

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CAIHONG DISPLAY DEVICES CO., LTD.,
Petitioner

v.

CORNING INCORPORATED,
Patent Owner

Case IPR2025-00937
U.S. Patent No. 8,640,498

PATENT OWNER'S PRELIMINARY RESPONSE

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PATENT OWNER'S EXHIBIT LIST

Exhibit No.	Description
2001	<i>Certain Glass Substrates for Liquid Crystal Displays, Products Containing the Same, and Methods for Manufacturing the Same II</i> , Inv. No. 337-TA-1441, Order Setting the Procedural Schedule (ITC March 31, 2025)
2002	Display of the Year Award Archive, accessed at https://www.sid.org/Awards/Display-Industry-Awards/DIAAwardsArchive (last accessed Apr. 9, 2025)
2003	“Corning wins awards for EAGLE XG(TM),” accessed at: https://www.glassonline.com/corning-wins-awards-for-eagle-xgtm/ (last accessed Apr. 9, 2025) (May 23, 2007)
2004	Bocko, Peter L., “Handbook of Visual Display Technology,” Chapter 5.1.1: Glass Substrates for AMLCD, OLED and Emerging Display Platforms, pp. 599-623 (2012)
2005	Prosecution History of U.S. Patent Application No. 11/478,493 (now U.S. Patent No. 7,851,394)
2006	<i>Certain Glass Substrates for Liquid Crystal Displays, Products Containing the Same, and Methods for Manufacturing the Same</i> , Inv. No. 337-TA-1441, Order 2 (ITC March 7, 2025)
2007	<i>Gestures Tech. Partners LLC. v. Apple Inc. et al.</i> , Petition for Writ of Certiorari, Case. No. 24- (filed June 11, 2025)
2008	Interim Processes for PTAB Workload Management Memorandum (March 26, 2025)
2009	Declaration of Dr. Richard Brow in Support of Patent Owner’s Preliminary Response
2010	<i>Curriculum Vitae</i> of Dr. Richard Brow
2011	Kim, K.D., “Influence of BaO/(SrO+BaO) on melt properties in R2O-RO-SiO2 glasses for plasma display panel substrates,” <i>Glass Technol.</i> , 41(5):161-164 (2000)
2012	Shelby, J.E., “Introduction to Glass Science and Technology,” <i>The Royal Society of Chemistry</i> , 2nd Ed. (2005)

Exhibit No.	Description
2013	Dejneka, M. & Kiczenski, T.J., “Display Glass,” <i>Springer Handbook of Glass</i> , 1519-51 (2019)
2014	<i>Certain Glass Substrates for Liquid Crystal Displays, Products Containing the Same, and Methods for Manufacturing the Same</i> , Case No. 337-TA-1441, Ex. 133 – Claim Chart for U.S. Patent 8,640,498
2015	Corning Eagle XG Glass Substrates
2016	The Story of Corning® EAGLE XG® Slim Glass Substrates
2017	<i>Certain Glass Substrates for Liquid Crystal Displays, Products Containing the Same, and Methods for Manufacturing the Same</i> , Case No. 337-TA-1441, Ex. 127 – Corning® EAGLE XG® Glass substrates Innovation Timeline

I. INTRODUCTION

U.S. Patent No. 8,640,498 (“the ’498 patent”) claims industry-recognized, innovative improvements to the production of alkali-free boroaluminosilicate glass. The ’498 patent describes methods of making glass that are free from certain toxic fining agents, and yet still achieve the high liquidus viscosity and defect-free quality that is desired for certain sophisticated glass applications (like LCD screens). The Petition purports to present four invalidity Grounds, none of which present prior-art methods of making glass that achieves the claimed liquidus viscosity. At least the liquidus-viscosity limitation recited in all independent claims is missing from every Ground.

The Petition further fails to present a challenge with any likelihood of showing unpatentability because it mixes concepts of anticipation and obviousness, relies on references that are not part of the Grounds, and omits essential parts of the *KSR* and *Graham* analyses. The technical arguments are largely conclusory and rely heavily on an expert declaration to fill gaps in the prior-art disclosures and in the argumentation. This shortcoming of the Petition is compounded by the facts that (1) Petitioner’s expert lacks the qualifications of a POSA and (2) the declaration is riddled with errors that render it unreliable, including incorrect citations, mixing up prior-art references, confusing basic scientific concepts, and mistaking legal principles. Individually, these errors defeat the expert’s respective

conclusions. Collectively, they render the entire Petition unsupported by competent evidence. The Petition cannot support a Final Written Decision of unpatentability on the merits. It should be denied.

