

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZHUHAI COSMX BATTERY CO., LTD.,
Petitioner,

v.

NINGE AMPEREX TECHNOLOGY LIMITED,
Patent Owner.

IPR2025-00385
Patent 10,964,927 B2

Before DONNA M. PRAISS, JOHN G. NEW, and
DEBRA L. DENNETT, *Administrative Patent Judges*.

DENNETT, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Zhuhai CosMX Battery Co., Ltd. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–10 (the “challenged claims”) of U.S. Patent No. 10,964,927 B2 (Ex. 1001, “the ’927 patent”). Ningde Amperex Technology Limited (“Patent Owner”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). Patent Owner requested discretionary denial of the Petition (Paper 6), which Petitioner opposed (Paper 7). The Director denied Patent Owner’s request for discretionary denial of the Petition, and referred the Petition to the Board. (Paper 9).

We have authority to determine whether to institute an *inter partes* review under 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a). The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted “unless the Director determines . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least [one] of the claims challenged in the petition.”

For the reasons set forth below, upon considering the Petition and Preliminary Response, we determine that Petitioner has not established a reasonable likelihood of prevailing with respect to at least one challenged claim. Accordingly, we deny the Petition and decline to institute an *inter partes* review.

II. BACKGROUND

A. *Real Parties-in-Interest*

Petitioner identifies Zhuhai CosMX Battery Co., Ltd. as the real party-in-interest. Pet. 72. Patent Owner identifies Ningde Amperex Technology Ltd. as the real party-in-interest. Paper 3, 1.

B. Related Proceedings

The parties identify *Zhuhai CosMX Battery Co. v. Ningde Ampere Technology Limited*, Case No. 2:24-cv-00728 (E.D. Tex.) (“the parallel litigation”) as involving the ’927 patent. Pet. 72; Paper 3, 1. Patent Owner states that the parallel litigation involves additional patents that are the subject of additional petitions by the same Petitioner for *inter partes* review of patents at issue in the proceedings listed below:

Proceeding No.	U.S. Patent No.
IPR2025-00389	11,923,498 B2
IPR2025-00405	11,769,910 B2
IPR2025-00432	11,575,148

C. Technology Overview

The technology of the ’927 patent broadly relates to lithium-ion batteries. Lithium-ion batteries have an anode, a cathode, an electrolyte, and a separator. Ex. 2015 ¶ 42. Lithium ions move through the electrolyte from the cathode to the anode when the battery is charging, and in the reverse direction when discharging. *Id.* Movement of lithium ions from the anode to the cathode releases energy that powers a device is connected to the battery. *Id.*

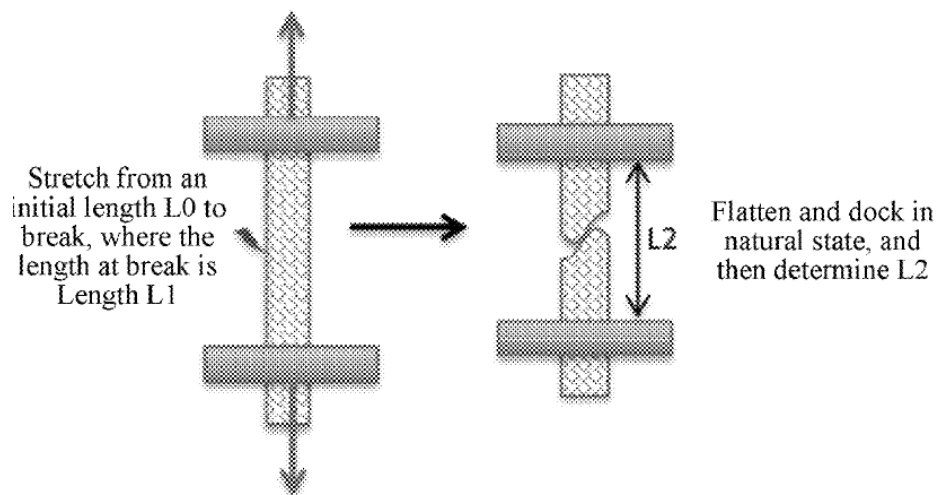
The separator portion of the battery is a membrane located between the cathode and the anode that prevents direct contact between electrodes, while still allowing lithium ions to pass through between electrodes. Ex. 2015 ¶ 43. Direct contact between the cathode and anode can cause a short circuit, and could result in fire or explosion. *Id.* A separator must be strong enough to withstand outside forces that could puncture it, while still allowing lithium ion flow between the electrodes. *Id.* ¶¶ 43–44.

