, 154:7, 156:17, 158:7, 158:8, 158:15, 158:17, 160:14, 161:3, 161:7, 162:5, 163:12, 164:3, 165:7, 165:14, 165:15, 165:17, 165:21, 165:22, 166:2, 166:10, 166:17, 166:19, 167:1
displayed
75:16
dispute
21:10, 21:12, 21:15, 21:20, 127:15
dissolve
133:3, 133:5, 135:7
dissolved
243:17
distinction
50:21, 128:21, 192:21, 246:13
distributed
100:17, 183:10, 184:5, 208:1
distribution
60:12, 60:21, 61:3, 61:8, 62:4, 62:5, 95:7, 95:17, 96:6, 137:3, 137:4, 138:19, 140:10, 140:14, 141:16, 142:9, 142:11, 143:7, 150:21, 151:14, 155:18, 158:10, 158:13, 160:2, 161:22, 162:3, 162:13, 163:16, 169:21, 170:4, 170:19, 170:22, 171:11, 172:17, 172:19, 173:16, 175:10, 175:14, 175:22, 177:16, 179:18, 180:12, 181:15, 181:19, 183:4, 183:9, 184:3, 184:15, 186:21, 187:3, 187:6, 187:20, 187:22, 188:1, 188:6, 189:11, 196:2, 196:15, 196:19, 196:22, 197:3, 197:10, 204:10, 205:1, 208:2, 208:6, 208:8, 212:22, 227:7, 227:17, 227:22, 229:3, 233:6, 236:13, 236:14, 239:11, 239:13, 240:12, 240:16, 240:22, 261:6, 261:13, 261:15, 261:18, 261:21, 262:1, 263:9, 263:11, 263:15, 267:19, 270:7, 271:22, 272:1, 272:14, 274:2, 274:8
distributions
60:15, 60:18, 61:22, 137:18, 149:18, 149:21, 151:12, 151:13, 173:9, 175:11, 178:5, 197:15, 263:20, 263:21, 270:16
district
21:3, 21:8, 23:14, 25:4, 25:11, 26:2, 26:4, 26:5, 26:7, 26:15, 27:21
divide
37:5, 44:5, 44:6
divided
208:17, 211:4, 227:13, 227:14, 228:18, 274:15, 275:11, 275:22
divides
272:9

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 291 of 334

dividing
228:20
dm
138:1
dn
137:22
document
47:21, 48:5, 49:9, 116:17, 141:5, 141:9, 184:21, 193:16
documents
8:9, 9:18, 47:6, 138:7
doing
25:13, 25:14, 45:13, 52:12, 64:8, 65:19, 79:12, 100:6, 140:20, 142:3, 148:11, 149:17, 150:3, 150:20, 151:1, 151:10, 151:15, 154:17, 156:22, 163:8, 164:12, 165:3, 167:8, 170:19, 171:3, 171:4, 179:13, 186:3, 200:6, 212:19, 223:17, 258:10, 259:10, 262:14, 274:19
dollars
22:3
dolomite
188:2
dome
76:18
dominant
106:1
dominated
104:9, 104:13, 104:17, 104:18, 105:2, 105:5, 105:6, 118:11, 118:15, 119:1
dominating
104:19, 120:20
done
21:5, 34:18, 57:1, 57:2, 61:11, 61:12, 91:16, 114:20, 124:5, 131:18, 139:15, 144:2, 170:16, 214:1, 265:11
doors
69:15, 69:18
doorways
106:19
dot
76:4, 129:12
dots
75:19, 127:19, 128:17, 129:4, 129:20, 245:7
down
7:13, 64:14, 91:7, 91:8, 95:9, 95:11, 107:14, 139:2, 171:10, 181:5, 199:3, 199:8, 225:22, 234:4, 255:5
downsides
93:1, 93:11
dr
5:13, 5:19, 13:12, 13:19, 20:13, 31:7, 46:4, 62:15, 82:22, 106:16, 108:14, 167:22, 183:14, 217:22, 225:9, 228:4, 237:3, 274:17, 276:7
draft
65:21
drafting
48:14
draw
49:22, 57:16, 58:2, 185:12
drawing
33:22, 120:14, 211:12
drawings
255:14
drawn
41:19, 42:14, 121:17, 121:19, 188:21
drew
42:19, 122:3, 185:7, 185:15, 185:16, 185:17, 185:20
dried
133:20, 133:22
drive
221:12, 228:5
driving
221:8
dropped
127:13
dry
131:21, 131:22, 132:9, 132:10, 211:22, 255:3
drying
130:12, 130:19, 131:3, 131:4, 131:13, 132:2, 132:5, 132:6, 132:9, 132:12, 133:11, 133:13, 133:19, 134:10, 134:11, 134:12, 134:16, 134:20, 134:21, 136:12, 211:13, 212:19
drywall
106:16, 106:21, 107:9, 107:13
dual
257:4
ductility
92:10
due
212:12, 221:14
duly
5:3, 277:7
durability
264:17
during
7:12, 46:4, 46:7, 46:8, 93:8, 93:10, 222:16, 223:10, 258:18
dv
136:22, 137:21, 138:10, 180:19, 181:7, 182:10, 188:8, 188:9, 188:13, 188:14, 189:7, 196:2, 196:9, 272:17, 275:16
dvs
138:10
dw
138:1

E

e-y
97:9
each
18:18, 24:14, 90:12, 94:16, 155:17, 156:15, 161:14, 161:16, 206:2, 206:3, 243:14
earlier
80:15, 89:19, 118:15, 121:14, 205:6, 227:5, 241:7, 244:10
earth
104:1
easier
51:19, 115:5, 223:21, 269:13, 269:16, 270:5
easy
68:4, 224:4
edge
54:21, 55:1, 55:11

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

edges
56:5, 123:7
education
87:2
effect
155:21, 175:13, 259:20
effective
97:4, 147:16, 148:3, 149:11, 161:19
either
66:8, 123:18, 134:20, 143:18, 154:10, 161:1, 195:4, 222:7, 249:16, 251:1, 262:10, 263:5
electrical
231:6
electrically
231:4, 231:18, 257:17
electrochemical
87:7, 87:9
electrochemically
236:6
electrode
14:10, 97:19
electrodes
91:15, 93:10, 232:17, 246:19
electrolyte
84:14, 84:16, 84:18, 85:15, 266:17
electron
34:16, 51:17, 56:16, 99:6, 99:10, 231:5, 254:16, 255:16
electronic
22:3
electrons
56:13, 56:19, 57:6, 76:15, 76:22, 77:13
element
11:21, 17:13, 56:13, 192:3
else
7:2, 71:11, 137:7, 140:20, 169:18, 259:14, 272:15
elsewhere
193:15
email
7:18
embodiment
55:12, 55:14, 55:16, 55:18, 58:6, 58:14, 65:6, 71:6, 78:5, 87:10, 122:13, 122:19, 177:1, 194:1, 222:19
embodiments
181:5, 200:15, 224:11, 252:5, 252:10, 252:11, 260:14, 260:18
emphasizing
120:14
employed
277:21
empty
14:17, 14:19, 14:21, 15:22, 44:4, 44:6
emulsification
147:5, 163:12, 164:3
emulsion
243:3
encapsulated
75:4, 78:12, 80:3, 80:9, 93:14
encountering
211:6
end
73:8, 93:8, 93:9, 124:13, 132:8, 151:14, 152:6
energy
23:3, 81:6, 86:3, 87:7, 98:5, 132:17, 132:19, 132:20, 215:5, 215:7, 215:8, 224:19, 258:16
english
264:5
enhance
113:4
enough
10:9, 11:19, 18:7, 55:2, 184:20, 191:9, 211:20, 245:12, 263:7, 265:10
ensure
264:15, 265:14
entire
33:15, 39:8, 50:22, 51:9
entirely
15:4, 15:21, 78:19, 159:18, 160:11, 176:5, 245:10
enveloped
16:21, 17:1
equal
72:2, 260:3
equivalent
272:4
especially
93:3, 211:16, 259:12
esquire
3:4, 3:12, 3:13
essentially
44:8, 126:11, 229:13, 254:19
est
2:2
establish
22:9
evaluate
10:9, 29:8
evaluations
11:12
even
15:20, 16:20, 27:9, 33:12, 34:17, 54:1, 55:4, 61:16, 62:13, 89:19, 105:18, 110:5, 111:11, 115:9, 120:19, 128:10, 128:16, 129:12, 139:22, 151:3, 152:1, 152:9, 160:11, 178:13, 180:5, 192:20, 197:4, 202:17, 204:15, 251:18, 263:13, 263:18, 265:11, 270:5
evening
45:22
ever
16:13, 41:20, 42:15, 87:16, 143:21, 188:14
every
30:21, 31:16, 36:4, 75:15, 143:10, 151:18, 151:21, 152:8, 182:19, 191:19
everybody
150:11, 169:17, 186:1, 274:20, 274:22, 275:2
everything
20:7, 36:11, 71:13, 124:6, 129:10, 150:14, 176:22, 182:8, 195:22, 205:16, 213:12, 234:7, 234:14, 245:7
everywhere
221:11
evidence
18:2, 18:16,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

19:9, 24:5, 25:2, 96:2, 103:12, 113:12, 201:17, 205:14, 209:12, 224:2, 250:1, 275:1, 275:7
evolves 101:8
exact 181:21, 183:20
exactly 94:18, 99:15, 100:22, 122:9, 122:10, 134:14, 145:19, 145:22, 155:22, 163:4, 183:3, 183:6, 185:19, 188:15, 188:16, 192:16, 205:19, 232:1, 243:8, 251:17
examination 4:4, 5:11
examine 17:10
examining 171:6
example 19:16, 30:18, 36:8, 36:9, 36:12, 36:13, 42:12, 43:3, 101:5, 101:12, 101:13, 101:15, 101:16, 101:17, 111:6, 131:2, 131:3, 131:4, 131:9, 135:22, 136:9, 140:12, 140:22, 141:15, 148:6, 151:18, 151:22, 152:8, 152:13, 152:14, 176:13, 176:17, 177:3, 177:7, 177:12, 186:14, 195:6, 198:18, 199:9, 206:4, 226:16, 230:22, 233:10, 237:8, 239:8, 240:5, 240:7, 253:8, 255:16, 255:21, 258:8, 270:19
examples 19:1, 39:22, 53:14, 130:15, 130:18, 131:8, 133:19, 134:20, 147:8, 151:11, 151:15, 152:9, 152:11, 152:12, 176:9, 177:21, 177:22, 204:2, 205:18, 217:2, 228:5, 232:10, 236:8, 236:18, 236:20, 236:21, 240:2, 240:4, 244:20, 245:1, 252:6
exceed 109:6, 181:10, 182:1, 182:7
exceeds 109:17, 110:20, 111:18, 112:8
excellent 264:17
except 94:3, 152:14, 243:21
exclude 37:21
exclusive 38:2, 229:5, 275:20
exclusively 201:6
exemplary 72:5
exercise 31:22
exfoliate 160:20
exfoliated 159:12, 159:14
exfoliates 146:14, 159:4
exfoliating 158:22
exfoliation 146:8, 146:18, 146:20, 147:1, 147:6, 148:2, 158:19, 159:5, 159:10
exhibit 4:8, 4:9, 4:10, 4:11, 4:12, 4:13, 4:14, 4:15, 4:16, 4:17, 4:18, 4:19, 4:20, 4:21, 8:15, 9:8, 9:10, 9:16, 10:16, 10:18, 10:21, 25:19, 25:20, 26:14, 26:21, 27:5, 27:9, 27:11, 27:12, 27:20, 35:5, 35:6, 35:7, 35:10, 40:21, 40:22, 41:1, 46:15, 47:12, 52:22, 53:2, 53:3, 53:4, 53:6, 64:11, 101:10, 101:12, 113:20, 113:21, 114:2, 116:14, 118:1, 121:4, 123:11, 124:2, 130:3, 130:5, 141:1, 141:2, 145:16, 152:3, 226:2, 226:4, 226:5, 252:18, 252:19, 262:17, 264:2, 264:3
exhibits 4:6, 7:8, 46:21
exist 168:7, 168:13, 173:17
existed 110:14
exp 277:31, 277:32
expect 100:4
expeditiously 108:7
expensive 92:22
experience 85:3, 85:13, 85:14, 85:15, 86:3, 86:9, 86:15, 86:22, 87:3, 100:2, 102:18, 254:18, 270:14
experiment 100:6
experimental 98:16
expert 21:14, 21:17, 23:9, 25:14
expertise 21:20, 31:21, 48:20, 85:17
explain 136:8, 136:14, 247:2, 257:8
explained 124:22, 125:14, 125:21
explaining 57:18
explains 125:8, 136:10
explicitly 172:22
exploring 178:15, 178:17
exposure 133:22
extend 65:1, 66:1,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

66:8, 66:21, 67:4, 67:8, 81:15, 93:12, 152:5, 194:2, 194:12, 221:22
extended 66:22
extending 65:7, 65:13, 80:16
extent 13:6, 19:13, 28:11, 33:2, 34:15, 82:13, 86:19, 101:8, 192:4, 221:10, 227:21, 236:17, 245:15
extreme 176:6
extremely 179:10, 222:12, 222:20, 223:7, 269:19, 269:20
extremes 123:19
eye 57:16

F

face 202:20, 203:11, 247:1, 247:2, 247:15, 247:16, 247:18, 249:17, 249:20, 250:9, 251:5
facility 63:7, 63:11
fact 9:20, 24:5, 25:2, 65:10, 109:4, 134:13, 146:10, 150:16, 162:2, 174:17, 179:7, 187:8, 189:6, 217:14, 224:13, 240:17, 243:9
factor 84:5, 106:1
factors 205:4, 225:1
facts 18:1, 18:16, 19:8, 96:1, 103:12, 113:12, 205:13, 209:11, 224:2, 250:1
fail 27:16
failed 22:1
failure 22:1, 22:2
fair 8:13, 31:12, 85:12, 92:14, 140:20, 204:22, 245:3, 259:6, 267:8
fairly 33:3, 174:10, 257:14
fall 29:4, 93:8, 94:1, 104:15, 107:14, 115:2
falling 93:15
falls 156:5
familiar 22:22, 43:4, 60:14, 251:19, 251:20
far 11:16, 96:8, 102:11, 208:9, 208:17, 211:2, 235:6, 243:19
fast 95:12, 108:9
fasteners 107:6, 107:10, 107:13
faster 204:18
fat 42:21
favorable 132:21, 216:7
fears 245:13
feature 99:21, 214:22
features 57:17, 99:4, 224:10, 224:11
feel 70:10, 108:8, 137:10
fell 29:10
felt 11:9
few 6:1, 21:5, 36:7, 61:7, 157:15, 196:17, 197:9, 198:12
fiber 55:17, 55:20, 194:14
fiberglass 220:3
fibers 196:18
fibrous 193:20, 194:2, 194:4, 194:8, 195:5, 195:7, 195:12
field 7:4, 132:15, 250:11
fields 212:17
figure 49:16, 52:11, 52:14, 53:1, 54:7, 54:10, 54:15, 55:12, 55:14, 55:16, 55:21, 57:12, 58:18, 59:6, 59:16, 59:20, 63:17, 64:22, 65:3, 66:5, 66:16, 68:1, 69:20, 73:15, 73:17, 73:22, 74:4, 74:21, 75:15, 75:16, 77:22, 78:5, 78:11, 79:17, 80:1, 80:20, 81:12, 81:19, 101:15, 117:16, 121:13, 122:1, 122:8, 122:17, 122:20, 185:4, 185:6, 185:12, 185:15, 188:19, 188:21, 190:20, 191:8, 194:9, 194:11, 195:7, 196:14, 197:16, 214:5, 215:3, 216:3, 218:3, 253:18, 253:21, 254:15, 255:13, 255:20, 256:4
figures 50:1, 54:17, 76:6
filed 45:12, 46:20, 48:10, 116:18, 117:2
fill 51:18, 211:20, 211:22
filled 43:10, 79:22, 193:9, 216:9, 218:7, 218:9, 218:10, 218:11, 218:20, 219:6, 219:7, 219:19, 219:21, 219:22, 220:3, 220:8,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 295 of 334

220:11, 220:14
filler
41:21, 42:15, 58:13, 68:8, 70:7, 73:13, 73:19, 74:1, 74:11, 75:8, 75:18, 75:21, 78:8, 78:11, 80:2, 80:4, 80:8, 80:18, 109:21, 121:17, 137:13, 172:16, 191:21, 192:13, 193:4, 197:20, 198:1, 198:8, 198:17, 199:16, 199:17, 200:2, 200:14, 200:20, 201:13, 201:14, 201:18, 201:19, 202:5, 209:8, 209:15, 215:18, 215:20, 215:21, 216:2, 216:6, 216:7, 216:11, 216:19, 217:3, 217:14, 218:16, 220:2, 220:10, 220:17, 221:2, 221:4, 221:15, 237:18, 238:6, 238:13, 238:19, 243:9, 243:10, 244:14, 244:17, 245:4, 253:16, 261:9, 267:15, 267:19, 267:21
fillers
60:5, 194:4, 194:14, 194:18, 201:22, 202:2, 221:21, 260:11
film
11:22, 13:2, 13:18, 30:2, 30:13, 33:15, 34:5, 34:12, 68:18, 81:2, 82:12, 84:2, 88:13, 97:11, 128:4, 128:7, 128:19, 132:9, 132:10, 135:19, 136:5, 169:16, 169:17, 171:2, 171:13, 172:13, 173:17, 179:9, 201:11, 204:17
films
80:20
filter
270:11
filtering
266:6
filters
265:18
filtration-type
269:3
final
150:2
financially
277:23
find
28:19, 34:17, 171:17, 233:10, 272:14, 275:9, 275:12
fine
23:12, 104:1, 125:18, 163:9, 167:20, 225:17, 244:9
finish
72:22, 79:11
finished
168:6, 183:17
fire
98:2
firm
5:5, 5:9
first
5:3, 31:18, 34:11, 55:2, 99:18, 124:11, 155:19, 165:4, 165:20, 168:15, 193:12, 198:10, 198:12, 206:19, 216:13, 216:16, 220:22, 224:14, 234:17, 235:7, 247:14, 263:4, 264:11
fit
110:6, 140:14, 190:8, 270:8
five
20:21, 45:19, 46:1, 82:17, 82:19, 82:20, 234:18, 235:8
flip
9:19
floating
167:5, 243:21
fluid
84:16, 84:18
fluoride
232:5, 232:18, 238:8, 253:16, 258:17
flying
156:3
focused
269:2
folks
167:15, 225:3
follow
73:1, 114:13
follow-up
114:1
following
27:16
follows
5:3, 16:17, 152:13
force
97:20, 163:11, 221:9
forces
156:10, 164:8, 164:10, 164:12, 164:13
foregoing
277:4
forever
124:6
forget
38:11, 110:9, 204:13, 244:21
forging
155:12
forgotten
183:19
form
16:5, 18:2, 18:4, 18:15, 21:21, 26:9, 28:11, 40:14, 73:3, 81:7, 95:22, 99:17, 100:19, 113:11, 127:17, 129:14, 138:21, 157:13, 158:21, 159:21, 177:18, 179:21, 180:9, 203:5, 215:10, 222:3, 223:7, 232:4, 237:16, 240:13, 245:9, 247:5, 247:9, 273:5
formation
179:8, 222:16, 223:10
formed
12:1, 13:3, 30:2, 37:8, 37:10, 37:12, 37:13, 37:14, 37:18, 37:19, 37:21, 38:1, 38:6, 38:7, 38:16, 38:17, 40:13, 67:11, 126:1, 126:7, 126:19, 126:22, 127:10, 127:12, 128:7, 128:20, 241:14, 242:4, 242:10, 242:14,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 296 of 334