II. FACTUAL BACKGROUND

The '498 patent is directed to a method of producing boroaluminosilicate glasses that can be used for displays, such as LCDs. EX1001, Abstract. The '498 patent teaches that “arsenic raises environmental and health issues, and thus there has been a continuing effort in the art to produce glasses with lower arsenic levels and, preferably, glasses which are substantially arsenic free,” and that while efforts have been made to replace arsenic with antimony, “antimony has its own environmental and health issues.” EX1001, 3:26-39. The boroaluminosilicate compositions in the methods claimed by the '498 patent allow for the fining (the removal of bubbles) of glass suitable for LCD screens without either of these toxic elements. EX1001, 11:57-12:51. This improvement is made possible through precise control of certain metal oxides within the boroaluminosilicate compositions, which is reflected in the claims.

A. Overview of the Technology

The '498 patent identifies and improves upon a method of producing silicate glass to solve a critical problem: the production of nearly defect-free glass without the use of harmful chemicals such as arsenic or antimony. During glass

manufacturing, materials such as SiO_2 , Al_2O_3 , or B_2O_3 are melted to create molten glass, which can produce gas bubbles. If gas bubbles are not removed, they can create defects in the glass product. Removing gas bubbles from glass is called “fining.” Historically, arsenic and antimony were used as “fining agents” to remove gas bubbles from molten glass, but they present environmental and health risks.

Two of the key innovations of the '498 patent glass composition are (1) the specified MgO mol% and (2) the ratio of the concentration of the divalent metal oxides (MgO , CaO , SrO , and BaO ; collectively, RO) to Al_2O_3 ($\Sigma[\text{RO}]/[\text{Al}_2\text{O}_3]$) of greater than 1.0. Although MgO had been used in display-glass compositions before the '498 patent, doing so was known to increase the liquidus temperature of the glass, making it more difficult to prevent crystals from forming prematurely during a glass-sheet manufacturing process. The inventor discovered that this effect could be counteracted by controlling the amount of MgO along with the ratio of RO to Al_2O_3 . Within the claimed range of RO to Al_2O_3 ratio, adding MgO actually *decreases* the liquidus temperature, rather than increasing it as expected at the time. EX1001, 10:13-48. This also led to the inventor's discovery that the addition of MgO , in combination with the claimed RO to Al_2O_3 ratio, accelerates the digestion of SiO_2 during melting of the glass. The accelerated digestion of SiO_2 reduces the amount of bubbles formed during melting and enables tin (SnO_2)—a

fining agent considered to be a much less effective fining agent than arsenic and antimony—to work effectively in fining the glass. EX1001, 7:24-29, 12:49-51.

These claimed glass compositions are formed using a fusion downdraw process, which allows for tightly controlled and reproducible glass dimensions, and glass sheets that are flat, smooth, defect-free, and thermally and mechanically durable, without further mechanical surface processing such as grinding or polishing. EX1001, 3:55-60, 4:54-67, 10:39-48, 12:52-67. The claimed glass compositions, lacking arsenic or antimony for fining, represent a substantial improvement over the prior-art glass compositions. EX1001, 3:55-4:2.

Commercially, key innovations of the '498 patent led to the launch of Corning® EAGLE XG® glass, a best-selling product for Corning Incorporated (“Patent Owner”).

B. Overview of the '498 Patent Family and Claims

The '498 patent, entitled “Fining of Boroalumino Silicate Glasses,” issued on February 4, 2014 to inventor Adam J.G. Ellison. *See* EX1001, (54), (45), (75). It shares a specification with the '394 patent and '491 patent. It issued from U.S. Patent Application No. 12/965,004, filed on December 10, 2010, which is a division of U.S. Patent Application No. 11/478,493, filed on June 28, 2006 (now the '394 patent), and claims the benefit of U.S. Provisional Application No. 60/694,478, filed on June 28, 2005. It is subject to a terminal disclaimer over U.S.