A common battery separator architecture includes a porous substrate, such as polypropylene or polyethylene, and another porous layer on one or both sides of the substrate. Ex. 1003 ¶ 51; Ex. 2015 ¶ 46. The porous layer typically includes a binder (adhesive) and a filler (organic or inorganic particles). Ex. 1003 ¶ 51.

D. The '927 Patent

The '927 patent, titled “Separator and Electrochemical Device,” issued Mar. 30, 2021, from U.S. Application 16/202,346, filed Nov. 28, 2018. Ex. 1001, codes (45), (21), (22). The '927 patent claims priority to China Application No. 201810640157, filed June 20, 2018. *Id.*, code (30).

The '927 patent concerns separators and electrochemical devices using a separator with improved safety performance. Ex. 1001, 1:13–15, 28–30. “The high plasticity of the separator is characterized by the plastic deformation rate of a porous substrate.” *Id.* 4:11–13. In the '927 patent, this plastic deformation rate is tested by the method shown in FIG. 1, reproduced below:



As illustrated above, the length of a sample of porous substrate before stretching is recorded as L_0 , then the porous substrate is stretched to break at

a certain rate, and the maximum length reached by the stretching is recorded as L1. Ex. 1001 4:14–19. The broken porous substrates then are docked along the fracture and flattened to test the length L2 in a natural state. *Id.* 4:19–21.

During the tensile test, the porous substrate is subjected to both elastic deformation and plastic deformation, with the amount of elastic deformation defined as L1 – L2, the amount of plastic deformation defined as L2 – L0, and the total amount of deformation defined as the amount of elastic deformation plus the amount of plastic deformation. *Id.* 4:22–27. The plastic deformation is a permanent deformation that does not bounce back. *Id.* 4:27–28.

The '927 patent discloses

The porous substrate has a large plastic deformation under external force, so that when the separator is pieced by a nail, the separator will have a large extensional deformation with the nail, thereby maintaining the effect in isolating the cathodes and anodes, preventing the internal short circuit in the lithium ion battery, and improving the safety of the lithium ion battery. The absolute plastic deformation rate ϵ_1 and the relative plastic deformation rate ϵ_2 of the porous substrate are calculated by the following equation:

$$\epsilon_1 = \frac{(L2 - L0)}{L0} \times 100\%$$

$$\epsilon_2 = \frac{(L2 - L0)}{(L1 - L0)} \times 100\%$$

Id. 4:41–54. The '927 patent discloses a porous substrate of a separator having identified ranges of absolute or relative plastic deformation rates. *Id.* 4:55–5:14.

E. Illustrative Claim

Claim 1 illustrates the challenged claims in the '927 patent, and is reproduced below:

1. An electrochemical device, comprising:
a cathode;
an anode; and
a separator;
wherein, the separator comprises a porous substrate and a porous layer;
wherein the porous layer is disposed on a surface of the porous substrate and comprises inorganic particles and a binder; and
the porous substrate has an absolute plastic deformation rate in a first direction ranging from about 40% to about 1800%, and
wherein the absolute plastic deformation rate is calculated according to an equation $(L2-L0)/L0 \times 100\%$, where L0 refers to a length of the porous substrate before stretching and L2 refers to a length of the porous substrate after the porous substrate is stretched to breakage and docked along the fracture caused by the breakage and flattened.

Ex. 1001, 25:20–37.