242:16, 246:21
forming
14:10, 34:13, 38:3, 38:5, 38:15, 67:10, 80:22, 81:14, 106:12, 230:18, 243:20, 264:9
forms
18:20, 81:2, 212:10, 230:17
formulation
36:21, 36:22
forth
31:11, 44:2, 56:5, 63:10, 87:14, 88:20, 259:3, 260:9, 277:7
found
165:1, 234:10, 261:1
four
146:5, 149:1, 149:4, 161:8, 234:18, 235:8
fraction
44:15, 178:7
fractional
44:9
framework
129:18
free
70:10, 137:10, 167:6, 243:21, 255:1, 255:19
freely
243:17
frequency
61:1, 141:13, 141:19, 143:7, 143:13, 143:16
frequently
85:1
frozen
24:6
ftir
100:9
fuel
87:8, 266:16
full
178:3, 178:10
fully
11:18, 17:18, 18:10, 29:5, 78:11, 80:2, 80:4, 80:9, 93:13
function
246:7
functionalities
153:3
functionalize
153:2
functioning
246:12, 246:15
funny
261:16
further
124:12, 137:8, 166:16, 182:21, 261:3, 277:12, 277:15, 277:19
fuse
51:11
future
46:7

G

g-u-r-l-y
97:9
gaps
14:10, 69:21, 105:22, 123:6
gas
44:2
gave
64:11
general
42:5, 55:15, 88:8, 89:4, 122:1, 122:7, 122:12, 122:15, 122:18, 123:2, 123:17, 128:16, 132:4, 133:15, 172:1, 180:10, 181:20
generally
67:21, 68:18, 109:22, 110:21, 111:8, 111:19, 112:1, 112:12, 119:21, 123:6, 132:1, 140:19, 152:13, 153:4, 170:2, 187:16, 232:6
generate
112:9, 112:21, 120:8
generated
56:3
generates
112:13
generating
112:19
geometry
204:11
georgia
3:7
getting
25:22, 117:12, 143:14, 175:12, 249:3
giant
196:17
gido
1:16, 2:6, 4:3, 5:2, 5:13, 5:17, 5:18, 5:19, 13:12, 13:19, 20:14, 31:8, 46:4, 62:15, 82:22, 106:16, 108:14, 167:22, 183:14, 225:9, 237:3, 276:7, 277:6, 277:16
gist
89:5
give
33:4, 36:17, 53:20, 70:14, 70:15, 82:7, 143:6, 180:11, 181:20, 184:9, 195:6, 199:7, 208:9, 212:21, 227:2, 227:3, 246:3, 252:22
given
54:22, 61:3, 70:20, 182:21, 185:16, 246:1, 269:12, 277:11
gives
61:21, 64:17, 64:18, 72:12, 137:15, 147:8, 180:12, 228:22
giving
91:18, 192:15, 250:16
glass
220:3
glean
29:18
glue
13:15, 104:7, 104:12, 118:10, 127:19, 129:4, 129:13, 129:20, 245:7
go
8:13, 10:14, 10:20, 11:16, 24:19, 25:18, 26:13, 27:19, 31:7, 40:18, 41:4, 41:5, 46:2, 49:10, 52:16, 52:19, 52:22, 54:15, 57:1, 58:8, 72:21, 72:22, 73:15, 74:7, 79:20, 97:11, 104:3, 108:6, 108:12, 116:14, 117:9, 121:4, 121:5, 121:10,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

124:17, 125:8, 125:9, 130:3, 130:15, 130:17, 134:6, 139:1, 140:22, 143:5, 153:19, 158:1, 158:2, 164:14, 165:4, 172:4, 173:21, 176:6, 176:20, 178:16, 189:14, 190:7, 193:6, 193:19, 201:1, 210:6, 211:2, 214:10, 218:18, 222:9, 233:16, 235:10, 241:6, 252:18, 253:3, 254:17, 257:20, 259:16, 261:22, 264:2, 264:11
goal
146:2, 207:11, 207:17, 208:11, 209:4
goals
92:16, 146:6, 236:9
goes
51:3, 69:10, 135:14, 157:4, 204:18
going
6:1, 10:15, 31:6, 33:5, 34:17, 40:5, 40:8, 54:19, 64:19, 67:18, 68:18, 71:10, 76:18, 89:11, 89:18, 94:7, 94:19, 101:5, 101:6, 103:16, 107:16, 108:11, 110:7, 114:8, 124:2, 126:14, 127:9, 128:22, 136:1, 153:11, 156:7, 157:7, 157:16, 157:18, 167:8, 169:12, 170:9, 170:17, 172:10, 177:5, 181:10, 188:5, 195:17, 195:19, 195:22, 196:18, 196:20, 196:21, 196:22, 197:1, 197:2, 205:22, 209:20, 210:11, 211:7, 211:13, 211:22, 212:2, 212:19, 212:20, 241:3, 256:20, 258:14, 258:15, 260:1, 263:5, 263:6, 269:18
good
5:13, 5:14, 7:15, 33:13, 68:5, 79:14, 82:20, 92:6, 92:13, 102:2, 108:5, 132:10, 132:13, 135:15, 167:17, 169:12, 201:4, 201:9, 207:21, 208:11, 208:14, 208:20, 209:7, 218:6, 223:12, 224:16, 226:1, 266:22, 267:5, 268:13
google
275:8, 275:9
gouging
93:10
graduate
225:13, 263:4
grains
265:7
grant
85:6
graphic
65:11, 65:19
graphics
68:5
graphite
146:21, 147:18, 152:18, 153:4, 159:6
greater
72:2, 101:8, 109:1, 113:9, 113:13, 119:17, 123:11, 123:13, 176:18, 191:12, 191:20, 192:13, 198:2, 198:4, 198:18, 200:2
grind
151:8, 171:8, 237:21, 238:1, 270:10
grinding
172:5, 172:7, 173:12
ground
237:21, 239:2
grounds
25:16, 130:9
group
73:18
growth
84:3
guess
16:7, 27:4, 74:2, 118:19, 129:8, 152:20, 157:3, 163:7, 164:22, 173:3, 183:18, 196:12, 207:22, 208:5, 210:15, 226:17, 247:19, 250:16, 256:8, 259:17
guide
59:15
gun
183:15
gurley
97:8, 100:9, 267:1
guy
65:20
guys
23:7, 24:9

H

half
167:19, 174:13, 190:8, 196:7, 270:2
halves
257:16
hand
144:9, 145:5, 145:8, 165:13, 166:12, 277:26
handled
21:10
hands
86:18
hang
40:17
happen
75:12, 129:11, 172:20, 190:21, 205:18, 240:2
happened
100:2
happens
92:8, 144:17, 144:20, 161:12, 162:7, 232:3, 249:9
happy
139:3
hard
34:9, 34:10, 52:6, 52:21, 54:18, 54:20, 75:17, 76:1, 76:7, 78:13, 79:6, 104:19, 126:14, 156:9, 182:17, 183:2, 224:4, 249:16, 256:5
harder
224:5, 224:6, 269:13, 269:16, 270:4, 270:5

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 298 of 334

hayes
3:5, 5:9
head
10:15, 63:5, 170:10, 214:16
heading
234:6
hear
24:6, 24:7, 24:9, 183:13
heard
28:2, 244:7
hearing
24:14
heat
78:16, 78:17, 81:3, 134:11, 265:12
heating
133:13, 134:1, 265:9
heavier
56:13, 76:21
heavily
237:20
heavy
155:11
heck
114:9, 150:1
height
56:5
held
2:6, 106:10, 106:13, 106:21, 107:2, 107:4, 107:5, 120:22, 123:8
help
92:11, 92:12
helpful
100:8, 100:10, 101:1
helps
192:10, 214:18
hence
216:8, 218:19, 220:13
here
7:11, 8:17, 9:13, 10:22, 12:16, 18:6, 25:17, 27:1, 27:12, 27:15, 29:3, 31:10, 49:16, 64:14, 66:10, 70:4, 70:16, 73:20, 73:22, 78:20, 79:9, 79:17, 81:19, 92:9, 108:2, 114:4, 117:13, 122:13, 123:17, 124:15, 126:13, 130:21, 133:16, 134:8, 141:4, 142:10, 142:21, 145:19, 146:1, 148:10, 157:17, 163:21, 167:8, 167:18, 168:19, 172:4, 176:7, 177:21, 181:5, 192:5, 198:1, 200:1, 200:4, 200:17, 213:14, 216:2, 224:9, 231:14, 233:17, 236:22, 237:18, 238:5, 242:14, 252:22, 253:5, 255:9, 255:11, 255:12, 258:10, 260:21, 271:9, 271:20, 272:15, 273:8, 275:7
hereby
277:4
hereinbefore
277:7
herunto
277:25
hexafluorophosphate
84:22
high
13:21, 14:3, 19:17, 19:18, 33:4, 81:6, 82:12, 84:2, 89:3, 101:4, 102:4, 103:8, 103:16, 104:5, 104:22, 105:12, 108:15, 113:8, 116:9, 118:1, 119:1, 120:11, 123:4, 126:3, 143:21, 145:9, 146:2, 147:17, 148:18, 150:16, 153:6, 154:4, 154:7, 154:19, 154:20, 155:4, 155:11, 156:12, 156:18, 198:7, 198:8, 204:5, 204:19, 209:2, 209:5, 215:1, 215:11, 215:14, 215:17, 216:10, 216:18, 216:20, 217:3, 244:14, 244:21, 245:1, 245:4, 264:16, 265:14, 266:18
higher
82:10, 82:15, 112:17, 164:10, 197:2, 197:10, 201:13, 206:9, 208:21, 209:9, 210:1, 210:9, 252:12
highest
210:13
highlighted
164:5
highlighting
7:9
highly
148:22, 161:20, 162:1, 223:7
histogram
140:13, 175:19
histograms
141:10
hit
157:12, 157:16
hold
13:14, 40:10, 79:21, 82:13, 104:7, 104:16, 117:12, 118:10, 124:3, 126:13, 141:3, 172:3
holding
13:16, 37:11, 105:22, 128:14, 128:17, 242:1, 245:5, 245:7
holds
104:12
hole
14:15, 14:16, 128:15, 210:6, 210:9, 210:17, 211:7
holes
69:7, 69:21, 106:18
honda
46:17, 252:20, 253:3, 253:10, 253:13, 253:15, 253:18, 260:10, 260:15, 261:7, 263:9, 263:17, 268:17, 268:21, 268:22, 269:1
honda's
255:20
honeycomb
253:7, 253:12, 253:19, 254:20
hope
64:10, 69:4
hoped
100:17
hot
134:1
hour
45:18, 167:18

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 299 of 334

however
60:8, 164:4
hydroelectric
90:9
hydrogen
87:11
hypothesize
260:1

I

idea
33:4, 68:4, 122:8, 156:18, 157:9, 267:2
ideal
82:5
ideas
252:16
identical
60:7, 60:9, 63:19, 63:22, 187:11, 188:19, 189:1
identically
59:20, 60:2, 60:6, 63:22, 65:10, 182:19, 188:8
identifies
174:6
identify
54:11
identifying
122:19
idiot
276:2
illustrate
65:13, 122:21, 185:9, 185:10
illustrated
55:21
illustrating
122:13, 123:1, 200:1
illustration
55:15, 65:5, 65:20, 121:16, 122:18
illustrations
147:4
image
32:6, 33:3, 33:11, 41:9, 41:10, 51:17, 51:18, 54:15, 55:22, 56:2, 56:17, 59:8, 66:17, 75:20, 76:2, 76:12, 77:3, 77:22, 78:15, 78:21, 98:13, 99:16, 101:1, 139:12, 169:9, 254:14, 254:17, 255:15, 255:21, 256:6, 256:7, 256:17
images
32:3, 32:4, 32:7, 32:8, 32:21, 33:3, 35:3, 35:19, 55:10, 98:11, 110:10, 169:11, 193:17
imaging
100:7, 100:12
immediately
162:18, 163:5, 274:6
immense
163:11, 164:8, 164:13
impact
196:8, 196:19
impacted
55:20
impacts
201:21
impair
267:22
impeller
144:15, 145:10
impinging
121:20
implementing
179:17
implied
222:4, 223:4
imply
222:6
implying
179:2, 179:4
importance
67:2
important
66:5, 66:7, 66:20, 105:20, 143:18, 184:12
improve
101:20
improves
126:2
include
14:20, 37:8, 38:6, 38:21, 39:12, 45:2, 109:5, 198:12, 253:16, 254:3
included
50:10
includes
14:18, 39:4, 50:11, 51:1, 51:10
including
10:3, 110:17, 135:18, 193:16, 199:4, 199:6, 199:7, 239:14, 239:15
inclusion
196:1
inconsistency
164:1
incorporated
74:12, 74:20, 74:22
incorporating
169:2
increase
91:13, 91:14
increased
174:6, 175:7, 206:7
increases
93:14
incredibly
169:6
indeed
22:10, 22:14
indefinite
26:16, 27:22, 28:6, 28:20
indefiniteness
28:14, 29:8
independent
96:21, 194:4, 194:14, 262:3
independently
111:9, 154:12
independents
192:9
indicate
58:4, 66:20, 201:21, 263:17, 266:21, 267:5
indicates
40:3
indicating
123:20
indication
79:4, 141:21
individual
68:11, 68:12, 147:2, 159:8, 166:15, 167:2, 185:18, 243:18, 243:21
individually
167:5
individuals
75:22
industrial
155:11
infer
142:4
inference
58:2
influence
197:10, 202:12, 204:9, 204:10, 204:20, 205:9,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 300 of 334

219:14, 259:3
influenced
259:14, 259:15
influences
205:1
information
98:14, 98:22, 180:12, 184:10, 184:11, 229:2
infringement
18:4, 25:11
infuse
43:22
inherently
61:21, 212:14
initial
27:13, 156:4, 166:10
injected
162:19, 163:6
inner
52:7, 52:10, 52:11, 53:10
inorganic
12:2, 12:5, 12:10, 12:14, 12:21, 13:9, 14:7, 15:19, 15:20, 17:7, 17:17, 17:21, 18:10, 18:13, 19:16, 30:3, 30:22, 31:17, 32:13, 33:16, 34:5, 35:16, 76:13, 79:5, 80:17, 81:14, 93:17, 126:2, 144:4, 146:19, 152:18, 152:20, 153:5, 194:19, 218:11, 235:12, 235:22, 236:4, 236:8, 236:10, 236:15, 236:18, 237:1, 237:9, 238:6, 238:22, 239:5, 239:8, 239:14, 239:22, 240:9, 247:18, 248:8, 248:22, 253:17, 256:3, 256:12, 260:11, 260:15, 260:18, 261:5, 267:16, 268:3, 272:18
inside
55:4, 75:10, 157:13, 193:20
instance
26:6, 30:8, 30:13, 33:6, 34:16, 36:8, 43:11, 56:7, 61:2, 69:17, 90:14, 91:12, 93:18, 98:4, 102:20, 103:1, 133:1, 133:9, 137:4, 146:21, 153:1, 153:3, 159:8, 175:17, 176:7, 178:1, 178:2, 178:5, 193:17, 195:6, 203:7, 205:8, 212:8, 224:7, 230:22, 232:4, 238:9, 239:19, 249:2, 249:11, 258:7, 258:20, 260:2, 262:9
instead
57:5, 69:21, 89:6, 127:19, 129:4, 143:7, 243:21
institutional
107:3
instrument
261:20
insurance
21:9, 21:12, 21:15, 21:20, 22:7, 22:8, 22:14
intended
14:6, 14:8, 83:1, 92:15, 122:8, 122:9, 127:2
intense
166:19
intensive
166:16
intent
14:12, 65:13, 122:6, 154:15
intention
65:18, 169:15
intentional
127:8
intentionally
157:12
intents
184:18
interact
205:7
interaction
132:17, 212:13, 215:5, 215:7, 215:8, 218:5, 224:19, 251:8
interactions
221:15, 221:20
interest
23:18
interested
92:7, 97:2, 178:14, 262:15, 277:23
interesting
276:4
interfaces
257:20
interfacial
258:16
interior
105:7
internet
24:11
interpret
28:16, 63:17, 64:22, 73:5, 93:16, 182:4, 239:20, 254:8
interpreting
29:12, 154:2, 180:15
interruption
83:17
interstitial
39:2, 51:7, 105:14, 106:1, 106:3, 119:9, 203:3, 211:21, 212:1, 230:20
introductory
263:3
invalidity
25:12
invention
14:13, 65:6, 88:6, 88:11, 89:9, 110:15, 110:17, 122:14, 122:22, 123:1, 137:12, 207:11, 207:12, 207:17, 252:17
inventor's
169:15
inventors
73:16, 154:15, 160:4, 187:18, 262:11
inverse
199:17
investigate
22:12, 260:6
involve
265:20
involved
22:19, 48:14, 85:21, 87:21, 205:4
involves
127:16, 135:13
involving
26:5, 132:17, 232:7
ion
69:16, 87:12,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 301 of 334

101:21, 102:2, 102:15, 209:17, 211:2, 266:22
ions 209:19, 267:3
ipr 1:11, 7:22, 8:7, 8:17, 8:20, 20:19, 20:22, 23:21, 25:7, 25:15, 28:10, 45:12, 114:7, 116:18, 116:19, 117:2, 121:5
iprs 25:10
irregular 70:2, 210:3, 210:8
isopropyl 166:7
issue 19:14, 29:3, 92:17, 94:2, 205:21
issues 18:6, 44:14, 84:1, 93:4, 102:7, 102:13, 179:7
itc 21:3
itcs 21:5
item 264:12
itself 48:4, 54:4, 65:2, 65:14, 93:13, 112:10, 112:14, 112:19, 113:1, 120:9, 127:20, 128:9, 129:5, 246:11, 267:7

J

jagged 79:6, 122:2, 210:8
jaggedness 79:1
james 3:4, 5:8, 247:6
japanese 85:7, 144:17, 144:21, 225:13, 225:14, 250:15, 262:16, 262:19, 262:20, 263:3, 263:6
jelly 244:7, 245:6, 248:12, 248:14, 249:4, 249:6
jets 156:14
job 1:22, 22:12
jogs 48:12
joined 5:6
jones 26:5
jot 7:13
jotting 95:11
jumped 183:15
jumping 273:11

K

keep 76:5, 91:9, 171:10, 251:14, 268:11
keeping 213:9, 213:11
kerfuffle 183:19
kinds 62:22, 84:4, 97:13, 149:1, 182:22, 202:21, 206:15, 214:8, 233:7, 260:8
klinger 1:21, 2:7, 225:22, 277:3, 277:30
knew 32:9, 126:7
knob 258:21
knobs 202:21
knowledge 6:16, 6:19, 62:6, 88:4, 275:4
known 101:19, 101:22
knows 250:15, 274:22, 275:2
kureha 85:7