Patent Nos. 7,696,113 and 7,946,128, and has an expiration date of November 13, 2026, about 16 months from the date of this Brief.

Claim 1 of the '498 patent, the only independent claim, recites a method for producing alkali-free glass sheets by a downdraw process, the glass sheets comprising SiO_2 , Al_2O_3 , B_2O_3 , MgO , and CaO . EX1001, 21:13-17. The glass comprises an $[\text{RO}]/[\text{Al}_2\text{O}_3]$ ratio greater than or equal to 1.0 and an MgO content that is greater than or equal to 1.0 mol%. EX1001, 21:18-23. Further, the glass comprises the following: (a) on an oxide basis, at most 0.005 mole percent As_2O_3 ; (b) on an oxide basis, at most 0.005 mole percent Sb_2O_3 ; (c) on an oxide basis in mole percent, $0.01 \leq \text{SnO}_2$, and (d) a liquidus viscosity that is greater than or equal to 100,000 poise. EX1001, 21:27-37.

C. Prosecution History

The '498 patent examination applied or at least considered several of the references presented in the Petition. First, the primary reference featured in Ground 2, Japanese Publication No. 2004-189535 (EX1005, "Miwa '535"), was cited by Patent Owner and specifically considered by the Examiner. EX1002, 33, 76, 80. In fact, Miwa '535 was cited in a § 103 rejection overcome by Patent Owner during prosecution. EX1002, 46-47, 72-73.

Further, the primary reference featured in Ground 3, U.S. Patent No. 6,319,867 (EX1008, "Chacon"), was cited in the '498 patent, EX1001, 2:48, and in

an IDS, EX1002, 156. The Examiner initialed the statement, indicating that she considered the reference. EX1002, 80. The Office also applied the child application of Chacon (U.S. Patent No. 6,831,029, which contains identical disclosure to that of Chacon) in a rejection of the claims of the related '394 patent, further demonstrating the Office's familiarity with Chacon and its substantive teachings, as well as its relevance to the technology at issue. EX2005, 216-222.

While the Office did not expressly consider Miwa '377, JP '741, Peuchert '469, Takase, or Peuchert '293, these references are irrelevant to the overall obviousness arguments presented in the Petition. For example, Ground 2 relies on JP '741 as alleged motivation to reduce the amount of As_2O_3 in an embodiment of Miwa '535 that already contained no As_2O_3 —making the citation of JP '741 in Ground 2 useless. As another example, Ground 3 relies on Takase to purportedly modify Chacon, but does not explain how Petitioner proposes modifying Chacon in view of Takase. It is not surprising that these additional references were not found by the Examiner, cited, or disclosed during original prosecution because they are even less relevant than the prior art that was considered.

III. PERSON OF ORDINARY SKILL IN THE ART (“POSA”)

A POSA is presumed to be aware of all pertinent art. The POSA possesses the “understandings and knowledge reflected in the prior art” and thinks along conventional wisdom. *See Abbott Labs. v. Andrx Pharm., Inc.*, 452 F.3d 1331,

1336 (Fed. Cir. 2006). For the '498 patent, a POSA at the time of the invention would have had a bachelor's degree in materials science, geology, chemistry, or a comparable field of study, and at least two to three years of research or industrial experience with the design, manufacturing, characterization, and testing of glasses, including oxide glasses. Alternatively, the POSA would have had a master's degree or higher in the same fields of study. EX2009, ¶16.

At this stage, Patent Owner submits that the Board does not need to resolve the appropriate level of skill for a POSA for purposes of deciding institution because the Petition fails under either the definition above or Petitioner's proposed definition. While Patent Owner does not necessarily agree with Petitioner's proposed definition of a POSA, what is important for purposes of institution is that Petitioner's expert does not satisfy Petitioner's own definition, and therefore cannot competently support the positions in the Petition. EX2009, ¶18.

IV. CLAIM CONSTRUCTION

The Board need not construe any term in order to deny institution on the merits. Patent Owner reserves the right to contest Petitioner's implicit or explicit constructions during any further proceedings.