F. Asserted Grounds

Petitioner contends that the challenged claims are unpatentable on the grounds presented below.

Ground	35 U.S.C. §	Claims	References
1	102(a)(2)	1–10	Nishikawa ¹
2A	103	1–10	Nishikawa
2B	103	1–10	Nishikawa, Chen ²
3	103	1–10	Chen, Zhang ³

Petitioner also relies on the Declaration of Michael Pecht, Ph.D. *See* Ex. 1003. Patent Owner relies on the Declaration of Dean R. Wheeler, Ph.D. *See* Ex. 2015.

III.ANALYSIS

A. Principles of Law

In an *inter partes* review, “the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (2012) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A prior art reference can only anticipate a claim if it discloses all the claimed limitations “arranged or combined in the same way as in the claim.” *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1361

¹ US 2015/0180002 A1, published June 25, 2015 (Ex. 1004, “Nishikawa”).

² J. Chen et al., *Deformation and fracture behaviors of microporous polymer separators for lithium ion batteries*, 4 RSC Adv. 14904–14 (2014), (Ex. 1005, “Chen”).

³ US 10,559,802 B2, issued Feb. 11, 2020 (Ex. 1006, “Zhang”).

(Fed. Cir. 2012) (quoting *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1370 (Fed. Cir. 2008)). “However, a reference can anticipate a claim even if it ‘d[oes] not expressly spell out’ all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would ‘at once envisage’ the claimed arrangement or combination.”

Kennametal, Inc. v. Ingersoll Cutting Tool Co., 780 F.3d 1376, 1381 (Fed. Cir. 2015) (alteration in original) (quoting *In re Petering*, 301 F.2d 676, 681 (CCPA 1962)); *see also Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1343 (Fed. Cir. 2016) (distinguishing *Net MoneyIN* when the reference in question explicitly contemplated the combination of the disclosed functionalities).

Obviousness is a question of law based on underlying determinations of fact. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966); *Richardson-Vicks, Inc. v. Upjohn Co.*, 122 F.3d 1476, 1479 (Fed. Cir. 1997). A claim is unpatentable as obvious, under 35 U.S.C. § 103, if the differences between the claimed invention and the prior art are such that the claimed invention, as a whole, would have been obvious to a person having ordinary skill in the art, before the effective filing date of the claimed invention. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham*, 383 U.S. at 17–18. Consideration of the *Graham* factors “helps inform the ultimate obviousness determination.” *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016) (en banc), *cert. denied*, 138 S. Ct. 420

(2017). “Obviousness does not require absolute predictability of success[;] . . . all that is required is a reasonable expectation of success.” *In re O’Farrell*, 853 F.2d 894, 903–04 (Fed. Cir. 1988) (citations omitted). But, a petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

B. Level of Ordinary Skill in the Art

We review the grounds of unpatentability in view of the understanding of a person of ordinary skill in the art (“POSITA”) before the effective filing date of the claimed invention. *Graham*, 383 U.S. at 17.

Petitioner contends that

A person of ordinary skill in the relevant art would typically hold an advanced degree in chemistry, material science, and/or a related discipline, and have at least two years of experience with designing and/or fabricating battery separators or have an equivalent level of education, training, and experience.

Pet. 5. Patent Owner “adopts the definition proposed by Petitioner” for the purposes of the Preliminary Response. Prelim. Resp. 22.

In light of the record before us, and for purposes of this Decision, we adopt Petitioner’s unopposed definition because it is consistent with the specification. We note that neither party indicated that the result would change under any different definition.

C. Claim Construction

In interpreting the claims of the ’927 patent, we “us[e] the same claim construction standard that would be used to construe the claim[s] in a civil

action under 35 U.S.C. [§] 282(b).” *See* 37 C.F.R. § 42.100(b) (2024). The claim construction standard includes construing claims in accordance with the ordinary and customary meaning of such claims as would have been understood by one of ordinary skill in the art in light of the written description and the prosecution history pertaining to the patent. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc).