L

l-n 118:1
lab 62:15, 63:6, 85:9, 85:22, 86:18, 86:22, 87:15, 154:1
label 57:15, 73:16
labeled 42:9
labels 54:16
laboratory 144:19
laborious 169:6
labs 63:9
lacks 201:17
language 10:12, 11:6, 11:8, 29:11, 29:18, 37:20, 118:18, 126:10, 128:1, 128:6, 160:6, 250:11
large 14:12, 219:11, 223:22, 230:18, 230:19, 241:9, 241:11, 245:15, 269:14, 269:20, 272:2, 272:4, 272:13
largely 105:17, 106:17, 201:6, 203:16, 241:22
larger 61:7, 111:7, 194:2, 194:8
largest 229:17, 229:21, 272:3
laser 61:20, 62:13, 62:14, 62:17, 62:21, 63:3, 138:9, 138:17, 139:13, 143:1, 143:3, 143:11, 168:1, 261:19, 263:14, 263:18, 268:7, 268:18
last 5:15, 125:14, 192:3, 259:18
late 275:6
later 81:3, 173:13
latex 230:12, 232:4, 232:8, 232:14, 232:19, 235:2, 238:9, 243:2, 243:4, 243:6, 248:1, 249:10
latexes 246:17

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

launched
156:2, 156:5
law
5:4, 5:8,
48:17, 48:20
lay
57:3
layer
13:17, 14:11,
76:14, 77:9,
77:10, 77:15,
77:18, 78:1,
90:17, 91:9,
91:16, 93:9,
103:13, 103:14,
104:8, 105:2,
108:22, 109:10,
109:13, 109:16,
109:17, 118:11,
118:22, 119:16,
136:2, 136:4,
136:9, 136:16,
137:11, 168:7,
168:11, 168:13,
169:2, 169:4,
172:16, 213:16,
213:18, 228:13,
237:10, 243:20,
245:17, 245:18,
251:9, 251:10
layered
147:22
layers
91:6, 105:1,
118:9, 119:2,
120:12, 123:4,
146:22, 147:1,
245:4, 258:2,
265:12
layperson
257:8
leaching
88:17
lead
266:15
leads
88:19, 151:5,
158:4
learn
71:8, 71:11,
192:18, 263:6
learned
263:7
learning
192:17
least
12:2, 12:5,
12:10, 12:13,
15:18, 17:5,
17:6, 17:20,
18:13, 30:3,
60:7, 64:18,
87:10, 89:18,
99:3, 102:6,
160:17, 162:4,
169:3, 177:5,
188:16, 191:1,
191:9, 204:12,
229:22, 238:22,
245:1, 252:5,
252:10, 263:17,
268:3
leave
124:6
lee
3:5, 5:9
left
50:9, 50:13,
50:15, 50:17,
52:20, 148:21,
198:16
left-hand
141:9, 233:19
legal
28:8, 29:2,
47:21, 48:19,
191:22, 192:15,
192:16, 192:21
length
208:17
less
67:17, 78:19,
85:15, 113:16,
115:19, 174:2,
174:7, 174:13,
174:14, 174:21,
175:1, 175:5,
176:15, 176:21,
177:14, 178:5,
179:3, 184:9,
184:11, 187:21,
188:8, 188:13,
188:14, 193:8,
202:5, 210:13,
221:10, 226:18,
226:19, 226:21,
261:12
let's
8:16, 9:9,
36:12, 36:22,
40:20, 52:22,
60:19, 71:17,
98:19, 116:14,
128:4, 130:3,
138:22, 139:1,
141:4, 192:4,
198:16, 198:17,
215:21, 225:9,
225:16, 231:11,
239:18, 255:10,
258:8, 260:13,
264:2
level
31:21, 82:4,
82:22, 83:6,
83:14, 83:19,
86:22, 104:3,
166:11, 166:12,
215:17
levels
215:1, 216:11,
216:18, 216:20,
216:21, 217:3
lg
23:3
life
87:2
light
57:11, 99:5,
99:8, 99:9
likelihood
93:14
likely
67:18, 115:19,
240:21
limit
39:21, 83:14,
83:18, 180:6,
261:10, 261:11
limitation
32:15, 34:4,
39:16, 40:16
limitations
188:12, 189:7
limited
5:6, 6:3, 6:7,
6:10
limits
17:12, 32:18,
44:11, 83:5,
84:6, 84:7,
102:3
line
7:17, 42:20,
42:21, 52:5,
55:1, 59:9,
208:18, 211:4
lines
235:15
linked
237:20
liquid
131:19, 135:6,
135:8, 136:15,
166:4, 214:21,
217:14, 217:16,
219:11, 221:1,
222:14, 223:9,
243:18
list
9:12, 21:1,
60:22, 94:7,
94:14, 94:15,
95:14, 96:15,
124:10, 148:3,
149:18, 184:19,
205:5, 231:9,
233:18
listed
149:11, 173:1
listing
234:11

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 303 of 334

lists
149:1, 149:7, 233:13
literal
12:9, 61:17
literature
229:15, 275:6
lithium
84:21, 84:22, 87:12
lithium-ion
84:8, 84:9, 85:4, 85:5, 86:4, 87:4, 87:17, 88:6, 94:9, 95:3, 213:17, 245:18, 251:10, 266:15, 266:19, 268:8, 268:19
litigation
17:16, 23:14
little
9:17, 11:7, 24:10, 31:10, 34:3, 34:20, 45:18, 50:9, 52:6, 52:21, 53:1, 54:17, 54:18, 54:20, 68:2, 68:6, 68:14, 69:14, 75:2, 76:7, 76:18, 78:13, 79:6, 88:14, 89:19, 90:21, 95:9, 100:1, 105:18, 107:4, 108:9, 110:9, 117:13, 126:13, 127:7, 127:19, 128:13, 128:15, 128:20, 129:4, 129:12, 129:20, 137:20, 138:22, 157:2, 163:22, 167:1, 167:3, 185:19, 188:22, 223:3, 225:13, 229:18, 230:13, 230:14, 230:15, 232:8, 238:10, 239:1, 243:5, 243:11, 243:22, 245:6, 247:11, 247:17, 248:11, 248:12, 248:15, 249:4, 249:14, 254:6, 256:9, 261:16, 264:16, 264:21, 265:6, 265:7, 271:19, 273:7
load
112:17, 113:8, 123:4
loading
103:17, 104:5, 105:1, 105:12, 108:15, 119:2, 120:12, 215:18, 215:20, 216:2, 216:11, 216:19, 217:3
loadings
103:9, 118:2
located
6:20
location
73:20
log
24:18, 24:19
logical
160:21
long
45:20, 80:17, 97:10, 108:6, 114:8
longer
19:7
look
8:9, 9:17, 18:18, 20:22, 27:15, 32:4, 34:15, 35:2, 36:12, 58:5, 64:1, 70:10, 71:19, 72:5, 79:2, 81:20, 81:21, 97:15, 100:22, 126:14, 128:1, 130:21, 138:6, 146:4, 154:10, 166:21, 176:17, 189:19, 196:5, 196:13, 204:13, 207:9, 216:4, 217:2, 228:10, 229:6, 231:9, 236:20, 239:17, 247:22, 252:15, 254:17, 255:5, 256:11, 270:15, 271:18, 271:19, 271:21, 274:3, 275:5, 276:2
looked
45:15, 55:9, 133:20, 144:15, 154:6, 155:20
looking
18:5, 26:20, 26:22, 27:1, 27:8, 29:9, 33:11, 33:14, 34:20, 35:3, 35:5, 49:8, 52:11, 56:16, 56:20, 56:21, 63:17, 64:7, 71:11, 77:2, 78:20, 83:2, 96:15, 99:7, 99:16, 100:7, 100:8, 100:18, 114:4, 117:6, 151:22, 157:17, 157:19, 161:14, 163:20, 188:3, 189:16, 189:20, 192:11, 197:6, 197:19, 198:11, 216:3, 224:20, 231:21, 233:21, 234:4, 234:5, 237:6, 250:12, 254:14, 254:19, 258:7, 267:10, 269:22, 272:8
looks
24:8, 42:9, 52:18, 54:16, 54:18, 55:5, 81:22, 82:1, 116:22, 166:9, 197:7, 218:1, 254:18
loose
16:13, 40:9
looser
202:14, 202:19
loss
264:17
lost
31:10, 256:17
lot
20:1, 20:3, 20:5, 31:4, 31:20, 36:3, 48:16, 49:21, 49:22, 61:5, 75:13, 82:1, 105:9, 111:12, 112:13, 112:20, 113:15, 120:18, 121:22, 172:10, 197:12, 205:6, 211:17, 213:4, 213:13, 232:6, 232:16, 251:20
lots
33:21, 61:13, 212:16, 275:12
low
102:16, 178:21, 179:5, 193:11, 208:7
lower
82:10, 90:21, 180:6, 208:21, 209:9, 261:10

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 304 of 334

lowest
210:13
lunch
107:19, 107:21, 108:9, 108:14

M

machine
57:4, 62:21, 142:20, 143:22, 144:11, 145:1, 145:9, 145:10, 145:11, 145:15, 145:18, 146:1, 146:15, 150:5, 150:9, 152:8, 154:5, 154:7, 154:8, 154:10, 157:5, 166:18, 167:5, 171:12, 175:18, 176:12, 177:2, 177:4, 177:8, 177:15, 178:6, 179:12
machines
62:17, 169:8
macro
14:12, 20:6
macroscopic
43:18
macroscopically
84:11, 84:12
made
22:5, 42:21, 43:8, 60:5, 65:20, 80:20, 81:11, 86:20, 90:5, 97:22, 183:2, 202:19, 232:6, 241:9, 247:8, 253:14, 255:19, 266:8
madeline
3:13, 5:7
magnification
33:4, 34:19
main
64:20, 84:7, 84:9, 217:11, 217:12, 225:1, 265:16, 267:13
mainly
85:6, 86:5, 231:8, 269:2
maintains
91:8
make
9:19, 11:11, 15:1, 50:21, 66:3, 67:4, 67:6, 67:7, 68:18, 76:5, 77:1, 89:7, 92:18, 96:18, 99:19, 102:3, 104:21, 113:4, 121:1, 122:2, 122:3, 151:13, 172:10, 174:16, 174:17, 178:6, 178:17, 183:16, 185:13, 206:8, 212:17, 259:1, 260:1, 260:5, 262:7, 262:12, 268:4
makes
62:9, 85:8, 147:2, 204:19, 209:2, 217:18, 257:9, 257:11
making
15:15, 85:22, 93:4, 99:11, 99:19, 101:3, 159:8, 172:12, 172:14, 183:17, 244:2
mandating
240:8
manufacture
169:20, 170:3
manufacturer
22:5, 22:6
manufacturers
213:22, 268:16
manufacturing
85:4, 213:7
many
20:16, 20:18, 21:2, 30:8, 32:1, 35:15, 76:2, 124:9, 140:14, 169:11, 196:13, 197:8, 197:11
marked
4:6
marks
59:12
marriage
277:21
mass
40:3, 62:4, 62:8, 103:19, 104:1, 104:2, 108:17, 137:22, 138:5, 260:19, 261:1, 261:3, 261:4, 261:22, 262:14
massachusetts
7:1
match
71:13
material
13:13, 39:2, 43:7, 43:8, 43:14, 43:17, 43:20, 56:20, 57:6, 58:14, 79:5, 80:2, 80:9, 85:2, 129:10, 152:19, 159:20, 161:19, 161:20, 162:1, 193:5, 193:9, 199:2, 223:7, 245:12, 257:11, 265:2, 265:3
materials
76:20, 83:7, 83:11, 83:20, 84:5, 85:5, 85:8, 85:16, 86:6, 86:7, 86:11, 86:21, 87:19, 89:2, 90:7, 91:3, 97:14, 98:22, 147:8, 147:16, 147:17, 148:3, 148:6, 149:2, 149:4, 149:11, 162:18, 163:10, 236:6, 244:3, 246:18, 251:20, 260:5
mathematically
44:14
matrix
74:12, 74:20, 76:4
matter
127:15, 129:14, 228:3, 269:19, 272:9, 277:24
matters
18:4, 210:21
maximum
70:7, 71:15, 72:6, 72:8, 181:8, 182:6, 190:4, 191:20, 192:13, 228:14, 229:9
maximums
70:17
maybe
10:14, 19:3, 20:17, 30:15, 36:9, 49:6, 51:16, 52:18, 54:14, 57:9, 60:22, 89:19, 91:6, 98:19, 99:12, 99:13, 99:21, 100:4, 104:17, 104:18, 133:22, 137:22, 138:2, 142:20, 180:19, 184:10,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

184:11, 195:1, 206:8, 206:9, 232:12, 234:18, 235:8, 237:21, 248:15, 258:9, 262:6, 265:8, 265:18, 271:5, 271:12, 272:14
mayne
104:17
meaning
18:21, 29:14
means
74:5, 80:11, 104:14, 105:6, 155:22, 156:1, 164:7, 207:22, 208:14, 208:16, 210:11, 215:6, 215:7, 217:17, 219:3, 221:5, 221:6, 222:8, 270:6
meant
17:6, 65:5, 68:22, 69:6, 101:13, 118:19, 119:6
measurable
55:5, 60:7
measure
43:15, 43:17, 44:13, 44:22, 51:14, 51:20, 52:1, 52:2, 59:1, 61:16, 61:20, 138:8, 138:18, 139:4, 139:8, 139:17, 140:5, 155:22, 168:10, 169:4, 169:17, 181:6, 261:19, 262:12, 263:19, 267:1
measured
43:6, 53:9, 54:12, 55:10, 58:19, 60:19, 142:18, 169:1, 169:16, 182:5
measurement
45:3, 52:13, 54:1, 59:2, 142:22, 167:22, 168:1, 170:21, 263:15
measurements
140:8
measures
43:19, 52:10, 54:3, 54:4, 57:12, 133:10, 168:5, 228:19, 261:20, 262:13, 263:13, 274:1
measuring
53:16, 53:19, 55:6, 57:14, 60:15, 138:14, 143:2, 143:4, 169:8, 169:10, 227:21, 272:13
mechanical
91:9, 97:15, 102:7, 126:2, 144:10, 145:10, 165:14, 219:3, 219:8
medium
167:6, 172:6, 181:6, 182:9, 215:13
meet
32:15, 40:11, 40:15
megapascals
150:18, 154:19, 155:1, 155:3, 155:7, 157:1, 164:17
meld
265:12
melt
81:4, 90:18, 134:1, 222:13, 223:8, 265:10
melted
249:19
melts
78:17, 91:7
membrane
57:20, 58:7, 58:16, 58:20, 79:22, 197:21, 198:2, 198:17, 207:12, 207:18, 230:5, 230:9, 241:9, 241:10, 242:4, 242:12, 246:8
membranes
242:9
memorized
58:9, 64:3
memory
48:12, 70:10, 130:22
mentioned
9:22, 74:3, 75:19, 90:4, 90:6, 131:7, 140:8, 144:12, 213:7, 227:18, 262:21
mentioning
93:15
mercury
44:2
merge
265:13
merit
2:7, 214:5
merits
49:1, 49:2
messaging
7:18
met
15:20, 29:21, 31:15, 34:4, 38:17, 39:16, 189:8
metes
29:6, 30:5
method
95:6, 95:15, 96:5, 99:14, 132:2, 132:5, 132:6, 134:10, 138:13, 152:14, 165:14, 211:11
methods
133:18, 134:10, 138:17, 139:7, 139:12, 140:4, 169:20, 170:3
mica
147:18, 159:6
micro
20:12
micron
70:1, 71:7, 175:4, 175:9, 176:15, 176:18, 177:15, 180:3, 180:4, 190:8, 190:9, 191:16, 270:2, 270:3
microns
64:13, 64:16, 70:13, 70:15, 70:18, 70:22, 71:4, 71:21, 71:22, 72:7, 72:8, 137:5, 150:1, 174:1, 174:20, 175:1, 175:8, 178:8, 181:10, 182:1, 189:22, 190:2, 190:4, 190:12, 191:15, 193:9, 226:17, 226:18, 226:19, 226:20, 253:8, 261:10, 261:11, 261:12, 270:3, 271:14, 271:15
micropores
254:8
microporous
80:5
microscope
51:17, 56:16,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 306 of 334

57:10, 99:6, 99:10, 254:17, 255:17
microscopic 34:22, 88:15, 166:11, 166:12, 230:14, 230:15, 243:5
microscopy 34:16
microtrac 167:22
mid 208:21
middle 11:20, 52:3, 52:16, 52:17, 52:19, 53:17, 54:19, 55:3, 55:6, 124:21, 125:17, 125:19, 218:15, 266:14
might 17:12, 34:15, 42:7, 54:9, 54:21, 61:4, 73:10, 73:11, 77:14, 79:4, 84:2, 90:15, 91:2, 91:4, 92:21, 97:16, 97:17, 98:10, 113:4, 115:17, 115:18, 116:1, 116:2, 116:11, 137:20, 137:21, 138:1, 153:1, 157:15, 166:16, 176:1, 177:1, 178:13, 181:1, 182:14, 198:19, 202:18, 204:15, 205:18, 206:5, 209:7, 209:18, 216:21, 227:11, 227:12, 227:14, 227:16, 237:1, 243:10, 249:8, 249:9, 251:7, 251:18, 259:22, 269:21, 274:9
mill 171:8, 171:19, 172:6, 270:10
milling 170:11, 171:1, 171:15, 175:16
mills 173:6
mind 213:15, 267:14
minds 153:22
mineral 146:21, 159:6, 195:4, 195:8
minerals 147:22
minimize 94:6
minimum 179:15, 189:17, 190:2, 228:14, 229:9
minor 127:1
minus 178:13, 182:6, 227:12, 227:13, 228:18, 228:20, 274:14, 275:11, 276:1
minute 24:20, 27:4, 45:19, 46:1, 114:3, 114:5, 114:13
minutes 79:15, 82:17, 82:18, 82:19, 108:4, 108:5
mischaracterizes 19:20, 31:2
misread 12:8
missed 213:14, 213:15
misspeak 255:11, 271:11
misstates 159:22, 203:22
mistake 262:10
mit 263:4
mix 144:16, 145:7, 145:8, 164:21, 165:11, 165:12, 165:13, 165:17, 166:8, 171:7, 236:18
mixed 37:2, 144:5, 144:7, 145:4, 162:18, 163:5, 165:18, 173:10, 236:21, 238:5, 240:3, 240:4, 258:12
mixes 148:18
mixing 67:9, 80:21, 132:21, 132:22, 144:11, 144:20, 145:11, 148:4, 164:13, 165:2, 165:14, 166:12, 170:15, 171:16, 200:7, 231:14, 231:15
mixture 166:7, 236:22, 239:22
mode 151:2, 153:10, 161:3, 162:5, 162:6, 167:4, 175:20
model 262:3
modes 146:9, 147:5, 156:17, 160:15
modest 134:1
molecular 13:21, 14:3, 22:21, 23:14
molecularly 248:4
molecule 14:4, 257:3, 257:13, 257:14
molecules 243:22
monodispersed 179:12, 187:20, 188:5
montmorillonite 147:18, 147:19
more 34:3, 40:2, 48:21, 48:22, 56:13, 56:16, 64:13, 67:16, 67:18, 70:3, 77:1, 79:3, 79:6, 79:17, 81:22, 82:1, 84:3, 85:14, 87:21, 90:22, 96:9, 103:10, 103:18, 103:19, 105:9, 106:5, 109:21, 110:5, 110:11, 112:20, 113:16, 115:6, 118:3, 119:17, 123:3, 123:5, 138:2, 139:11, 139:12, 165:13, 165:18, 166:16, 174:2, 175:1, 175:21, 177:17, 196:7, 202:17, 210:2, 210:8, 212:7, 217:20, 221:10, 225:1, 226:17, 226:19, 226:20, 245:15, 247:11, 249:19,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 307 of 334

251:8, 252:12, 257:18, 261:2, 261:11, 261:12, 269:3, 269:5
moreover 173:22
morning 5:13, 5:14
most 21:7, 60:8, 61:19, 72:13, 74:12, 74:20, 82:9, 105:7, 138:7, 143:1, 143:3, 169:3, 176:22, 177:13, 180:4, 196:16, 214:13, 217:7, 226:15, 226:22, 227:4, 230:1, 232:20
mostly 48:19, 50:14, 128:10, 157:16, 157:18, 211:18, 213:4, 266:5
motor 144:16
move 81:6, 150:14, 206:12, 225:9
moved 87:12, 242:7
much 12:16, 19:11, 19:12, 40:4, 44:1, 44:4, 61:7, 81:22, 97:20, 102:14, 103:9, 104:3, 118:2, 122:6, 184:13, 197:5, 198:21, 201:13, 201:18, 259:5, 260:7, 262:12, 269:19
multilayer 91:4
multiple 30:22, 31:16, 36:5
multiplication 146:8
murakami 35:6, 35:8, 35:12, 35:15, 35:19, 35:20, 39:22, 101:5, 101:10, 130:7, 130:11, 132:1, 133:4, 133:12, 134:5, 135:3, 144:11, 144:13, 145:6, 145:14, 149:15, 150:16, 151:17, 151:20, 152:1, 158:7, 159:16, 159:19, 160:1, 160:22, 164:16, 165:5, 167:10, 171:19, 171:22, 172:3, 173:19, 174:6, 178:12, 178:19, 179:14, 179:17, 179:20, 180:1, 180:8, 186:20, 186:22, 187:2, 189:16, 200:5, 200:6, 203:7, 203:20, 230:11, 230:17, 232:11, 241:17, 244:14, 244:16, 252:4, 252:8, 252:13, 267:10, 268:6
murakami's 36:8, 134:19, 135:22, 151:6, 213:17, 230:22, 251:9
must 12:20, 13:2
mutually 38:2, 96:20, 229:5, 275:20
myself 49:22, 85:22

N

nail 92:8, 97:21, 97:22, 214:6
nails 106:22
name 5:15, 5:17, 5:22
nano 20:12
nanoscale 20:10
nanotube 153:2
narrow 105:18, 105:21, 150:21, 151:14, 174:10, 174:17, 177:5, 177:15, 178:6, 179:11, 179:18, 183:4, 228:14
narrower 174:12, 174:16, 175:9, 175:12, 175:22, 179:4, 180:3
narrowest 178:17
narrowing 175:14, 175:19
natural 191:16, 263:22, 274:3
naturally 143:14, 195:5
nature 21:19
ne 3:6
near 187:11
nearly 63:22
necessarily 29:19, 53:22, 54:8, 63:20, 67:20, 71:12, 73:17, 76:12, 80:15, 93:16, 94:1, 100:13, 100:16, 101:2, 106:8, 110:3, 111:3, 116:22, 128:8, 143:12, 144:22, 153:22, 160:16, 161:12, 169:2, 174:11, 175:15, 176:11, 179:22, 184:1, 184:7, 185:6, 185:8, 186:2, 186:4, 193:13, 205:15, 210:4, 220:5, 223:14, 228:4, 228:8, 229:5, 240:15, 242:20, 244:12, 260:7
necessary 112:9, 120:8
need 7:12, 14:22, 28:16, 37:5, 95:1, 99:5, 101:2, 104:20, 113:14, 120:22, 124:7, 126:14, 137:10, 144:22, 151:19, 164:14, 164:20, 176:6, 176:11, 209:17, 220:6, 247:10, 260:4, 262:1, 262:2, 262:3, 262:4
needed 22:9, 114:17, 115:18, 165:3, 183:16
needs 128:18, 128:19,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

182:8
negate
150:2
negative
201:21, 215:8
neither
37:14, 131:5
network
194:4, 194:14
never
31:19, 49:3, 144:2, 163:19, 169:12, 187:19, 203:21, 274:19
new
31:5, 98:7, 99:11, 99:12, 99:13
next
95:14, 136:13, 149:13, 221:2
ningde
1:8, 5:5, 6:2, 6:7, 27:10
nobody
151:15, 170:17
nominal
43:13, 43:18, 88:12
non-conducting
125:22
non-conductive
230:5, 230:8, 231:3, 231:15, 231:17, 233:1, 233:3, 233:14, 233:19, 234:3, 234:7, 234:14, 234:15, 234:16, 234:19, 234:20, 235:1, 235:6, 235:11, 235:21, 235:22, 236:5, 236:14, 239:3, 239:4, 239:7, 239:12, 239:13, 239:18, 239:21, 240:10, 240:11, 241:8, 241:15, 242:5, 242:11, 242:15, 242:17, 243:1, 246:22, 247:20, 248:8, 249:21, 250:22, 251:2
non-particle
249:18
non-solvent
202:11, 204:14, 204:16, 205:21, 206:1, 206:11, 212:9, 258:11, 258:13, 259:11, 259:13
non-trivial
62:6
non-woven
89:2, 90:7
none
24:3, 24:22
nonetheless
37:18
nonresponsive
38:14, 42:13, 70:21, 129:1, 145:2, 150:13, 219:16, 275:13
normal
269:18
notations
58:4
notes
7:4, 7:7, 7:14
nothing
158:13, 159:11, 186:5, 186:20, 187:3, 200:1, 200:19, 213:13, 213:15, 240:7, 255:18, 256:6, 256:7
november
1:17, 2:1, 277:17, 277:26
nozzle
146:10, 147:9, 147:14, 148:10, 148:16, 148:17, 156:2, 156:19, 157:21, 158:5, 159:16, 164:11
number
8:1, 8:10, 8:12, 8:14, 8:16, 8:17, 9:10, 19:10, 25:5, 27:11, 41:7, 46:13, 46:14, 46:15, 46:16, 46:18, 47:1, 47:11, 48:4, 48:8, 48:22, 49:11, 59:19, 64:14, 76:20, 85:10, 97:6, 98:8, 100:9, 117:11, 135:10, 135:11, 135:17, 137:17, 137:21, 139:5, 140:9, 141:21, 142:10, 143:7, 152:5, 155:6, 179:19, 181:20, 204:4, 222:5, 227:3, 228:3, 228:6, 228:7, 228:22, 229:1, 264:12, 267:1, 274:10
numbers
27:3, 54:9, 124:12, 138:9, 138:12, 181:21, 197:10, 197:13, 221:1, 275:22, 276:1
numerator
44:15, 44:18, 44:22, 45:6

O

object
95:22, 128:22, 157:14
objecting
31:4
objection
15:11, 16:1, 16:5, 17:8, 18:1, 18:15, 19:8, 19:20, 21:16, 21:21, 25:3, 25:9, 26:3, 26:9, 28:1, 28:7, 29:1, 29:16, 30:7, 31:1, 32:16, 34:7, 35:17, 38:14, 38:19, 39:3, 39:18, 40:14, 42:13, 42:17, 51:8, 58:21, 63:4, 63:16, 65:15, 70:9, 70:21, 71:1, 73:3, 83:9, 83:16, 84:20, 99:17, 100:19, 103:11, 107:1, 107:11, 109:3, 113:11, 129:7, 138:21, 145:2, 150:13, 158:21, 159:1, 159:21, 163:2, 163:17, 164:18, 168:3, 168:8, 170:6, 176:3, 177:18, 179:21, 180:9, 181:12, 183:11, 183:16, 183:17, 184:6, 184:16, 185:5, 187:13, 188:10, 188:20, 189:3, 189:9, 190:16, 191:22, 194:20, 196:10, 200:9, 201:16, 203:5, 203:22, 205:13, 206:21,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 309 of 334

207:4, 209:11, 210:20, 211:15, 213:1, 213:10, 213:19, 217:9, 219:16, 222:3, 223:1, 224:1, 229:11, 237:16, 240:13, 242:6, 245:9, 245:20, 247:5, 247:8, 249:22, 251:12, 258:5, 268:9, 268:20, 269:8, 269:15, 273:5, 275:13, 275:17
objections
96:14, 104:10, 105:4, 105:16, 106:7, 109:7, 109:18, 110:2, 111:1, 111:14, 111:21, 112:11, 114:18, 273:19
objective
251:21
objects
78:2, 99:7
oblique
149:12, 160:12, 161:15
obliquely
161:16
observer
57:4
observing
255:15
obtain
165:7, 165:14, 165:20, 270:7
obtained
137:14, 165:15, 165:22, 242:10, 255:15
obviates
151:15
obviously
126:22, 149:15, 182:6, 193:14, 231:17
occur
115:6, 116:10, 131:14, 160:16
occurred
277:16
occurrence
61:1
occurs
145:12
off-the-shelf
176:8
offer
24:5, 25:2
offered
22:20
office
1:1, 6:22, 76:4
officer
277:3
often
49:21, 52:4, 84:22, 232:22
oftentimes
61:2, 243:12, 257:13, 265:8
oh
10:19, 12:11, 27:2, 27:6, 27:8, 27:12, 33:18, 46:19, 69:4, 114:4, 124:4, 124:15, 125:16, 147:13, 194:10, 213:14, 216:14, 216:18, 218:17, 231:12, 234:1, 234:3, 250:12, 274:18, 274:19
oil
257:5, 257:16, 257:20, 257:22
oily
257:5
once
140:7, 151:10
one-half
257:16, 257:17
one-third
198:16
ones
83:22, 87:22, 94:4, 103:17, 227:4, 232:11, 236:10, 236:12, 239:22, 240:1, 270:11, 270:12
ongoing
21:6, 23:5
only
34:5, 34:13, 34:20, 54:4, 106:13, 124:10, 130:18, 153:9, 158:7, 160:18, 161:1, 161:3, 169:5, 183:7, 184:1, 186:6, 188:11, 188:14, 196:14, 197:7, 251:2, 266:21
open
7:17, 8:13, 25:18, 25:21, 27:5, 39:5, 39:9, 43:7, 43:10, 43:12, 45:5, 47:4, 47:10, 50:11, 59:7, 65:8, 113:20, 114:3, 116:15, 124:6, 152:1, 201:10, 217:21
opened
41:3
opening
69:9, 113:22
operation
146:9
opinion
18:4, 18:8, 28:4, 28:5, 28:12, 32:14, 40:11, 50:5, 50:19, 92:2, 242:20
opinions
28:15, 38:5, 38:15, 49:6, 129:15, 192:16, 197:17, 264:9
opposed
87:12, 93:13, 210:18, 273:3, 273:17, 275:15
opposing
53:12, 156:15
opposite
210:5, 222:6
optical
57:10
optimize
102:1, 275:14
optimized
214:13, 217:7, 252:2
optimizing
275:15
optimum
251:17
option
195:11
optional
130:12, 130:19, 172:7, 194:1
options
134:4, 146:11
orange
125:10, 125:14
order
64:13, 84:16, 90:16, 131:14, 131:16, 166:14, 175:7, 223:6, 261:22
ordinary
29:14
organic
13:22, 85:1, 152:18, 152:22, 153:2, 235:12, 236:1, 236:12, 236:18, 236:22,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 310 of 334

237:9, 237:11, 237:19, 238:17, 238:19, 238:20, 238:21, 239:15, 239:22, 240:8, 244:3
original
48:5, 53:2, 262:16
other
7:7, 14:2, 20:19, 21:4, 21:9, 24:14, 32:8, 43:19, 51:5, 57:7, 62:6, 62:7, 62:11, 62:22, 63:9, 66:21, 70:17, 73:10, 76:8, 84:1, 89:1, 90:7, 90:9, 90:12, 95:19, 96:12, 98:16, 102:4, 102:8, 106:18, 108:19, 109:4, 109:15, 112:6, 119:14, 135:2, 155:17, 156:15, 159:17, 160:3, 160:12, 161:2, 161:8, 161:17, 172:20, 173:12, 187:10, 199:10, 206:2, 206:3, 213:6, 219:10, 220:2, 223:15, 231:21, 232:2, 238:3, 239:5, 240:6, 243:14, 243:15, 246:5, 260:11, 263:20, 272:22, 273:14
others
21:2, 63:14, 89:8, 139:12, 268:15
otherwise
14:21, 40:9, 69:16, 73:1, 152:15, 161:4, 183:8, 184:3, 277:23
ought
67:4
ourselves
110:13
out
15:22, 16:11, 16:17, 16:18, 17:2, 17:19, 18:11, 37:5, 37:6, 43:9, 66:13, 66:15, 67:20, 68:13, 68:16, 75:1, 76:9, 77:21, 85:13, 107:13, 108:11, 110:7, 110:12, 127:6, 131:21, 134:16, 135:16, 138:10, 146:13, 156:2, 156:12, 156:19, 156:21, 171:9, 171:18, 182:13, 190:10, 190:13, 191:7, 191:9, 191:18, 203:13, 211:22, 212:11, 217:12, 217:17, 232:21, 241:1, 249:12, 250:4, 253:14, 254:11, 254:13, 255:3, 258:18, 259:1, 260:6, 265:21, 266:8, 270:11, 272:9, 273:11
outcome
277:24
outer
52:8, 122:2, 265:9, 265:12
outside
84:20, 169:1
over
45:18, 68:6, 108:17, 112:18, 206:13, 210:7, 221:22, 245:13, 272:10, 272:12, 274:13, 275:11
overall
95:19, 96:13
overheat
90:16
overheats
98:1
own
73:6, 86:18, 172:10, 172:12, 172:13, 172:14
owner
1:9, 3:11, 6:2, 6:6, 25:14
owner's
45:10, 47:15
owners
46:22
oxide
56:12, 74:10, 74:13, 74:21, 80:4, 149:8, 268:3

P

packed
119:10, 193:4
packing
179:9
page
4:2, 4:7, 10:20, 26:13, 26:18, 26:22, 27:1, 27:3, 27:19, 41:6, 49:10, 49:12, 49:14, 74:17, 117:6, 117:7, 117:10, 117:11, 117:13, 117:15, 124:18, 124:21, 125:3, 125:4, 125:18, 141:8, 146:4, 148:21, 149:13, 233:11, 264:12
pages
48:22, 114:8, 121:11, 146:22
paint
243:7, 243:9
panels
106:21
paper
4:8, 4:9, 4:10, 4:11, 7:11, 8:14, 8:15, 8:16, 46:13, 46:14, 46:15, 46:16, 46:18, 47:10, 47:12, 48:4, 48:8, 48:22, 49:10, 95:1, 95:11, 159:7, 159:9
paragraph
36:15, 40:18, 41:5, 58:5, 58:11, 64:7, 70:20, 71:18, 72:1, 74:7, 74:15, 74:17, 79:20, 117:9, 117:17, 120:14, 121:5, 121:11, 123:11, 124:17, 124:21, 126:11, 130:16, 133:17, 134:5, 134:7, 137:11, 165:5, 172:4, 172:15, 173:20, 173:21, 177:16, 180:16, 186:9, 186:13, 186:14, 189:20, 193:6, 193:19, 197:19, 200:17, 201:1, 207:10, 209:1, 214:10, 216:3, 216:5, 216:13, 218:8, 222:9, 230:3,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

235:10, 241:3, 242:3, 242:7, 246:6, 253:3, 255:15, 255:22, 256:13, 256:20, 260:22, 261:8, 261:17, 266:12, 270:18, 270:20, 270:22
paragraphs
72:16, 136:1, 136:7, 136:8, 136:14, 152:15, 226:9, 226:11, 259:16, 260:10
parameter
132:20, 133:9, 206:13
parameters
61:10, 96:22, 205:6, 219:13, 227:15
parse
52:6
part
12:2, 12:5, 12:10, 12:14, 12:21, 13:17, 15:1, 15:8, 15:13, 15:15, 15:19, 16:10, 16:14, 16:19, 17:1, 17:2, 17:3, 17:7, 17:21, 18:13, 19:4, 19:7, 28:15, 30:3, 32:13, 33:16, 34:20, 36:5, 38:9, 38:10, 38:17, 40:6, 40:7, 51:12, 52:7, 52:8, 102:6, 124:11, 146:12, 195:16, 196:22, 197:3, 198:11, 199:1, 204:7, 218:3, 230:18, 230:19, 262:11
partially
16:11, 90:18, 112:4
participate
38:3
participating
38:13
particular
11:13, 13:15, 26:11, 38:13, 42:3, 49:8, 49:9, 63:6, 65:4, 73:6, 73:20, 91:19, 100:6, 105:10, 122:13, 122:14, 122:21, 122:22, 123:1, 123:20, 127:3, 140:15, 140:16, 143:9, 144:21, 163:20, 164:1, 164:2, 199:8, 236:9, 256:11, 259:10
particularly
56:3, 136:2, 174:2, 174:13, 175:4, 217:13, 270:4
particulate
230:11, 231:1, 231:12, 231:13, 231:16, 231:19, 232:13, 232:15, 232:20, 234:22, 235:3, 237:13, 238:7, 241:18, 242:17, 242:22, 243:2, 245:5, 246:7, 246:10, 246:16, 246:20, 246:21, 247:4, 247:17, 248:19
parties
277:20, 277:22
partition
253:6, 253:10, 253:13, 253:19, 253:21, 254:1, 254:20
parts
37:1, 37:3, 112:5, 112:6
party
23:19, 277:12
pass
57:5, 57:6, 276:5
passed
163:10
passes
150:17, 156:22, 164:17, 164:21, 165:3
patent
1:1, 1:3, 1:9, 1:12, 3:11, 6:2, 6:5, 7:22, 8:4, 8:22, 9:2, 9:4, 10:1, 10:3, 10:6, 10:14, 11:2, 14:5, 14:9, 19:12, 24:5, 25:2, 25:14, 26:11, 26:16, 27:22, 45:10, 46:22, 47:14, 57:20, 65:20, 73:12, 76:4, 82:6, 88:7, 89:9, 93:18, 110:8, 110:10, 110:15, 127:16, 130:6, 133:1, 135:11, 136:5, 137:8, 153:17, 153:18, 168:12, 168:17, 188:13, 189:8, 204:15, 208:3, 211:8, 272:6, 272:7, 272:12, 272:17
patent's
110:17
patentholder
25:5
patents
68:3, 117:4, 117:22, 172:11, 275:9
path
208:17, 209:19, 211:1
pathways
201:14, 201:20, 202:1, 202:3, 209:9
pause
153:15, 247:11
pay
22:15, 275:19
pdf
26:17, 49:13, 49:14, 117:10, 117:13, 121:11, 124:17, 125:4, 233:11
peel
97:19, 97:20
peeling
159:7
pen
7:11
penetrate
97:22, 204:16
penetration
92:8, 97:21
people
89:16, 92:7, 126:6, 138:1, 139:7, 139:20, 142:3, 158:7, 158:8, 170:1, 171:3, 184:7, 184:8, 184:9, 186:2, 229:15, 232:20, 232:21, 244:5, 267:1
people's
153:22
percent
25:6, 30:15,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 312 of 334