Petitioner submits that “all claim terms should receive their plain and ordinary meaning in the context of the Specification, with the exception of terms that are expressly defined by equations,” i.e., “absolute plastic deformation rate” and “relative plastic deformation rate.” Pet. 22. Petitioner states

These terms should be construed as extending to the physical properties they denote, even though those properties may also be expressed by other equations. The Specification observes that “[p]lastic deformation is a permanent deformation that does not bounce back.” EX1001, 4:27-28. This is consistent with the plain and ordinary meaning of “plastic deformation,” a well-known property that can be measured and expressed (as an “absolute” or “relative” “rate” or percentage) using various well-known inputs. In any event, Petitioner submits that the prior art anticipates and renders obvious the challenged claims under any reasonable construction of these terms.

Id.

Patent Owner argues that Petitioner’s proposed constructions impermissibly read out the express claim language, which requires specific equations for these terms. Prelim. Resp. 22 (citing Ex. 1001 Claim 1 and *Stylwan IP Holding, LLC v. Stress Eng’g Servs.*, 2025 U.S. App. LEXIS 12733, at *12 (Fed. Cir. May 27, 2025) (non-precedential) (“Thus, even assuming the claimed inventions could operate using other formulas, the district court did not err by limiting the claims to the identifier equations in

its construction.”). Patent Owner points out that Petitioner acknowledges these terms “are expressly defined by equations” and argues that construction that ignore express definitions are “contrary to traditional claim construction principles and should not be permitted.” *Id.* (citing *Hoffer v. Microsoft Corp.*, 405 F.3d 1326, 1329 (Fed. Cir. 2005) (“When a whereby or wherein clause states a condition that is material to patentability, it cannot be ignored in order to change the substance of the invention.”)).

“Absolute plastic deformation rate” and “relative plastic deformation rate” are the only claim terms disputed in this proceeding, and are clearly defined in the Specification and in claim 1. *See* Spec. 4:22–27, 4:47–54; 25:31–37. Because we determine that claim construction is not necessary to decide whether to institute, we do not expressly construe any claim terms. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that “only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy”); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs.* in the context of an *inter partes* review).

D. Ground 1: Alleged Anticipation of Claims 1–10 by Nishikawa

1. Overview of Nishikawa (Ex. 1004)

Nishikawa (Patent Publication US 2015/0180002 A1), titled “Separator for Nonaqueous Electrolyte Battery, and Nonaqueous Electrolyte Battery,” was published on June 25, 2015. Ex. 1004, code (54), (10), (43). Nishikawa discloses that coating an adhesive porous layer on a porous substrate such as a polyolefin microporous membrane may cause variations in the coat weight of an adhesive porous layer and variations in adhesion to

electrodes. *Id.* ¶¶ 8–9. Variations in the thickness of a substrate are also typically present. *Id.* ¶ 8. These variations in adhesion are directly related to non-uniform ion permeability in a battery. *Id.* ¶ 9. As a result, a part in a separator with desired adhesion will differ in ion permeability from a part with reduced adhesion, causing the part with high ion permeability to degrade and significantly decrease the long-term cycle characteristics of the entire battery. *Id.*

Nishikawa seeks to provide a separator for a nonaqueous electrolyte battery, which has excellent adhesion to electrodes and provides a battery with improved cycle characteristics, and also a nonaqueous electrolyte battery that stably develops excellent cycle characteristics. *Id.* ¶ 10.

Of relevance to the issues raised in the Petition, Nishikawa provides a table of test results on porous substrates used in example separators and comparative example separators. Ex. 1004 ¶ 164, Table 1. The data on the porous substrates includes thickness, elongation (%), tensile strength (N/cm³), and Young's modulus (GPa). *Id.*

2. Claim 1

Petitioner argues that Nishikawa anticipates claim 1. Pet. 23. Petitioner addresses where in Nishikawa each claim limitation is explicitly taught except for the claim language addressed to the absolute plastic deformation rate, which the parties refer to as “element 1.4.” *Id.* at 23–25; *see also* Prelim. Resp. 24. The absolute plastic deformation rate (APDR) claim language reads as follows:

the porous substrate has an absolute plastic deformation rate in a first direction ranging from about 40% to about 1800%, and wherein the absolute plastic deformation rate is calculated according to an equation $(L2-L0)/L0 \times 100\%$, where L0 refers to

a length of the porous substrate before stretching and L2 refers to a length of the porous substrate after the porous substrate is stretched to breakage and docked along the fracture caused by the breakage and flattened.