32:12, 33:9, 34:2, 35:22, 36:1, 37:6, 37:16, 37:17, 39:15, 40:1, 40:5, 44:10, 64:21, 101:9, 103:9, 103:17, 103:19, 108:17, 109:6, 109:17, 110:20, 111:18, 112:8, 112:18, 113:9, 113:14, 113:16, 115:11, 116:9, 116:11, 118:2, 119:3, 119:18, 123:5, 123:12, 123:13, 137:2, 137:3, 137:5, 137:6, 180:20, 188:17, 198:3, 198:4, 198:15, 198:16, 198:18, 198:19, 198:22, 199:1, 199:16, 199:17, 200:2, 200:14, 200:20, 203:9, 203:10, 203:20, 212:7, 244:18, 261:2, 261:3, 261:4, 272:3
percentage 36:20, 43:12, 44:9, 108:16, 112:17, 123:5, 142:15, 215:15, 215:22, 260:19
percentages 40:3, 198:12
perfect 82:5
perfectly 140:1
performance 86:10, 86:12, 86:16, 102:19, 149:20, 214:3, 214:6, 264:16, 265:15
performs 164:16
perhaps 14:2, 15:3, 74:22, 119:17
permeability 69:17, 97:8, 101:21, 102:10, 267:2, 267:4, 267:5
permeable 267:3
permit 154:22
perpendicular 255:17
person 28:21, 67:3, 71:5, 72:17, 115:14, 115:16, 143:17, 153:21, 179:16
personally 21:13
petition 48:4, 49:1, 116:19
petitioner 1:6, 3:3, 5:10, 6:13, 23:22
petitioner's 47:14
petitioners 25:8, 25:10
ph 1:16, 2:6, 4:3, 5:2, 263:6, 277:6, 277:16
phase 113:15, 114:22
phenolic 237:22
phone 251:17
photons 57:5
phrase 11:13, 12:20, 30:1
phrases 13:8
physical 115:1, 132:16
physically 6:20
pick 72:17, 75:17, 241:2
picked 227:2, 227:3
pickup 229:20, 251:16
picture 157:17
piece 18:9, 34:21, 43:17, 130:8, 248:5, 248:6, 264:8, 265:2, 265:3
pink 125:10
pipe 162:8, 210:11
piping 157:4
place 65:12, 68:7, 74:8, 106:22, 120:22, 128:12, 206:13, 210:7, 242:2, 245:7, 249:4
places 64:14, 64:18, 64:20, 69:7, 129:12
plain 29:14
play 107:12
please 22:15, 111:16, 183:20, 269:9
plenty 32:10, 170:10, 275:10
plow 108:7
point 15:17, 51:22, 74:3, 136:4, 150:3, 151:10, 154:3, 164:9, 164:21, 170:20, 179:6, 216:21, 218:3, 237:8, 247:1, 247:3, 248:17, 248:18, 248:20, 248:22, 249:6, 249:15, 250:20
pointed 147:12
pointing 59:12
points 105:18, 249:5, 251:3
poke 66:13, 67:12, 67:22, 75:1
poking 66:15, 67:20
polyethylene 88:14, 90:5, 90:19, 90:20, 91:5, 91:7, 92:4
polymeric 257:14
polymerization 232:7, 243:3, 246:18
polymers 85:14, 85:20, 89:3, 90:9, 132:18, 217:15, 220:1, 221:2, 221:21, 231:1, 231:11, 234:19, 238:20, 238:22, 246:16, 247:4

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 313 of 334

polyolefin
88:13, 88:22, 90:4, 90:17, 103:15, 123:21, 172:13, 264:15, 266:9, 268:4
polyolefins
92:10
polypropylene
88:14, 90:19, 90:22, 91:5, 91:8, 92:4
polyvinylidene
232:5, 232:18, 253:15, 258:17
poor
102:20, 256:6
popular
22:4
pore's
51:14
pores
12:2, 12:5, 12:9, 12:13, 12:22, 13:3, 15:18, 17:6, 17:20, 18:12, 30:2, 30:3, 30:8, 30:10, 30:13, 32:2, 32:11, 32:13, 33:7, 33:10, 33:12, 33:15, 33:16, 33:19, 33:20, 33:21, 34:5, 34:14, 35:15, 36:7, 37:8, 37:10, 37:12, 37:13, 37:14, 37:18, 37:22, 38:3, 38:7, 38:8, 38:11, 38:17, 38:21, 39:9, 40:6, 40:8, 40:12, 41:15, 44:1, 44:19, 45:1, 51:3, 51:11, 69:13, 80:16, 82:1, 88:15, 90:18, 102:3, 105:21, 110:8, 120:15, 120:16, 121:2, 123:6, 124:1, 128:5, 128:7, 128:19, 129:21, 194:3, 194:13, 199:4, 199:6, 199:7, 202:20, 203:2, 203:17, 204:19, 206:9, 215:12, 219:11, 222:15, 222:22, 223:10, 223:20, 230:9, 230:17, 241:14, 241:19, 241:20, 241:21, 242:4, 242:10, 242:14, 242:16, 258:20, 260:2
porosities
206:14
porosity
43:4, 43:6, 43:7, 43:11, 44:7, 44:8, 45:7, 45:9, 82:4, 82:8, 82:10, 82:11, 82:15, 82:22, 83:6, 83:14, 83:19, 84:1, 84:6, 95:5, 95:12, 96:4, 101:20, 101:22, 102:4, 102:9, 102:14, 105:14, 112:9, 112:14, 112:19, 112:22, 113:4, 113:5, 113:8, 116:7, 119:8, 120:8, 198:13, 205:2, 205:9, 206:9, 206:18, 206:20, 212:4, 212:10, 215:1, 241:10, 266:22
porous
11:22, 12:1, 13:2, 13:17, 13:18, 18:20, 30:1, 33:15, 34:4, 50:22, 57:19, 58:7, 58:15, 58:20, 79:22, 81:14, 81:21, 82:3, 97:13, 103:13, 109:11, 126:1, 126:8, 126:17, 126:19, 126:21, 127:1, 127:12, 127:13, 127:17, 127:20, 128:4, 128:7, 128:9, 128:18, 129:5, 129:22, 136:4, 136:5, 137:11, 168:7, 171:2, 173:17, 194:4, 194:14, 207:12, 207:18, 212:15, 213:16, 213:17, 213:18, 220:4, 220:5, 223:7, 230:5, 230:8, 241:9, 241:10, 242:4, 242:9, 242:12, 245:17, 246:8, 251:9, 251:10, 264:15, 268:7, 268:18
portion
50:17, 50:18, 74:10
posita
50:20, 51:3, 73:4, 97:1, 116:2, 142:4, 150:6, 154:3, 160:4, 161:6, 168:21, 173:4, 187:17, 192:19, 222:14, 227:16, 229:6, 252:15, 260:4, 265:14, 273:1, 273:15, 274:3, 274:18, 275:4, 275:14, 275:19, 276:3
position
16:4, 17:4, 22:13, 26:15, 27:21, 30:19, 30:21, 31:13, 31:15, 37:16, 42:11, 43:1, 69:19, 106:13
positions
17:14, 106:4, 106:6, 106:9, 107:9, 107:10
positive
215:6
possibilities
236:3, 250:19
possibility
77:21, 161:13
possible
17:11, 29:7, 72:9, 72:10, 78:2, 81:13, 81:16, 89:1, 111:10, 133:18, 180:17, 182:15, 182:16, 182:18, 184:14, 190:22, 193:2, 206:6, 216:9, 218:9, 218:19, 219:7, 219:18, 220:11, 249:17, 252:13
possibly
129:10, 271:17
post
78:16
potential
146:6, 266:21
potentially
42:6, 71:21,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

72:7, 76:17, 103:5, 115:13, 143:20, 229:4
powder 40:9
powerful 161:17, 162:9, 163:12, 164:2
practical 35:4
practice 60:1
practiced 178:1
practicing 252:17
pre 87:1
precipitate 217:18
precipitating 212:12
precipitation 258:19
precisely 217:19
preclude 120:4
precluded 113:18
prefer 94:14, 208:7
preferability 174:7
preferable 174:15, 174:19, 175:21, 177:13, 180:4, 226:15, 227:1, 227:4, 236:4, 236:7, 236:9, 236:10, 260:19, 261:6, 261:11, 261:12
preferably 35:22, 137:12, 174:1, 174:2, 174:13, 174:14, 175:1, 175:4, 236:7, 261:2, 261:3, 261:9
preference 175:8
preferred 82:7, 176:22, 226:12
preliminary 45:11
preparation 47:19, 152:14
prepare 136:15, 136:16
prepared 9:7, 10:7, 11:4, 88:1, 88:2, 136:9, 136:10
preparing 9:5, 10:1
present 115:7, 137:12, 253:5
presented 42:4
presently 23:17
pressure 97:11, 133:14, 134:12, 143:21, 145:9, 145:12, 146:2, 150:17, 153:6, 154:4, 154:7, 154:19, 154:20, 155:4, 155:8, 155:11, 155:15, 156:2, 156:5, 156:12, 156:19, 264:17
pressures 155:10
pressurized 157:5, 161:16, 162:9, 162:19, 163:6, 163:10
presumably 178:14, 229:16
pretty 13:20, 59:10, 104:2, 154:20, 180:14, 181:16, 231:10
prevent 14:9, 202:2, 202:18
previous 78:21
previously 4:6, 47:6, 100:2, 203:3
printer 76:4
prior 10:10, 11:12, 17:10, 17:15, 18:9, 18:22, 19:13, 19:14, 19:21, 29:4, 29:10, 29:13, 29:21, 30:20, 30:21, 31:14, 31:16, 32:1, 32:3, 32:8, 32:10, 32:12, 32:21, 35:12, 42:4, 49:17, 51:16, 53:16, 53:20, 71:14, 82:7, 108:20, 110:14, 126:18, 130:8, 135:12, 159:22, 192:17, 192:19, 204:12, 264:8
probably 20:21, 25:5, 61:19, 113:14, 133:16, 133:17, 134:8, 148:2, 151:3, 166:11, 167:17, 171:6, 173:4, 176:9, 180:18, 181:18, 217:2, 219:8, 230:12, 240:22, 241:1, 245:12, 245:15, 250:14, 254:10
problem 33:22, 65:22, 102:10, 124:9, 158:19, 264:14
problematic 116:1, 116:3, 116:4
problems 88:19, 102:4, 102:13, 174:18
procedure 150:8
proceeding 7:22, 8:6, 21:4, 22:8
proceedings 20:19, 20:20, 20:22, 21:3, 23:2, 23:21, 25:7
process 59:2, 80:21, 81:1, 81:5, 83:12, 83:20, 84:5, 88:16, 88:17, 93:6, 93:8, 96:18, 112:13, 112:22, 113:2, 113:3, 113:7, 113:15, 113:18, 113:19, 114:17, 114:21, 130:12, 130:13, 130:19, 130:20, 135:13, 136:11, 202:7, 202:20, 203:1, 203:7, 203:12, 204:15, 212:13, 212:20, 213:3, 213:7, 215:9, 217:19, 223:16, 232:7, 255:3, 258:12, 259:11, 259:12, 265:4
processes 127:16, 212:9

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 315 of 334

produced
88:15, 183:1, 265:3
produces
212:15
product
17:17, 17:20, 18:10, 18:12, 22:1, 33:1
production
99:14
professor
87:1
professors
63:9, 86:17
program
7:18
programs
7:17
prohibitively
92:22
projecting
56:19, 156:12
projection
56:20
projects
86:20
pronounce
5:15
pronounced
225:15
pronouncing
6:15, 225:10
pronunciation
225:11, 263:1
properties
90:13, 92:11, 246:4, 257:11, 268:13, 268:14
property
90:15, 91:18
proportion
201:14
proprietary
251:19
propylene
90:6
protein
265:21
protons
87:11
protrude
93:12
protruding
33:7, 68:13, 68:16, 68:21
protrusions
80:2
provide
35:19, 53:14, 92:6, 98:13, 214:13, 229:8, 229:9, 264:14
provided
26:1, 45:15, 47:7, 48:15, 185:3, 201:11, 239:12
provides
72:4, 73:2, 147:16, 183:7, 184:2, 221:12, 271:14
providing
227:7, 239:13
publication
138:4
pull
197:1, 197:9, 226:2, 262:17
pulverization
146:8, 147:5, 151:2, 153:10, 160:14, 161:6, 161:9, 161:17, 162:9, 163:1, 163:8, 164:4, 164:5, 171:1, 173:12, 175:13, 175:20, 176:1, 177:2
pulverize
146:13, 146:16, 149:14, 149:16, 149:22, 150:8, 150:10, 150:11, 150:12, 150:15, 151:9, 154:11, 154:12, 159:19, 160:10, 160:19, 162:15, 176:12
pulverized
144:6, 160:7
pulverizes
154:8
pulverizing
144:3, 146:17, 170:13, 171:15
puncture
92:9
purchase
156:10
purports
81:18
purposes
5:19, 57:20
push
17:12
pushes
217:17
put
19:10, 31:6, 42:21, 73:16, 88:22, 90:11, 91:11, 97:18, 109:10, 122:4, 137:20, 157:14, 169:17, 245:12, 256:18, 258:9
puts
84:5
putting
57:15, 65:11, 89:17, 110:13, 265:20

Q

qualitative
215:4
qualitatively
33:19
quality
115:3, 115:8, 135:14, 256:6
quantity
274:14
question
11:1, 15:3, 15:5, 15:8, 16:6, 27:18, 31:7, 31:10, 47:5, 47:18, 48:21, 49:2, 72:22, 96:1, 100:20, 127:9, 129:3, 134:13, 140:3, 145:3, 145:4, 158:3, 183:20, 184:1, 200:11, 206:19, 207:15, 217:6, 218:22, 219:17, 219:18, 225:6, 230:7, 247:9, 251:15, 255:9, 260:14, 268:11, 268:17, 269:11, 272:21, 273:6, 273:12, 273:13
questions
6:1, 31:5, 79:17, 89:8, 114:1, 276:6
quite
31:20, 35:21, 36:10, 39:20, 39:21, 52:4, 70:5, 82:1, 94:18, 102:20, 154:21, 155:4, 182:11, 182:12, 185:12, 243:16, 247:13, 248:13, 252:6, 252:7
quote
170:9
quoted
53:21, 54:9

R

radiuses
272:7
ran
162:4

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

random
248:14
randomly
67:9, 159:9
range
11:20, 35:21, 36:2, 70:20, 174:10, 178:10, 178:15, 178:18, 180:17, 180:22, 185:4, 187:17, 199:21, 200:18, 208:21, 226:15, 229:15, 230:2, 244:19, 269:17, 270:3, 272:19
ranges
44:9, 53:20, 53:21, 54:1, 64:4, 64:19, 67:21, 70:14, 70:17, 72:19, 82:7, 82:11, 82:14, 137:15, 185:2, 191:1, 191:13
rarely
86:18
rate
102:19
rather
56:21, 68:21, 78:4, 105:8, 209:20, 217:14
rating
215:21
ratio
19:16, 19:19, 147:17, 186:17, 197:20, 199:3, 199:9, 200:7, 227:20, 245:4, 269:12, 269:13, 270:8, 272:17, 273:2, 273:16, 274:13, 275:15
ratios
72:5, 72:13, 73:2, 115:22, 196:3, 199:8, 199:10, 199:18, 227:10, 244:14, 244:17, 269:5, 269:10, 272:8
rattle
94:7
rattling
16:13, 93:19
raw
162:18
reactors
155:12
read
10:8, 12:13, 74:9, 96:3, 122:5, 153:18, 154:13, 161:6, 173:2, 184:12, 184:17, 186:4, 192:22, 193:1, 205:5, 217:11, 247:13, 256:2, 262:19
reader's
57:16
reading
12:7, 29:18, 73:4, 121:22, 160:4, 160:22, 161:5, 163:21, 200:16, 239:19
real
60:1, 122:19
realistic
185:14
realized
263:5
really
17:13, 18:6, 29:5, 32:5, 32:18, 32:19, 33:10, 33:11, 33:22, 40:2, 42:1, 42:22, 48:13, 48:21, 52:5, 59:1, 75:17, 76:1, 77:2, 92:2, 92:20, 100:22, 104:20, 106:8, 115:9, 127:9, 133:3, 155:20, 156:7, 156:18, 177:5, 193:11, 196:5, 197:14, 213:21, 246:1, 251:16, 270:11, 270:12
realtime
2:8
reask
31:9
reason
50:10, 75:14, 76:6, 164:16, 171:5, 180:19, 180:20, 187:9, 267:1, 273:1, 273:15
reasons
73:7, 73:10, 177:22, 206:15, 209:7, 257:21
rebar
22:21, 23:14
recall
45:13, 45:16, 47:8, 48:15, 49:8, 49:21, 64:20, 108:14, 116:21, 127:11, 127:13, 200:22, 235:15, 241:7
recent
126:12, 126:16
recess
24:21, 46:3, 82:21, 108:13, 167:21, 225:8
recited
134:14, 181:21, 200:17
recognize
35:10, 116:2, 116:17, 130:5, 226:5, 253:1, 264:5
recognized
125:1, 125:15, 125:22
recollection
118:16
recommend
148:22
record
24:19, 31:6, 46:2, 108:12, 277:10
recycled
98:8
reduce
150:22
reduced
133:14, 134:12
redundancy
165:10
refer
6:12, 8:3, 8:6, 12:13, 103:16, 136:21, 136:22, 137:16, 219:19, 254:8
reference
49:17, 136:18, 226:6, 231:19, 252:21, 253:1, 264:6
references
48:17, 135:12, 200:8, 232:2, 272:22, 273:14, 275:5
referencing
47:22, 48:19
referring
6:6, 69:3, 73:21, 80:1, 80:19, 81:10, 81:11, 94:19, 102:6, 137:9, 139:20, 140:19, 148:1, 167:9,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 317 of 334

182:18, 210:15, 215:3, 231:2, 233:2, 233:4, 235:21, 238:14, 250:21, 251:6, 266:13
refers 159:5, 186:5, 233:1, 235:20
reflect 76:22
refresh 118:16, 130:22
regard 26:10, 67:2
regarding 28:15
regardless 173:5
registered 2:7
related 21:13, 26:2, 114:21, 202:6, 277:19
relates 7:21, 8:20, 11:21, 215:9
relating 7:22
relationship 205:8
relative 20:3, 43:12, 59:7, 67:17, 95:5, 95:13, 96:4, 101:4, 110:4, 111:4, 190:21, 228:19, 228:22, 274:11, 274:12
relatively 119:10, 208:7
relevance 25:3, 26:9, 28:1, 28:7, 63:4, 63:16, 107:1
relevant 11:11, 40:2, 129:16, 160:21, 266:18
relied 35:12, 187:7, 264:9
rely 130:9, 168:22, 197:16
relying 195:12, 267:18
remaining 131:19
remains 80:5
remember 8:18, 50:1, 117:5, 208:9
remote 1:15, 2:6
remove 127:10
removed 126:10, 132:2, 135:3
reopen 47:2
repeat 11:1, 111:15, 269:9
repel 217:17
repels 215:7, 217:15, 218:6, 219:11, 222:5
report 60:21, 61:15, 140:10, 140:13, 143:18, 184:21, 263:19
reported 1:21, 60:19, 60:21, 142:10
reporter 2:8, 277:1
reporting 138:12, 138:19, 141:12
reports 62:8, 263:9
represent 5:9, 32:5, 32:21
represented 23:2, 23:7, 59:20, 277:13
representing 5:5, 23:18
repulsive 214:21
require 252:3, 272:17
required 97:20, 114:16, 193:13
requirement 27:16, 40:12
requires 12:20, 62:6, 65:4, 191:19
requiring 40:12, 65:1, 65:3, 240:8
resin 135:7, 237:22
resins 237:20
resistance 91:14
resolution 68:2, 76:3
respect 10:9, 29:9, 42:2, 86:5, 260:17, 272:16
responding 48:9
response 45:11, 47:14
responsible 224:15
rest 21:7, 171:12
result 57:7, 77:14, 102:17, 105:14, 119:8, 143:14, 150:2, 162:12, 162:22, 173:13, 221:18, 223:16, 228:2
resulting 163:11
results 149:19, 201:4, 201:9, 212:21, 223:12, 224:12, 224:16
retained 6:9, 23:10, 23:11
review 9:4, 10:3, 40:17, 45:10, 46:13, 47:18
reviewed 9:22, 47:6, 49:2
reviewing 47:8
rid 258:1
right-hand 146:7
ring 117:1
rip 156:11
rmr-crr 1:21, 277:30
robust 92:21
rock 238:1, 238:4, 239:2
role 107:12
rolling 93:7
room 7:2, 106:15, 107:8
ross 3:15

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 318 of 334

rotate
199:15
rough
211:6
rougher
210:2
roughly
50:8, 172:5
round
68:14, 69:13, 70:3
rows
234:18, 235:9
ruined
22:2
rule
77:21
rules
275:7
run
102:14, 155:17, 156:15, 160:9, 174:18
runaway
214:7
running
77:12, 213:11, 273:10

S

s
3:1
safe
92:21
safety
88:20, 92:6
said
8:18, 12:4, 31:19, 32:20, 59:8, 68:22, 69:2, 74:15, 87:19, 118:8, 118:22, 120:7, 122:3, 122:4, 122:8, 126:18, 127:20, 128:9, 129:5, 129:9, 146:1, 151:7, 151:9, 160:3, 160:6, 181:22, 183:22, 186:22, 219:13, 225:1, 241:16, 246:16, 256:2
salt
84:21
sam
5:18
same
9:20, 25:9, 26:19, 53:11, 55:12, 61:16, 83:16, 89:15, 89:16, 96:14, 104:3, 104:10, 105:4, 105:16, 106:7, 107:11, 109:7, 109:18, 110:2, 111:1, 111:14, 111:21, 112:11, 113:3, 113:7, 114:18, 126:11, 131:3, 151:13, 170:15, 177:12, 182:20, 183:3, 183:6, 184:6, 184:16, 185:5, 188:10, 188:16, 189:3, 189:5, 189:6, 189:9, 189:13, 190:11, 205:16, 206:16, 206:20, 210:20, 211:15, 213:1, 216:5, 223:17, 225:6, 228:2, 228:3, 228:6, 228:7, 230:10, 237:10, 240:11, 240:15, 240:21, 241:16, 243:8, 266:22, 268:11, 268:17, 268:20, 269:15, 272:11, 273:19
sample
30:9, 32:6, 57:11, 168:6, 260:5, 274:4
sampling
32:22
samsung
23:3
samuel
1:16, 2:6, 4:3, 5:2, 5:17, 5:18, 277:6, 277:16
satisfy
176:10
saw
204:2
sawdust
220:2
saying
11:16, 128:18, 128:19, 145:7, 173:14, 174:15, 174:16, 180:1, 193:11, 193:12, 202:4, 203:19, 207:20, 208:5, 210:22, 213:14, 223:6, 223:14, 224:4, 250:3, 250:12
scale
14:12, 55:5, 58:14, 59:5, 59:16, 70:4, 228:21
scanning
254:16, 255:16
scatter
76:22
scattering
76:15, 98:20, 100:10
scatters
56:13
schematic
58:12
scholar
275:8
school
225:13
science
133:7
scope
28:22, 84:20, 168:3, 168:8, 178:3
scratch
95:1, 172:12, 172:13, 269:10
screens
270:12
screwed
22:10, 22:14, 22:17
se
268:16
sea
104:3
sealed
82:2
search
64:8, 137:10, 154:22, 186:7, 255:12
searching
66:10
second
36:17, 48:3, 117:12, 172:3, 194:1, 252:22
secondary
77:13, 84:8, 84:10, 266:15, 266:20
section
58:13, 127:5, 127:6, 136:13, 148:22, 171:22, 172:8
sections
172:11
seem
59:6, 117:8, 147:21, 165:16, 187:21, 193:10, 235:14
seems
59:10, 121:21,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

148:1, 163:22, 172:14, 193:2, 195:9, 207:20, 245:11, 263:17
seen
47:6, 49:3, 141:5, 170:10
sem
33:2, 33:3, 34:18, 51:17, 54:15, 54:22, 55:22, 59:8, 63:13, 66:16, 76:12, 77:12, 77:22, 98:11, 110:10, 169:5, 169:9, 193:17, 254:18
sems
79:2
sense
55:18, 180:11, 229:3, 229:22, 231:5, 231:6, 243:16, 251:22, 262:12
senses
204:4
sensitive
62:1
sent
85:9
sentence
125:1, 216:13, 216:16, 224:14
sentences
198:12, 223:5
separate
91:6, 106:9, 146:9, 160:15, 162:6, 162:17, 167:2, 265:21
separated
109:22, 110:21, 111:19, 112:2, 119:21, 120:5, 121:18
separately
57:13, 219:15
separates
212:11
separating
258:18
separation
113:15, 115:6, 115:9, 202:20, 203:11, 204:14, 258:11
separator
14:11, 34:13, 34:21, 43:2, 83:3, 84:15, 88:2, 88:13, 91:15, 91:22, 92:1, 92:15, 92:16, 94:9, 94:12, 95:3, 95:20, 96:13, 96:18, 97:5, 97:12, 97:16, 98:1, 98:7, 99:2, 99:11, 99:12, 102:5, 105:1, 109:9, 113:8, 113:10, 118:9, 119:2, 123:12, 123:15, 198:8, 198:9, 208:19, 209:20, 210:12, 211:3, 211:5, 213:17, 214:2, 228:13, 231:18, 245:3, 245:19, 251:11, 255:16, 258:2, 266:1, 266:2, 266:3, 266:4, 266:7, 266:11, 266:14, 266:19, 267:4, 268:8, 268:19
separators
42:5, 42:7, 87:14, 88:5, 88:10, 89:17, 89:22, 90:3, 98:12, 103:8, 103:17, 104:6, 104:12, 105:13, 108:15, 108:16, 108:20, 109:4, 109:5, 109:15, 109:20, 111:17, 112:7, 117:22, 119:14, 123:2, 212:18, 231:22, 246:19, 265:18, 267:2, 267:9
serve
7:17
set
119:3, 143:12, 155:15, 277:7, 277:25
setting
44:13
shape
40:10, 62:7, 70:2, 76:17, 246:21, 248:14, 262:2, 262:4
shapes
185:21
share
51:12, 63:8, 63:13
shared
50:14
sharp
79:3, 249:5
shear
148:18, 163:11, 164:8, 164:10, 164:12, 164:13
shears
148:18
sheet
7:10, 159:5
sheets
147:2, 159:7, 159:9
shine
57:10
shooting
148:17, 156:19
short-circuit
91:10
short-circuits
88:20, 92:6
shorthand
277:1
shot
156:21, 157:2, 157:5
should
10:14, 63:19, 66:8, 72:2, 140:20, 178:20, 180:2, 210:1, 228:13, 252:20
shouldn't
161:5, 184:12
show
41:9, 65:7, 81:18, 177:22, 178:1
showed
65:21, 175:19, 185:15
showing
48:9, 54:7, 58:13, 142:10, 147:4, 177:3, 177:21, 178:9, 178:10, 190:19, 199:19
shown
9:8, 177:16, 214:17, 264:12
shows
54:10, 80:1, 147:6, 166:22, 167:1, 215:16
shrink
155:17
shutdown
90:15, 91:2
shuts
91:7
side
50:9, 52:19, 52:20, 53:12, 57:7, 106:11,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

146:7, 233:20, 272:1, 272:2, 272:4, 272:13
side-by-side 126:15
sides 40:6, 191:9, 204:7, 241:22
sidewalls 254:10
sieves 270:13
signature-mig2k 277:28
signed 118:6
significant 32:5, 32:22, 211:19, 212:6
significantly 108:22, 119:17, 169:21, 196:8
silica 149:7
similar 25:13, 55:20, 75:20, 100:4, 195:8, 230:21, 238:21, 243:4, 243:20, 244:4, 252:6, 254:10, 257:19, 268:4
similarities 252:9
similarly 102:9, 137:5, 243:17
simple 165:13, 205:7
simply 78:3
since 158:10
single 146:10, 147:9, 147:14, 148:10, 148:16, 148:17, 156:19, 157:21, 158:4, 159:16, 164:10, 164:11, 232:21
sintered 264:15, 265:1
sintering 265:4, 265:5, 265:6
site 55:17
sitting 68:10, 93:17, 213:14, 248:16, 249:14
situation 22:13, 24:17, 39:21, 127:18, 129:3, 129:19, 211:17, 230:21, 250:21
situations 112:16
six 234:18, 235:9
sized 59:21, 60:2, 60:6, 63:22, 65:10, 137:17, 182:19, 188:8, 240:12
sizes 60:11, 60:22, 61:17, 61:20, 63:18, 64:5, 64:12, 64:17, 70:13, 71:7, 71:10, 138:16, 140:15, 140:18, 141:12, 142:18, 143:2, 143:4, 150:22, 154:18, 168:2, 168:5, 168:10, 168:13, 168:22, 169:22, 170:4, 171:2, 171:6, 180:7, 180:14, 180:17, 180:22, 181:1, 184:15, 185:3, 185:4, 185:21, 186:5, 186:7, 186:8, 186:21, 187:4, 187:11, 188:19, 189:2, 193:15, 205:10, 205:11, 206:14, 206:17, 206:19, 207:3, 215:11, 223:22, 229:16, 236:13, 236:15, 263:10, 263:13, 263:19, 269:7, 269:14, 269:18, 271:6, 271:7, 271:8, 271:9, 271:13, 273:9, 274:11
skill 28:21, 71:5, 72:17, 115:14, 115:16, 139:8, 143:17, 153:21
skilled 126:6
skipping 211:13
slapped 248:6
slit 163:9, 163:11, 164:15
slow 95:9, 102:21, 102:22
slowly 211:22
slurry 136:10, 155:16, 159:11, 166:4, 171:7
small 14:16, 15:1, 20:7, 39:5, 61:6, 80:1, 99:4, 99:7, 100:5, 115:10, 128:10, 179:19, 180:14, 190:21, 222:12, 222:21, 223:7, 223:21, 224:14, 224:17, 224:22, 225:2, 245:5, 257:14, 269:20, 270:12, 272:1
smaller 14:2, 70:3, 70:5, 99:4, 99:8, 115:20, 153:7, 180:7, 182:8, 182:13, 193:19, 196:16, 196:20, 202:14, 224:5
smallest 229:17, 229:20
smash 148:19, 149:22, 156:16
smashing 148:14, 156:13
smooth 210:10, 210:11, 210:13, 210:18, 210:19
smoother 210:1, 211:6
snake 248:5
soap 257:2, 257:21
solid 43:8, 168:11, 198:19, 199:1, 201:5, 212:2, 265:3, 266:16
solidification 95:7, 95:15, 96:6
solidifying 203:18
solids 222:15, 223:11, 223:20

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 321 of 334

solubility
133:8, 133:9
soluble
235:3, 244:4
solution
114:22, 115:7, 168:11, 171:10, 203:13, 212:12, 217:18, 222:13, 223:9, 243:17, 248:2, 265:20
solutions
85:15
solvent
85:1, 115:4, 115:8, 115:9, 130:13, 130:20, 131:5, 131:9, 131:13, 131:17, 131:18, 131:20, 132:1, 132:7, 132:10, 132:11, 132:14, 133:2, 133:4, 134:7, 134:16, 134:17, 134:21, 135:3, 135:5, 135:7, 135:14, 135:15, 135:18, 135:20, 162:19, 163:6, 166:6, 202:11, 202:12, 203:8, 211:11, 212:13, 212:20, 214:20, 217:16, 218:5, 222:13, 223:9, 243:12, 258:11, 258:12, 259:11
solvents
132:18, 244:4
somebody
144:11
somehow
100:18, 126:22, 227:11, 250:4
someone
183:7, 184:1
someplace
137:7, 207:7, 272:14
something
7:12, 7:13, 9:14, 14:15, 15:12, 21:11, 25:13, 43:22, 51:19, 54:2, 66:4, 71:11, 78:14, 78:18, 92:20, 99:19, 101:3, 101:6, 101:9, 116:22, 133:3, 133:5, 133:8, 134:2, 140:20, 144:12, 144:16, 157:16, 159:4, 164:12, 185:10, 185:22, 192:18, 195:2, 206:7, 206:10, 206:12, 212:8, 228:21, 235:15, 237:22, 248:6, 259:13, 259:14, 262:1, 262:13, 265:7, 265:22, 270:2, 274:16
sometime
132:21
sometimes
88:17, 94:1, 101:2, 132:20, 170:16, 227:11, 228:6, 229:14
somewhat
25:13, 90:19, 246:3
somewhere
45:21, 116:12, 133:16, 138:3, 138:7, 142:21, 144:12, 202:9, 231:14, 255:12, 271:20
sorry
16:3, 24:17, 26:7, 56:22, 72:21, 84:8, 101:17, 124:4, 143:5, 153:11, 183:13, 187:1, 200:7, 200:12, 216:3, 216:4, 216:15, 228:3, 242:8, 247:6, 247:11, 265:1, 266:10, 271:9, 273:11
sort
11:9, 11:20, 21:9, 22:7, 42:2, 43:13, 43:17, 43:22, 54:22, 55:3, 61:3, 61:13, 75:6, 75:20, 79:3, 80:20, 84:11, 88:12, 88:19, 89:1, 89:4, 92:13, 96:20, 98:19, 99:1, 107:4, 107:5, 110:3, 147:1, 152:21, 152:22, 156:9, 156:11, 157:13, 171:22, 172:1, 179:2, 180:11, 196:16, 208:16, 210:11, 210:12, 212:15, 214:5, 227:15, 248:3, 250:11, 259:10, 262:2, 269:3, 270:10, 274:10, 274:15
sounds
7:15, 79:14, 101:16, 147:20
space
14:17, 14:19, 14:21, 15:22, 39:2, 39:5, 39:9, 40:4, 41:17, 43:7, 43:10, 43:12, 44:4, 44:6, 44:18, 45:1, 45:5, 50:11, 51:7, 59:7, 66:2, 69:12, 106:2, 131:19, 156:12, 156:20, 156:21, 203:15, 206:13, 209:15, 230:4, 230:20, 241:8, 241:14, 242:4, 242:10, 242:16
spaces
106:4, 211:21, 212:1, 230:7
spaghetti
248:6
span
227:11, 227:12, 227:13, 227:14, 274:1, 274:16
speak
17:19, 46:4, 85:13
specific
60:5, 82:4, 83:7, 123:3, 228:15
specifically
49:7, 57:22, 65:17, 148:1, 149:17, 154:17, 158:9, 234:19, 241:1, 244:20, 244:22
specification
59:18, 153:20, 192:18, 193:1
specifics
208:9
specified
11:18, 11:19, 34:10, 152:15
specifies
174:9
specify
151:4, 236:11

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

specifying
123:18, 174:10, 183:8, 184:3
spectroscopies
98:17
spectroscopy
100:9
spectrum
36:10
speculate
184:22
speculating
129:17
speculation
19:9, 32:17, 34:8, 35:18, 39:19, 65:16, 70:9, 71:2, 83:10, 96:1, 103:12, 159:2, 163:3, 163:18, 164:19, 168:9, 170:7, 176:4, 177:19, 181:13, 183:12, 187:14, 190:17, 196:11, 201:17, 207:5, 213:20, 217:10, 224:2, 229:12, 245:21, 250:1, 251:13, 258:6, 268:10, 273:6, 275:18
spending
45:16
sphere
247:18, 248:11, 248:15, 248:16
spherical
140:1, 248:13, 262:6
spider
218:1
spike
189:12
spinodal
212:14, 217:21
spongy
212:15
sponsored
86:14
spot
76:11
spots
56:8, 68:6, 68:11, 68:12, 68:14, 69:2, 69:6, 69:7, 69:20, 70:6, 77:3, 77:8, 77:22, 256:9
spread
221:9, 248:4, 250:4, 251:8
spreading
249:12
square
80:14
stability
126:3
stable
236:6
stack
159:7
stacked
124:9
stan
273:22
standard
73:17, 80:21, 97:11, 250:11, 274:1, 274:13
star
144:22, 145:9, 145:15, 145:17, 149:1, 151:17, 175:18, 177:4, 177:7, 177:15
starburst
142:20
start
94:21, 94:22
starts
27:10, 90:16, 136:2
state
58:1, 138:3, 171:10
stated
193:1
statement
75:2, 81:11, 81:20, 111:13, 111:15, 111:22
statements
223:13, 223:15
states
1:1, 2:9
stating
224:10
statistical
229:22
statistically
32:5, 32:22, 33:13, 67:9, 75:7
statistics
169:7, 169:12, 229:19
stay
104:1
steel
170:14
step
166:17, 166:19
steps
172:20, 173:13
stick
89:6, 144:16, 190:10, 190:13, 191:7, 191:9, 191:18, 203:13, 230:16, 243:14, 243:15, 244:1, 265:10, 265:13
sticking
15:22, 16:11, 16:17, 16:18, 17:2, 17:19, 18:11, 56:9, 76:9, 77:4, 77:5, 89:8, 110:7, 110:12, 220:20, 248:22, 249:7
sticks
221:5
sticky
238:10, 243:6, 243:11, 243:13, 244:7, 245:6, 248:11, 248:12, 249:4
still
16:9, 16:14, 23:5, 37:18, 45:8, 51:12, 76:15, 82:3, 87:13, 89:15, 89:16, 105:20, 110:7, 110:12, 113:2, 113:3, 121:2, 131:21, 171:11, 171:17, 181:17, 182:13, 185:20, 203:11, 203:17, 229:1
stirring
172:6
storage
86:3, 87:7, 87:9, 266:15
straight
208:18, 211:4, 212:19
stream
157:18
street
3:6
strength
97:16, 102:7, 126:3, 179:8, 219:3, 219:4, 219:8
stretch
97:17
stretching
88:16, 88:17
strike
150:14
string
248:5
strips
147:1