Ex. 1001, 25:28–37. Petitioner contends that “Nishikawa discloses an ‘absolute plastic deformation rate’ as defined in the [’927] patent, and within the claimed range, both expressly and inherently.” Pet. 25 (citing Ex. 1004, Table 1; Ex. 1003 ¶ 95). According to Petitioner

The claims define “absolute plastic deformation” (“APD”) in terms of the difference between the length of separator before and after it is stretched to its breaking point (i.e., L2-L0). It reflects the amount a separator is deformed permanently, and will not rebound when the force of a stress test is removed. EX1003, ¶69. This property can be estimated from data disclosed in Nishikawa, specifically the strain at break (elongation) and the plastic strain. EX1003, ¶¶95-98. The strain at break represents the total deformation of the material: the sum of both elastic strain and plastic strain. *Id.*

Id. at 25–26. Elastic deformation is defined in the ’927 patent as “L1 – L2 ” (Exhibit 1001, 4:23–24), and Petitioner contends that “a proxy for L1 – L2” is Stress at break (Petitioner uses Nishikawa’s “tensile strength” for stress at break) divided by Young’s modulus, then multiplied by 100% as an approximation of elastic strain. Pet. 30–32..⁴

Petitioner’s arguments are unconvincing. Petitioner points to nothing in Nishikawa that allows a POSITA to determine L2 (defined as “a length of

⁴ Tensile strength is measured as force per units area, such as MPa or psi. One MPa equals one N/mm². Nishikawa Table 1 discloses tensile strength in N/cm. Ex. 1004 Table 1. Petitioner makes calculations to convert the reported N/cm into N/m² and then to GPa, but provides no explanation for why tensile strength is reported in N/cm or how it was measured. See Pet. 31.

the porous substrate after the porous substrate is stretched to breakage and docked along the fracture caused by the breakage and flattened”) or L2 – L0. *See generally* Pet., Ex. 1004. Petitioner and its expert, Dr. Pecht, fail to adequately explain why tensile strength divided by Young’s modulus is “a proxy for L1 – L2” or why such a proxy is sufficient to disclose the limitation as stated. Instead, we are required to rely on “approximations” and “estimates” with insufficient explanation of why such they are appropriate or adequate. *See* Pet. 26, 30, 32; *see also* Ex. 1003 ¶¶ 97, 105–108, 111.

To the extent that Dr. Pecht and Petitioner rely on the theoretical stress-strain curve provided (*see* Petition 10; Exhibit 1003 paragraph 62) to assert that tensile strength divided by Young’s modulus is an “approximation” or “estimate” of the elastic portion of the strain (*see* Exhibit 1003 paragraph 60), it is clear from Petitioner’s cited references that the theoretical stress-strain curve is not consistent with the actual stress-strain curves of the porous separators disclosed therein, and a POSITA would not rely on data gleaned from a theoretical stress-strain curve.⁵ *Compare* Ex. Pet. 10, *with* Ex. 1005 (Chen), 14908; Ex. 1007 (Zhang thesis), 68. Nishikawa does not expressly disclose the recited absolute plastic deformation rate as required in claim 1.