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

strongest
216:8, 218:9, 218:13, 218:14, 218:19, 219:7, 219:18, 220:11, 220:14
structural
63:1, 78:22, 98:21
structure
13:17, 18:20, 38:20, 39:4, 41:16, 42:2, 43:8, 50:22, 51:1, 51:10, 53:11, 55:19, 56:1, 67:10, 68:12, 69:8, 80:5, 81:8, 81:9, 81:14, 82:3, 91:5, 91:9, 99:16, 100:13, 101:7, 104:8, 104:15, 104:21, 105:2, 118:11, 118:22, 120:20, 120:22, 121:1, 123:10, 123:16, 159:13, 179:8, 190:19, 192:5, 195:19, 201:10, 202:13, 202:14, 202:19, 211:10, 211:14, 212:15, 212:17, 213:8, 214:13, 217:8, 217:20, 217:21, 242:12, 253:7, 253:12, 253:19, 254:21, 259:1, 259:7, 267:8, 268:5
structures
20:11, 42:11, 43:2, 79:3, 119:21, 215:10, 254:2, 259:21
stuck
75:9, 75:12, 93:20, 93:21, 93:22, 94:3, 167:3, 248:2, 248:17
student
85:8
students
87:8, 87:18, 99:15
studied
155:21
studies
149:17, 150:3, 154:17, 158:12, 263:4
study
114:20
studying
48:16
stuff
19:2, 48:18, 67:7, 67:10, 108:11, 136:12, 145:21, 173:6, 173:7, 213:13, 249:8, 249:14
submitted
9:20
subscript
137:20
substance
13:22, 14:1
substantially
197:14
substituted
134:17, 135:6
substitution
130:13, 130:20, 131:5, 131:10, 131:13, 131:17, 131:18, 132:7, 132:11, 134:21, 135:5, 211:11, 212:20
substrate
88:22, 90:11, 109:11, 123:21, 255:2
substrates
89:2, 90:7
suggesting
58:10
suggests
54:12, 72:15, 186:20, 187:3, 200:6, 200:13, 200:20
sugino
145:15, 145:17, 150:16, 151:17, 167:10, 167:13, 175:22
sugino's
159:16
suing
22:5
suite
3:6, 3:15
summary
207:11
super
92:21
supplier
22:10, 22:12
support
117:3
suppose
10:8, 11:18, 117:1, 118:21, 130:1, 219:9, 240:1
supposedly
82:2
supposition
173:4
sure
8:11, 8:20, 9:19, 12:11, 23:8, 36:18, 52:12, 64:11, 64:21, 66:3, 67:4, 78:14, 79:10, 89:7, 92:19, 94:13, 94:19, 95:10, 103:15, 104:14, 105:6, 106:20, 107:2, 107:18, 111:17, 115:16, 127:1, 131:1, 140:21, 143:16, 147:15, 149:14, 150:14, 153:4, 153:14, 154:21, 155:2, 163:4, 164:6, 176:10, 182:2, 183:17, 189:10, 194:21, 197:12, 206:4, 207:6, 207:21, 214:4, 219:9, 222:19, 223:3, 223:13, 224:8, 224:9, 224:12, 224:21, 231:10, 232:13, 234:4, 234:6, 237:2, 238:16, 240:19, 246:4, 247:13, 247:15, 249:2, 251:5, 264:1, 267:12, 270:5
surface
38:21, 44:3, 53:10, 56:2, 56:4, 56:21, 68:16, 76:13, 80:12, 97:18, 105:7, 205:22, 206:2, 211:6, 220:20, 221:9, 222:1, 245:13, 245:14, 248:3, 248:4, 248:7, 249:13, 249:20, 250:5, 255:1, 255:18, 255:19, 260:3
surfaces
81:6, 81:7, 265:9
surfactant
235:4, 235:5, 256:21, 257:1,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

257:3, 257:9, 257:10, 257:12, 258:4, 258:9, 258:14, 259:4, 259:7, 259:15, 259:19
surfactants
257:15, 260:8
surprised
235:16
surprising
240:17, 240:20
surrounded
106:15, 110:1, 110:22, 111:11, 111:20, 112:3, 112:4, 119:22, 120:6, 121:18
surrounding
15:6, 39:14
survey
31:22, 214:1
susan
1:21, 2:7, 277:3, 277:30
suspended
243:12
suspension
232:7, 246:17
switch
146:13
sworn
5:3, 277:8
system
205:20, 213:2, 214:20, 216:9, 218:8, 218:10, 218:20, 219:8, 219:19, 219:21, 219:22, 220:4, 220:8, 220:11, 220:14
systems
129:10, 214:20

T

table
149:18, 214:17, 215:3, 215:19, 216:5, 218:4, 220:21, 222:5, 224:20, 233:10, 233:13, 233:17, 233:22, 234:10
tabs
152:5
take
17:14, 22:13, 40:4, 43:17, 45:19, 45:20, 46:1, 51:17, 79:9, 79:12, 79:18, 82:16, 107:18, 107:21, 127:22, 150:6, 160:4, 167:15, 167:18, 169:11, 171:9, 189:19, 209:19, 225:4, 274:14
takeaway
217:12
taken
20:13, 21:7, 26:14, 27:20, 33:3, 102:10, 170:22, 277:4, 277:9
takes
97:10, 208:18
taking
101:1, 265:6
talk
46:8, 53:18, 59:2, 74:4, 133:11, 145:19, 173:6, 186:17, 187:5, 231:9, 258:8, 266:5, 272:7
talked
213:12, 227:5, 233:8, 241:7, 260:17
talking
19:15, 19:17, 19:18, 20:7, 46:16, 58:2, 59:4, 70:12, 101:15, 101:16, 108:15, 109:8, 109:9, 109:12, 111:5, 121:14, 122:17, 133:12, 139:20, 144:8, 145:5, 164:8, 172:9, 172:15, 174:3, 179:2, 187:2, 188:2, 194:12, 194:18, 195:9, 198:11, 209:22, 210:19, 218:10, 220:16, 225:21, 232:2, 233:9, 233:17, 234:17, 234:22, 238:12, 238:14, 244:20, 247:15, 248:20, 249:18, 256:20, 261:14, 269:17, 271:5, 271:6, 271:7, 271:8, 271:13, 273:1, 273:8, 273:9, 273:15, 274:18
talks
19:14, 51:16, 64:13, 66:11, 67:1, 131:2, 173:19, 186:6, 197:20, 207:7, 207:10, 209:14, 215:4, 218:7, 218:8, 230:4, 231:15, 253:5, 260:10, 270:18
tanaka
264:6, 266:1, 266:3, 268:7, 268:18, 268:21, 269:2, 270:18, 271:3, 271:21, 272:11, 272:22, 273:14
tanaka's
267:8
taught
67:21, 137:7, 176:7
teach
53:21, 67:7, 81:19, 82:9, 115:1, 177:1, 178:15, 180:1, 180:2, 191:11, 208:3
teaches
35:21, 67:3, 72:1, 191:13, 192:18, 193:4, 201:4, 201:9, 235:11, 242:3, 244:16, 244:19
teaching
54:2, 63:18, 68:19, 71:3, 72:10, 115:2, 160:5, 161:6, 191:10, 211:8
teachings
73:5, 73:12, 191:5
tech
27:11
technical
44:14, 45:7, 48:18, 49:1
technique
43:19, 51:16, 61:16, 61:19, 61:20, 63:1, 98:20
techniques
43:21, 62:14, 98:16
technology
1:8, 5:6, 6:3, 6:7, 86:4
tedious
234:11
tell
33:14, 33:18,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

46:9, 54:20, 66:2, 69:22, 76:7, 77:2, 77:7, 94:10, 98:17, 104:19, 124:11, 137:9, 138:7, 140:19, 143:8, 152:6, 161:4, 173:8, 215:19, 235:7, 256:5, 271:20
tells
98:21, 124:7
tem
56:18, 57:11, 63:13
temperature
89:3, 90:21, 91:1, 91:13, 126:3
temperatures
90:20
tend
52:2, 153:6, 231:10, 248:12, 260:1
tendency
150:20
tends
245:1, 257:20
tensile
215:21, 219:4
tension
258:16
tensions
260:3
term
11:13, 11:15, 29:7, 38:16, 43:4, 64:9, 73:17, 104:13
terms
11:3, 13:9, 13:10, 20:6, 26:16, 27:16, 27:22, 28:5, 28:20, 29:4, 29:14, 90:13, 102:17, 137:13, 182:22, 212:21
terrible
68:2, 76:3, 169:7
test
70:11, 92:8, 97:4, 97:8, 97:9, 97:13, 97:21, 98:2, 98:4, 214:6, 259:19
tested
87:3, 87:6, 87:17
testified
5:3, 23:22
testimony
19:21, 31:2, 80:15, 118:5, 159:22, 204:1, 277:10
tests
260:5, 269:1
texas
2:9, 3:16, 277:31
text
12:9, 66:14, 66:17, 66:19, 67:1, 74:3, 74:8, 161:14
th
3:6, 277:26
thank
46:12, 130:2, 167:14, 276:6
themselves
37:15, 120:21, 129:21, 240:11
thereby
222:1
therefore
15:2, 15:15, 16:9, 149:10
thermal
214:7
thermodynamic
221:8, 221:12
thermodynamics
216:8
thick
18:21, 19:1, 19:6, 19:18, 20:2, 77:10, 77:16, 77:18, 77:19, 122:3, 190:9, 191:2
thickeners
231:12, 231:13
thicker
19:12, 19:13, 59:7, 72:11, 202:15
thickness
55:10, 57:13, 58:19, 67:13, 72:2, 72:18, 95:20, 96:13, 189:17, 189:21, 190:2, 190:4, 191:14, 191:15, 191:20, 192:13, 193:3, 211:4, 253:6, 259:2
thicknesses
71:15, 71:16, 193:14
thin
52:4, 55:2, 57:11, 59:10, 59:11, 76:14, 77:9, 78:1
thing
12:20, 22:7, 34:15, 81:3, 100:11, 114:8, 117:7, 124:11, 138:6, 141:4, 148:10, 160:3, 165:19, 169:6, 171:17, 176:1, 177:12, 192:20, 195:10, 207:21, 215:4, 223:17, 230:11, 242:2, 243:8, 255:2, 265:17, 272:11, 274:3
things
13:14, 16:7, 20:4, 21:9, 40:4, 43:9, 49:22, 52:4, 58:9, 62:7, 62:22, 69:17, 80:21, 82:14, 85:11, 86:18, 89:4, 89:5, 90:10, 97:2, 97:3, 97:7, 98:15, 98:18, 99:1, 100:7, 100:8, 100:22, 102:8, 106:9, 106:19, 111:9, 122:22, 126:15, 128:17, 133:12, 133:22, 138:8, 145:8, 164:22, 165:12, 202:16, 209:17, 210:5, 228:9, 228:10, 229:4, 233:15, 234:5, 235:6, 237:17, 237:19, 238:8, 243:15, 247:14, 250:18, 252:2, 252:16, 254:4, 259:7, 260:2, 265:18, 266:6, 270:15, 272:13
thinking
45:17, 184:22, 259:17
thinner
73:9, 202:15, 217:21
third
221:3
thought
18:6, 31:20, 56:22, 69:2, 125:17, 197:14,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

216:14, 246:1, 262:21, 271:12
three
18:5, 37:1, 64:18, 150:17, 156:22, 164:16, 164:20, 165:3, 214:19, 234:18, 235:8
three-dimensional
56:1, 56:4, 139:13, 140:4
three-dimensionally
139:16
threshold
34:2
through
9:19, 56:19, 56:20, 57:6, 57:11, 97:11, 97:22, 108:7, 139:1, 157:4, 163:10, 194:3, 194:13, 195:17, 195:19, 195:22, 201:11, 208:18, 209:20, 210:12, 211:2, 211:3, 211:7, 212:20, 237:6, 246:22, 247:1, 254:10, 254:11, 259:16, 260:10, 265:21
throughout
34:14, 75:19, 156:6
throwing
159:9
thursday
277:17
ti
188:2, 243:10
tight
52:6
tightly
119:10
time
25:6, 45:16, 63:14, 94:15, 110:14, 116:21, 154:3, 167:17, 170:15, 216:5, 273:11
times
20:16, 34:19, 98:9, 155:7, 155:9, 155:15, 186:8
tiny
34:20, 156:9, 230:13, 243:22, 247:17
titanium
56:12, 74:10, 74:13, 74:21, 76:20, 77:5, 77:8, 77:14, 80:4, 195:1, 196:16
title
117:6
today
6:2, 6:21
today's
7:21
together
13:14, 13:16, 37:12, 51:2, 51:11, 68:11, 71:7, 73:19, 75:13, 80:22, 82:13, 104:8, 104:13, 104:16, 104:20, 105:22, 107:2, 107:4, 107:5, 118:10, 123:8, 128:13, 128:14, 128:17, 148:15, 160:16, 165:12, 166:14, 167:3, 203:14, 207:1, 230:16, 241:17, 244:1, 245:6, 249:5, 249:7, 251:4, 265:8, 265:10, 265:13
took
107:13, 217:12, 225:13, 263:3
top
10:15, 63:5, 117:16, 134:9, 170:10, 214:16, 234:1, 235:7
topography
56:4, 78:3
tortuosity
208:11, 208:14, 208:16, 208:20, 208:21, 208:22, 209:2, 209:5, 209:10, 209:16, 210:1, 210:9, 210:14, 210:22
tortuous
209:19
total
43:13, 44:6, 44:19, 137:2, 137:4, 180:17, 197:21, 198:2, 198:17, 213:11
touches
41:20, 42:15
toward
125:12
towards
85:18, 124:13, 125:10, 125:17, 221:1, 221:3
trademark
1:1
traditional
57:9, 249:19
training
87:2
transition
19:6
translated
250:15
translation
264:6
translator
262:11
transmission
56:15, 57:10
transport
209:18, 266:22
trap
69:15, 69:18
treat
238:2
treating
238:2
treatment
78:17
tri-motor
144:13, 144:14, 144:20
trial
1:3
tricky
34:3, 61:18, 229:18
tried
24:4, 25:1, 115:12, 165:1
trilayer
92:3
trivial
31:22, 229:7
trouble
11:14, 11:17, 158:11
true
16:20, 74:19, 103:8, 108:19, 112:9, 118:17, 119:5, 119:6, 119:12, 120:2, 120:3, 121:16, 126:6, 126:12, 139:22, 143:10, 151:5, 160:1, 173:15, 188:15, 190:11, 222:18, 277:10
try
47:20, 62:10, 94:5, 115:18, 116:12, 116:13, 237:6, 270:11

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148
Page 327 of 334

trying
14:9, 21:18, 45:21, 51:4, 52:7, 71:8, 73:6, 122:21, 158:9, 185:8, 185:10, 207:2, 228:12
tune
258:19
tuning
202:20, 258:15
turn
85:13, 114:3, 202:22, 252:18
turned
38:11
turns
211:3
turny
211:7
twice
191:2, 198:20
twists
211:3
twisty
210:17, 211:7
two
21:5, 27:2, 33:3, 34:5, 34:14, 35:3, 148:13, 156:14, 176:14, 214:12, 216:16, 218:6, 220:22, 223:5, 223:13, 227:20, 234:18, 235:7, 235:8, 237:15, 237:17, 240:10, 249:4, 257:15, 263:5, 272:8, 273:2, 273:3, 273:16, 273:17, 273:20
two-dimensional
139:11, 140:3
two-dimensionally
139:16
two-thirds
198:22
type
21:4, 90:14, 91:22, 92:14, 95:5, 95:6, 95:13, 96:5, 98:14, 99:12, 100:12, 104:11, 113:3, 123:12, 149:12, 161:15, 162:17, 172:6, 194:7, 194:17, 203:6, 217:19, 234:22, 235:3, 235:4, 254:14, 263:14
types
14:2, 20:10, 20:19, 60:4, 79:2, 88:5, 88:9, 89:22, 90:2, 91:11, 109:20, 111:17, 112:7, 118:8, 119:20, 132:17, 132:18, 145:20, 188:3, 203:2, 214:2, 231:21, 240:10, 268:3
typically
14:15, 60:2, 60:11, 60:20, 77:12, 84:17, 88:13, 88:16, 88:21, 109:10, 133:21, 137:19, 139:19, 143:6, 181:4, 232:19, 237:19, 244:3, 257:17

U

ultra
163:9
ultrafine
164:15
um
153:14
unbounded
14:22
unclear
30:4, 208:15
uncoiling
249:13
under
77:11, 133:14, 161:14, 216:7
undergo
93:6
understand
6:6, 8:7, 9:2, 10:6, 10:12, 10:13, 11:4, 11:5, 12:12, 13:7, 13:10, 17:4, 28:13, 28:18, 28:21, 29:5, 30:5, 98:15, 100:6, 124:8, 145:14, 159:18, 187:17, 187:18, 187:19, 276:4
understanding
8:1, 11:14, 11:17, 12:19, 13:5, 17:5, 17:10, 29:17, 39:7, 78:10, 142:2, 153:20, 167:7, 254:1, 266:8
understood
10:8, 11:9, 17:6, 23:11, 29:15, 32:20, 38:6, 38:15
undertaking
186:1
undesirable
179:20
unfavorable
132:21, 133:2
uniform
166:9
uniformity
165:2
uniformly
165:18
unincorporated
68:8, 73:13, 73:22, 74:1, 74:5, 74:11, 75:8, 75:18, 75:21
united
1:1
university
6:22, 63:7
unknowable
171:17
unless
16:12, 140:19, 241:1
unlike
56:22, 57:3
unlikely
182:21
unrelated
114:1
until
89:18, 97:17, 100:12, 124:6, 124:7, 166:8, 263:5
unusual
181:19, 274:20
upper
73:8, 261:11
ups
114:13
use
41:6, 43:18, 43:21, 45:6, 62:17, 62:21, 71:6, 71:10, 73:8, 81:13, 88:5, 88:10, 89:1, 91:2, 91:4, 98:10, 98:17, 99:6, 99:10, 100:11, 103:8, 112:13, 113:3, 113:7, 113:14, 118:1,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

118:14, 118:18, 130:19, 131:9, 132:4, 132:6, 138:3, 139:8, 144:22, 146:15, 146:16, 147:9, 148:9, 150:16, 151:17, 152:7, 152:10, 152:11, 153:6, 154:15, 155:10, 159:16, 161:1, 161:2, 162:14, 165:18, 167:4, 171:19, 175:22, 177:4, 177:7, 177:15, 186:10, 188:4, 211:11, 213:16, 214:20, 225:7, 227:16, 243:6, 244:6, 244:10, 244:11, 251:10, 259:6, 260:9, 260:15, 260:18, 265:18, 266:19, 268:7, 268:18
useful
98:15, 98:22, 229:4, 237:10
user
102:18
uses
63:3, 87:11, 90:13, 131:5, 253:15
using
34:16, 61:16, 80:20, 80:22, 83:8, 86:21, 90:6, 92:9, 93:1, 99:12, 99:13, 99:14, 112:22, 113:17, 113:18, 138:9, 138:18, 138:19, 149:1, 150:4, 150:7, 151:3, 151:7, 151:8, 153:9, 177:2, 193:4, 194:22, 195:1, 200:1, 200:14, 200:20, 202:6, 245:18, 252:11, 255:16, 258:4, 258:11, 261:19, 263:18, 263:20, 268:16, 270:12
usually
13:13, 13:22, 14:1, 93:22, 94:3, 99:19

V

vacuum
99:20
valid
24:5, 25:2
validity
28:16
value
44:9, 45:7, 228:14
values
61:22, 62:8, 136:19, 136:21, 226:12, 226:16, 227:1, 227:3, 227:8, 267:1, 270:19, 273:2, 273:4, 273:16, 273:18, 273:20
variable
96:20, 100:4, 111:9, 219:15
variables
213:6
variant
204:5, 204:20
varied
158:12
various
10:10, 43:16, 43:21, 44:3, 51:16, 53:20, 58:6, 58:15, 58:22, 61:1, 82:7, 88:19, 89:2, 91:11, 98:17, 127:16, 142:12, 148:13, 185:15, 202:7, 205:18, 251:3
vary
61:15, 64:15, 82:14, 180:22, 181:2, 189:21, 189:22
varying
99:20
version
49:6, 49:8, 157:10
versions
157:10, 274:15, 275:10
versus
20:19, 21:3, 138:19, 210:19
via
66:5
view
7:5, 14:18, 15:9, 15:17, 57:6, 154:3, 216:21
viewpoint
236:5, 236:7
vinylidene
238:8, 258:17
violate
73:11
virtually
277:16
virtue
65:9
vis-a-vis
21:20, 207:15, 247:3
visible
74:11, 99:5
void
17:19, 18:12, 51:7, 51:10, 54:4, 65:8, 75:5, 215:14, 215:22
voids
51:1, 51:2, 198:15, 219:11, 253:11
volume
40:1, 40:2, 43:13, 43:19, 44:1, 44:18, 44:20, 45:1, 45:2, 45:5, 61:3, 61:4, 61:6, 61:12, 61:22, 62:2, 62:3, 62:5, 62:10, 103:20, 137:2, 137:4, 137:6, 137:14, 138:4, 138:13, 138:18, 138:20, 142:15, 143:8, 143:15, 188:17, 196:7, 197:4, 197:20, 197:21, 198:1, 198:2, 198:21, 203:9, 203:10, 203:20, 241:20, 244:17, 261:20, 261:22, 262:13, 263:21
volumetric
138:16, 142:14
vulnerable
84:3

W

wait
9:12, 26:20, 27:4, 114:5, 231:12, 241:12
waiting
183:15
wall
14:17, 14:19, 14:20, 14:22, 15:6, 15:8,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

15:9, 15:12, 15:21, 16:9, 16:11, 16:14, 16:15, 16:17, 16:19, 17:1, 17:3, 17:18, 18:11, 18:17, 18:19, 19:4, 20:1, 41:17, 41:19, 42:14, 45:4, 45:9, 50:9, 50:12, 50:13, 50:14, 51:4, 51:10, 51:12, 52:3, 52:8, 52:9, 52:10, 52:11, 52:17, 52:20, 53:10, 53:17, 54:19, 54:20, 54:21, 55:1, 55:10, 55:16, 57:13, 58:3, 58:19, 59:10, 65:1, 66:12, 66:14, 66:15, 67:20, 69:10, 71:16, 72:1, 72:7, 72:11, 72:14, 72:18, 73:9, 74:6, 75:10, 75:11, 75:12, 93:20, 93:22, 106:12, 110:4, 110:12, 189:17, 189:21, 190:9, 191:12, 191:13, 191:15, 191:20, 192:13, 193:3, 193:14, 204:7, 243:7, 253:6, 253:10, 253:11, 259:2

walls
18:21, 19:1, 19:18, 38:20, 39:5, 39:9, 39:10, 39:11, 39:14, 45:2, 51:1, 51:2, 51:7, 52:4, 59:6, 76:10, 95:8, 95:18, 96:7, 101:7, 110:7, 111:5, 111:7, 185:11, 190:15, 190:20, 190:22, 191:3, 191:7, 191:18, 193:5, 193:8, 194:15, 195:21, 201:6, 202:15, 203:16, 204:6, 210:2, 210:3, 210:18, 217:21, 218:11, 219:20, 220:6, 220:7, 230:19, 241:19, 241:21, 241:22, 253:13, 253:19, 253:21, 254:1, 254:11

want
7:13, 10:20, 12:4, 27:14, 45:19, 47:2, 71:10, 73:8, 79:12, 82:15, 83:1, 83:6, 85:13, 89:6, 89:7, 90:15, 90:17, 91:2, 91:4, 91:14, 94:5, 94:10, 100:22, 101:14, 102:1, 107:18, 108:4, 108:6, 118:20, 121:10, 129:17, 148:9, 149:14, 149:15, 149:21, 150:14, 158:14, 159:19, 160:2, 161:21, 164:14, 165:10, 165:16, 165:17, 165:18, 166:16, 167:15, 179:10, 179:11, 209:7, 209:17, 209:19, 210:16, 217:4, 224:12, 225:3, 226:8, 231:13, 231:18, 237:8, 252:15, 255:11, 259:2, 262:17, 265:14, 265:17, 270:17, 271:9, 274:12, 275:14

wanted
22:13, 41:4, 118:19, 162:15, 185:2, 187:10, 187:15, 187:16, 275:5

wants
62:9, 150:12, 186:2

warm
134:3

water
166:7, 235:3, 243:12, 244:4, 244:5, 257:19, 257:20, 258:1, 258:12, 258:13, 259:13, 264:16, 265:15, 266:18, 267:4, 267:7, 267:22

wavelength
99:8

wax
62:12

way
23:13, 38:11, 42:18, 43:15, 54:13, 54:22, 57:4, 66:13, 66:18, 66:20, 67:6, 67:7, 67:11, 68:19, 86:19, 100:5, 100:17, 114:20, 119:6, 125:2, 135:2, 135:5, 135:21, 140:12, 143:3, 143:13, 148:9, 152:5, 155:18, 160:12, 162:16, 169:5, 171:4, 171:5, 182:4, 185:14, 188:11, 188:14, 192:6, 202:5, 206:10, 212:11, 219:10, 234:1, 241:2, 244:2, 247:22, 259:1, 263:22, 266:5, 277:23

ways
44:3, 60:6, 60:14, 60:18, 61:14, 61:15, 135:10, 135:18, 139:5, 140:9, 143:2, 160:8, 213:22, 227:6, 227:21, 238:21, 270:13

we'll
15:6, 24:18, 24:19, 46:2, 79:17, 82:17, 114:3, 114:12, 155:1, 225:20

we're
20:6, 24:14, 52:7, 89:11, 99:19, 99:20, 99:22, 100:3, 101:6, 133:12, 189:15, 226:1, 250:18, 254:19, 262:14, 269:17, 271:13, 272:8

we've
121:13, 130:6, 144:5, 194:18, 196:15, 213:12, 231:21, 272:22, 273:14

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

weak
82:12, 84:2
webs
218:1
website
147:3, 166:22
weeks
263:5
weight
13:21, 14:3, 37:3, 37:7, 61:11, 103:10, 103:21, 104:2, 118:3, 119:3, 138:1, 261:14, 261:17, 263:10
well-known
22:4
went
47:22, 48:5, 145:6, 158:11, 241:1, 241:5, 256:16
weren't
11:18, 53:22, 184:20, 185:8
wet
80:4, 80:9, 172:4, 220:10, 220:13, 221:4
wets
215:6, 221:5, 221:6
wetting
215:6, 217:15, 221:5, 221:8, 222:1, 222:4, 222:7
whatever
7:14, 29:22, 33:9, 50:10, 68:5, 75:14, 150:1, 160:13, 171:4, 180:12, 225:20, 243:20, 275:9
wheeler
217:22, 228:5, 274:17
whereas
148:6, 269:1
wherein
30:1
whereof
277:25
whether
33:6, 50:1, 50:2, 57:22, 66:13, 70:14, 70:16, 77:3, 77:4, 97:21, 98:1, 105:10, 118:16, 132:6, 132:9, 132:10, 139:15, 145:18, 145:22, 160:14, 160:15, 161:12, 162:5, 162:6, 172:2, 178:12, 206:2, 210:11, 211:5, 219:2, 223:3, 224:21, 229:2, 236:20, 240:21, 245:10, 259:4, 262:9, 269:17
white
7:4, 243:9, 254:2
whole
34:12, 34:14, 60:21, 61:5, 62:12, 94:14, 109:9, 124:10, 132:15, 133:7, 150:3, 157:9, 164:9, 164:21, 170:20, 218:3, 233:14, 242:1
wide
190:8, 191:2, 274:2
widely
207:22, 246:2
wider
185:2, 185:3
width
95:7, 95:18, 96:7, 100:15
winding
93:6, 93:10
window
128:14, 128:15
windows
69:14
withdrawn
123:9, 242:8
within
7:4, 15:21, 17:18, 18:11, 29:4, 29:10, 29:11, 29:22, 36:2, 67:19, 67:21, 82:10, 82:14, 83:4, 102:2, 105:21, 129:21, 140:14, 142:12, 190:9, 193:5, 194:15, 201:6, 219:20, 230:2, 269:17, 270:8, 272:18
without
25:22, 81:16, 99:16, 100:17, 112:22, 113:17, 129:17, 146:17, 183:8, 184:2, 212:3, 212:19, 227:7, 228:20, 246:14
witness
4:2, 21:14, 21:17, 23:9, 24:9, 24:11, 24:15, 107:20, 108:3, 108:5, 108:9, 108:10, 167:20, 247:6, 247:10, 276:5, 277:6, 277:11, 277:25
wollastonite
195:5, 195:6
wondering
262:9
word
64:9, 105:5, 125:14, 150:6, 160:5, 208:15, 220:18
wording
127:2, 183:20
words
11:5, 125:10, 127:6
work
87:3, 104:20, 114:17, 115:11, 115:15, 200:6, 209:18, 225:11, 225:18
worked
25:4, 28:11, 85:5, 85:9, 85:10, 85:18, 86:11, 86:19, 87:19, 163:19
working
22:11, 25:13, 85:22, 87:11, 205:20
works
54:22, 57:4, 114:21, 135:5, 143:14, 225:12, 260:6
world
60:1
worm
210:6, 210:9, 210:17, 211:7
worries
101:18, 183:22
worth
22:3
wouldn't
11:16, 23:6, 31:18, 40:10, 69:16, 73:1, 93:16, 100:14, 100:15, 100:16,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

122:5, 149:21, 165:10, 178:9, 178:10, 186:3, 209:15, 235:16, 274:21
write
7:13, 95:12
writes
225:22
written
7:7, 178:2
wrong
94:11, 141:3, 151:22
wrote
118:21, 119:4, 160:6

X

x-ray
57:4, 57:9, 98:20, 100:9

Y

year
263:4
years
21:5, 85:7, 85:10, 86:2
yep
41:2, 41:8
yourself
32:20, 41:10, 41:13, 49:20, 86:15, 237:2

Z

zhuhai
1:5, 6:9, 41:1, 277:13
zoom
53:7, 83:17

.

.00
64:6
.001
64:13, 64:16, 189:22, 190:2
.005
64:15
.01
71:21, 189:21, 261:10
.02
193:8
.05
71:21, 189:21
.1
64:15, 71:22, 72:7, 178:8, 189:22, 190:4, 190:9, 191:16, 253:8, 261:10
.1918
3:8
.2
64:16, 70:13, 70:15, 71:4, 72:8, 150:1, 178:8, 181:10, 181:18, 182:1, 182:3, 182:7, 182:9, 182:13, 182:14, 191:15
.22
137:5, 176:13, 190:12
.3
226:17
.3443
3:17
.4
226:18
.44
190:12
.7
226:18
.9
226:19

0

00432
1:11, 7:22, 8:7, 8:20
00587
116:19
02
2:2, 188:2, 243:10
05
46:3, 82:21

1

1
167:21, 199:13
1,000
34:19, 155:4, 155:9, 155:14
1.03
176:13
1.2
226:20
1.3
11:22
1.4
11:22
1.5
176:21, 179:3, 199:13, 226:20
10
2:2, 4:12, 20:21, 32:12, 33:9, 34:1, 45:19, 46:3, 61:10, 82:17, 136:19, 136:22, 137:3, 137:15, 137:16, 137:21, 137:22, 138:1, 138:3, 173:20, 174:1, 174:8, 174:20, 176:13, 176:18, 177:14, 178:13, 178:20, 179:19, 180:12, 181:9, 181:17, 181:22, 182:6, 182:12, 188:8, 188:13, 189:7, 196:2, 196:9, 196:19, 198:3, 198:18, 198:19, 200:2, 200:14, 226:12, 226:16, 226:18, 227:1, 227:7, 227:12, 227:13, 227:14, 227:19, 227:20, 228:15, 228:18, 228:20, 250:13, 261:3, 261:10, 269:5, 269:12, 270:19, 271:14, 272:3, 272:10, 272:12, 272:17, 273:20, 274:5, 274:7, 274:13, 274:14, 275:11, 275:16, 275:22, 276:1, 277:31
10,000
35:3
100
33:12, 33:15, 37:2, 37:5, 44:10, 58:6, 58:14, 58:18, 64:21, 97:10, 150:17, 154:19, 155:3, 155:7, 156:22, 164:17, 169:10, 180:19, 229:13
100,000
35:3
1001
4:12, 10:17, 10:18, 168:18
1003
4:13, 9:8, 9:16, 27:8, 40:21, 40:22, 41:1, 121:4, 121:8, 121:9, 123:11
1005
4:14, 35:5, 35:6, 35:7, 130:3, 152:3
1006
262:18
1007
4:15, 252:18,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

252:19
1009
4:16, 118:1, 264:2, 264:3, 264:5
1010
4:17, 52:22, 53:3, 53:4, 53:6
1011
4:18, 226:2, 226:4, 226:5
102
52:13, 53:9
103
37:5
105
172:4
106
186:6
108
193:21
10:02 am
277:18
11
64:7, 74:17, 82:21, 108:13, 186:9, 186:14, 255:15, 277:32
11,575,148
1:12
112
25:15, 27:16
113
4:21
11575148
8:1
118
255:22, 256:15, 256:16, 258:8
12
108:13
123
41:6
13
1:17, 2:1, 192:9, 277:17
13.8
271:14
135
36:16, 130:16, 136:1
139
136:2
14
3:6, 277:26
140
90:21, 136:8, 172:15
141
4:20, 136:8, 165:5, 172:20
14487
277:32
148
8:4, 8:22, 9:4, 9:22, 14:5, 26:16, 27:22, 82:6, 88:7, 89:9, 93:18, 110:8, 110:10, 110:15, 110:17, 127:15, 133:1, 135:11, 136:5, 168:12, 188:12, 189:7, 204:15, 208:3, 272:5, 272:16
150
242:3, 242:7
156
136:1
157
152:15
16
192:9
160
90:22
161
177:17
169
152:15
17
10:20, 58:5, 58:9, 58:11
18
48:22, 137:11
19
41:6, 121:11
194
241:5
1970
76:5
1:1
199:10, 205:8
1:2
199:11

2

2.5
174:1, 174:20, 175:8
20
33:12, 33:14, 121:11, 169:10, 198:4, 198:19, 233:11
2003
4:19, 25:19, 25:20, 26:14, 26:21, 27:5, 27:6, 27:7, 27:9, 27:11, 27:20, 41:3
2010
89:18
2018
89:11
2023
116:19, 116:20
2025
1:11, 1:17, 2:1, 7:22, 8:7, 8:20, 277:17, 277:26
2029
4:20, 141:1, 141:2, 141:4, 145:16
2030
114:5, 124:13
2031
4:21, 113:20, 113:21, 114:4, 116:14, 124:2
206
74:1, 74:11
21
71:18, 72:6, 72:14, 72:16, 189:20
214.922
3:17
22
64:15, 70:12, 70:20, 72:6, 72:14, 72:17, 180:16
2200
3:15
226
4:18
2300
3:15
25
4:19, 193:19, 216:13, 216:14
2500
3:6
252
4:15
26
49:10, 49:12, 108:13, 277:32
264
4:16
27
186:17, 277:31
28
72:1, 72:12, 186:17, 225:8
29
24:21, 197:19, 197:22, 200:17
2:1
199:9, 216:22

3

3
225:8
30
20:17, 27:2, 108:8, 117:11,

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148

117:15, 198:15, 212:7, 277:32
302
79:22
30309
3:7
31
48:22, 125:5, 226:9, 277:31
32
26:13, 26:17, 27:1, 27:14, 27:19, 226:9
33
24:21, 40:18, 41:5, 121:6, 121:11, 123:11, 186:8, 199:1, 199:15, 199:17, 226:9
34
49:14, 225:8
35
4:14
36
74:7, 74:16, 74:17
38
235:10, 235:17
39
117:10, 117:13

4

40
4:13, 70:18, 70:22, 71:4, 71:6, 108:4, 108:5, 124:18, 124:21, 125:3, 125:4
404.736
3:8
45
253:3
46
4:9, 4:10, 108:13
47
4:11

5

5
276:8
5.07
271:15
50
25:6, 61:10, 79:20, 101:9, 109:6, 109:17, 110:20, 111:18, 112:8, 113:9, 113:13, 116:9, 119:17, 136:19, 136:22, 137:5, 137:15, 137:16, 180:19, 181:7, 182:10, 188:9, 188:13, 189:7, 196:9, 196:20, 226:12, 226:18, 227:1, 227:7, 227:13, 228:19, 228:21, 261:3, 270:1, 274:5, 274:15, 275:12
500
114:8
5000
34:19
512
117:10
52
117:9, 117:17, 117:21, 167:21
53
4:17, 124:17, 124:22, 125:19
57
259:16, 260:10, 264:12, 276:8
58
167:21, 261:8
59
261:17
5:57 pm
277:18

6

607481
1:22
62
259:16, 260:10, 260:22
64
172:4, 222:9, 256:20
6531
277:31
66
173:20, 173:21
67
198:22, 199:16, 199:17
69
266:12

7

70
198:15
73
270:18, 270:21, 271:1, 271:2, 272:11
75
3:6
75201
3:16

8

80
261:2
85
214:10, 216:3, 216:5, 216:14, 216:15, 216:16, 218:8, 218:15
86
201:1
87
134:5, 134:6

9

9
24:21
90
30:15, 61:10, 103:9, 103:17, 103:19, 108:17, 112:18, 113:16, 118:2, 119:3, 123:5, 123:12, 123:13, 136:19, 136:22, 137:6, 137:15, 137:16, 173:20, 174:1, 174:8, 174:20, 176:13, 176:18, 177:14, 178:12, 178:20, 179:19, 181:9, 181:17, 182:1, 182:6, 182:11, 188:14, 188:17, 189:7, 196:2, 196:9, 196:20, 197:1, 197:2, 197:3, 200:2, 200:14, 200:20, 226:12, 226:20, 227:1, 227:8, 227:12, 227:13, 227:14, 227:19, 227:20, 228:15, 228:17, 228:18, 228:20, 244:18, 250:13, 269:5, 269:12, 270:19, 271:15, 272:5, 272:10, 272:12, 272:17, 273:20, 274:5, 274:7, 274:13, 274:14, 275:11, 275:16, 275:22, 276:1
93
39:22, 203:9, 203:20
94
230:3, 241:3, 241:6, 246:6
95
35:22, 36:1, 244:18, 261:2
97
37:6, 37:16
987
155:9

Ningde Amperex Tech. Exhibit No. 2033
Zhuhai CosMX Battery Co. Ltd. v. Ningde Amperex Tech.
IPR2025-00432, U.S. Patent No. 11,575,148