Petitioner contends that “[i]t would be well within the knowledge and skill of a POSA that the polymers of Nishikawa, given their various properties as reported, would necessarily have absolute plastic deformation

⁵ We also note for the record that Nishikawa defines “elongation” as “[t]he chuck-to-chuck distance at break [] *divided by* the initial chuck-to-chuck distance of 50 mm, and the *quotient* was taken as elongation.” Ex. 1004 ¶ 134 (emphasis added). This, too, is inconsistent with Petitioner’s arguments. Petitioner does not address the disparity. *See generally* Pet.

rates over 40%.” Pet. 32–33. According to Petitioner, Nishikawa discloses the method of manufacture for its separator, and “that would inform a POSA whether the plastic deformation rate was within the claimed range, because plastic deformation is a property imparted to the composition by its method of manufacture.” *Id.* at 33 (citing Ex. 1008, 24).

Exhibit 1008 is part of the prosecution history from the parent Chinese patent application to which Patent Owner claims priority for the ’927 parent. It is not available prior art. At the page cited by Petitioner, Patent Owner stated “the plastic deformation rate of the porous substrate is mainly affected by the *stretching conditions* in the process of preparation” and “desired absolute plastic deformation rates can be obtained by changing a *stretching ratio*.” Ex. 1008, 24 (emphasis added). Although Nishikawa discloses a general process for making a polyolefin microporous membrane (see paragraph 45) including “stretching the sheet,” it reveals nothing at all about the stretching conditions or stretching ratios.

Elements that are inherently present must necessarily be present in or result from the prior art. *In re Montgomery*, 677 F.3d 1375, 1379–80 (Fed. Cir. 2012) (“A reference may anticipate inherently if a claim limitation that is not expressly disclosed ‘is necessarily present, or inherent, in the single anticipating reference.’”) (citing *Verizon Servs. Corp. v. Cox Fibernet Va., Inc.*, 602 F.3d 1325, 1336–37 (Fed. Cir. 2010). “Inherency . . . may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *In re Olerich*, 666 F.2d 578, 581 (CCPA 1981) (quoting *Hansgirk v. Kemmer*, 102 F.2d 212, 214 (CCPA 1939)).

Petitioner provides no evidence to demonstrate that the absolute plastic deformation rate claimed is inherent in a porous substrate.⁶ Thus, disclosure of an absolute plastic deformation rate in the claimed range is neither explicit nor inherent in Nishikawa.

On this record, Petitioner fails to establish a reasonable likelihood of prevailing with in showing claim 1 is anticipated by Nishikawa.

3. Claims 2–10

Claims 2–10 depend from claim 1. As discussed above, Petitioner has not shown sufficiently that claim 1 or its dependent claims are anticipated by Nishikawa.

Petitioner does not demonstrate a reasonable likelihood of prevailing on at least challenged claim based on Nishikawa.

E. Ground 2A: Alleged Obviousness of Claims 1–10 over Nishikawa

Petitioner argues that claims 1–10 are obvious over Nishikawa. Pet. 40. Petitioner’s reasoning is essentially a restatement of the arguments made in relation to its anticipation challenge. It is no more successful as an obvious challenge for the same reasons discussed above with respect to anticipation.

Petitioner fails to establish a reasonable likelihood of prevailing with in showing any claim is obvious over Nishikawa.

⁶ The Comparative Examples in the ‘927 patent demonstrate that porous substrates prepared from the same components but with different stretching ratios did not have absolute plastic deformation rates that satisfied the claims. Ex. 1001, 11:23-22:11; Table 1.

F. Ground 2B: Alleged Obviousness of Claims 1–10 over Nishikawa in view of Chen

In Ground 2B, Petitioner asserts claims 1–10 are obvious over the combination of Nishikawa and Chen. Pet. 40, 44. In this ground, Petitioner relies on Chen as explicitly disclosing the absolute plastic deformation rates of the Teijin separators disclosed in Nishikawa. *Id.* at 46. Petitioner notes that Teijin Limited is the applicant and assignee of Nishikawa. *Id.* at 44; see also Ex. 1004, codes (71) and (73). Petitioner argues that a POSITA would have supplemented Nishikawa’s disclosure with Chen’s disclosure of battery separators “having clearly depicted absolute and relative plastic strain” with “an expectation of success in understanding or manipulating the properties of Nishikawa’s separators or of adding Chen’s separators to the electrochemical device taught by Nishikawa.” Pet. 45.

Petitioner contends that “the absolute plastic deformation rates of the Teijin separators disclosed in Nishikawa” “are explicitly disclosed for the Teijin separator described and tested in Chen by virtue of the provided stress-strain curves.” Pet. 46 (citing Ex. 1005, Fig. 3, 14908). The portion of Chen’s Figure 3 relied on by Petitioner is reproduced below:

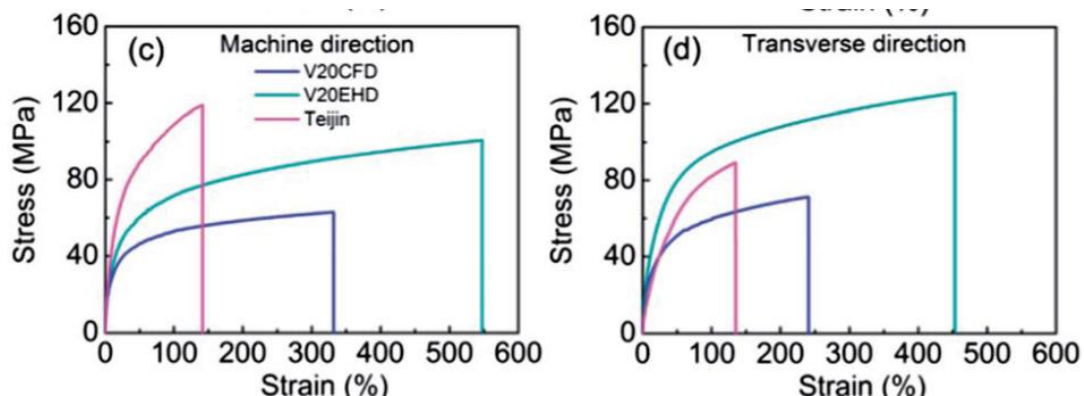


Figure 3 show two stress-strain curves for Toray V20CFD, V20EHD, and Teijin separators, one curve for the machine direction, one curve for the

transverse direction. Ex. 1005, 14908. All three separators are made by the wet process. *Id.* at Abstr. The curves in pink show the curves for the Teijin separator. *Id.* at 14908.

Dr. Pecht testifies that “[s]tress-strain curves depict the elastic and plastic deformation of a material in a numbered graph—explicitly disclosing the absolute and relative plastic deformation rates (as those terms are defined in the patent).” Ex. 1003 ¶ 158. According to Petitioner, a POSITA reading Nishikawa would look to Chen to learn more about the performance of the separator disclosed in Nishikawa. Pet. 49 (citing Ex. 1003 ¶ 157). The POSITA “would further expect that the Teijin separator tested in Chen would work in the Teijin battery disclosed in Nishikawa, again because both references disclose different attributes of the same products.” *Id.* Petitioner also describes the Nishikawa and Chen Teijin separators as “manufactured by similar processes.” *Id.* Petitioner argues that a POSITA would understand that the Teijin polyethylene “substrate coated with a fluorine based compound (porous layer) tested in Chen could be manufactured to have the absolute plastic deformation rates depicted in Chen, and fully expect success at least because both separators are Teijin polyethylene separators with coatings. *Id.* at 51.

Patent Owner argues that Chen, like Nishikawa, does not disclose L2 or $(L2 - L0)/L0 \times 100\%$, and does not measure the porous substrate after it has been stretched to breakage and docked along the fracture caused by the breakage and flattened. Prelim. Resp. 56–57. According to Patent Owner, Petitioner makes the same incorrect and unreliable assumptions in evaluating Chen as it did for Nishikawa to estimate elastic strain. *Id.* at 57. Patent Owner argues that Petitioner and Dr. Pecht incorrectly assume that Chen’s

reported “strain that non-linearity occurred (%)” reflects elastic stain and “strain at break” reflects total strain, and the difference between them is the absolute plastic deformation. *Id.* at 58; *see also* Ex. 2015 ¶¶ 151–152. Patent Owner points out that Petitioner relies on an assumption that there is no elastic strain after the subjective point of non-linearity, despite the difference between Chen’s stress-strain curves and the theoretical stress-strain curve. Prelim. Resp. 59; Ex. 2015 ¶ 154. According to Patent Owner, Petitioner improperly ignores parameters that affect stress-strain behavior, including stretching rate, initial chuck-to-chuck distance, and sample dimensions that all impact the deformation properties of a separator and the stress-strain behavior of a polymer. Prelim. Resp. 61 (citing Ex. 2015 ¶ 157–158).

Our review of Chen does not support Petitioner’s assertion that “the absolute plastic deformation rates of the Teijin separators disclosed in Nishikawa” “are explicitly disclosed for the Teijin separator described and tested in Chen by virtue of the provided stress-strain curves.” *See* Pet. 46. There is no disclosure of L_2 or $(L_2 - L_0)/L_0 \times 100\%$ in Chen, and insufficient explanation by Petitioner as to how a POSITA would discern these values from Chen.

Petitioner contends that Nishikawa and Chen “disclose different attributes of the *same products*.” Pet. 49 (emphasis added). But Dr. Pecht estimates the plastic strain in the MD direction to be 72.55–72.75% in Nishikawa and 137.2–141.57% in Chen. Ex. 1003 ¶¶ 110, 155. Further, Young’s modulus for the Teijin separator in the MD direction is reported in Nishikawa as 2.4 GPA (2,400 MPa), but in Chen as 733 ± 41 MPa. *Compare* Ex. 1004 Table 1, *with* Ex. 1005 Table 2. Petitioner fails to account for these inconsistencies, calling into question Petitioner’s assertion that a POSITA

would have been motivated to combine the references or would have expected success in doing so.

On this record, Petitioner fails to establish a reasonable likelihood of prevailing with in showing any claim is obvious over the combination of Nishikawa and Chen.

G. Ground 3: Alleged Obviousness of Claims 1–10 over Chen in view of Zhang

Petitioner argues that claims 1–10 are obvious over Chen in view of Zhang. Pet. 56. For Ground 3, Petitioner relies on the Celgard separators analyzed in Chen, rather than the Teijin separator. *Id.* at 56–57. Petitioner relies on Zhang for disclosure of the claimed porous layer, acknowledging that the Celgard separators analyzed in Chen do not have any porous layer. *Id.* at 57–58.

Petitioner argues that Chen discloses stress-strain curves and Young’s moduli for two Celgard porous separators, and that yielding occurs at about 35% strain for both separators. Pet. 64–65. Petitioner contends that elastic strain is equal to the strain observed at yield stress, and that subtracting the 35% strain from the strain at break gives the absolute plastic deformation rate. *Id.* at 65.

Petitioner’s argument are unconvincing. In Ground 2B, Petitioner argues that “strain that non-linearity occurred (%)” equaled the elastic strain. Pet. 47. In Ground 3, Petitioner ignores the data given for strain that non-linearity occurred for the Celgard separators (0.79% and 0.61% in the MD direction respectively for the 2325 and 2400 Celgard separators, Exhibit 1005, Table 2)), and uses 35% instead. Pet. 65. There is no explanation given for the dramatic difference, or why “strain that non-linearity occurred”

represents elastic strain for the Teijin separator, but not for the Celgard separators.

In any case, Petitioner fails to demonstrate that subtracting the yield strength from the elongation at break equals the absolute plastic deformation rate. There is no evidence that Chen discloses the claimed absolute plastic formation rate.

Petitioner fails to establish a reasonable likelihood of prevailing with in showing any claim is obvious over Chen in view of Zhang.

IV. CONCLUSION

For the above reasons, we *deny* the Petition and do not institute an *inter partes* review. 35 U.S.C. § 314(a)(1).

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is denied and no *inter partes* review is instituted.

IPR2025-00385
Patent 10,964,927 B2

For PETITIONER:

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