V. REASONS TO DENY INSTITUTION

First, the Petition fails to present competent supporting evidence. The supporting declaration does not present testimony of a qualified expert, it is riddled

with errors to the point of being unreliable, and it does not corroborate the opinions rendered with evidence. Second, even when Petitioner's positions are taken at face value, the Grounds fail to show unpatentability for any claim due to missing limitations and a lack of motivation to modify and combine their references, much less with any reasonable expectation of success. Furthermore, objective indicia overwhelmingly support nonobviousness of the claimed glass produced by a downdraw process. Corning's flagship LCD glass product, EAGLE XG Glass, which embodies claim 1 of the '498 patent, has enjoyed immense commercial success and industry praise due at least in part to the product solving a long-felt need for a lightweight, defect-free LCD glass panel made without arsenic or antimony.

A. The Petition Fails to Present Competent Supporting Evidence

Petitioner's obviousness and anticipation arguments in the Petition are largely conclusory and rely heavily on the say-so of Petitioner's supporting expert declaration. For example, Petitioner argues obviousness based on routine optimization without providing any analysis or support for how the modification would have been routine. *See, e.g.*, Pet., 33. Elsewhere, the Petition states that every limitation of the claims is taught in the prior art, and then bulk-cites to "EX1003, ¶¶ 121-155," over 30 paragraphs of the expert opinion, without providing further analysis. Pet., 34. Petitioner's expert often purports to fill gaps in

the allegations regarding what one of skill in the art would know and be motivated to do, but the declaration is devoid of evidence at crucial junctures. *See, e.g.*, EX1003, ¶76 (lacking citation or analysis), ¶158 (statements presented as fact with no citation or analysis), ¶¶186-188 (lacking analysis), ¶197 (lacking citation or analysis). There are other significant problems with Petitioner's approach.

First, aside from Petitioner's expert's *ipse dixit*, the Petition has no evidentiary support for a POSA's alleged knowledge and motivation to combine. *See* Pet., 29 (citing EX1003, ¶76). The Federal Circuit has made clear that the *ipse dixit* of an expert is not sufficient to support obviousness challenges at the P.T.A.B. *See, e.g., TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1362 (Fed. Cir. 2019) (reversing P.T.A.B. obviousness finding regarding motivation to combine based only on conclusory expert testimony as not supported by substantial evidence). This is particularly troubling where, as here, Petitioner's expert does not even possess the qualifications that the Petition ascribes to a POSA. EX2009, ¶18.

Specifically, Dr. Ernst completely lacks "experience with design, synthesis, and characterization of silicate, borosilicate, aluminosilicate, and boroaluminosilicate glasses." *Compare* Pet., 21 (defining level of skill for a POSA), *with* EX1011 (Ernst CV). The Federal Circuit has made clear that "to be qualified to offer expert testimony on issues from the vantage point of an ordinarily skilled artisan in a patent case, an expert must at a minimum possess ordinary skill

in the art.” *Kyocera Senco Indus. Tools Inc. v. Int’l Trade Comm’n*, 22 F.4th 1369, 1377 (Fed. Cir. 2022).

Petitioner’s expert does not have what the Petition has identified as the level of ordinary skill in the relevant art. Although Dr. Ernst claims that “[b]ased on [his] education and experience, [he] meet[s] the criteria for a POSITA,” he fails to point to any specific education or experience in his CV or otherwise to support this claim. EX1003, ¶25. Without a qualified expert, the Petition has no competent evidentiary support and the P,T,A,B, cannot render a FWD granting the Petition that would be supported by substantial evidence. *See Kyocera*, 22 F.4th at 1377.

Second, the expert declaration is so riddled with glaring errors and blatant misstatements that it could not have been carefully reviewed and approved by Dr. Ernst (or anyone). As just a few examples, the declaration argues that one would combine Miwa ’535, JP ’741, and Peuchert ’469, or Chacon and Takase, because it would have been within the skill of a POSA to optimize the combined fraction of SrO and BaO to obtain low-density alkali-free substrate glasses. EX1003, ¶76. But substituting BaO for SrO only pertains to the Petition’s use of the Peuchert ’469 reference cited against dependent claim 4. Pet., 37. The Miwa ’535/JP ’741 and Chacon/Takase combinations cited against independent claim 1 have nothing to do with substituting BaO for SrO. EX2009, ¶40. There is therefore no given reason to combine those references.

As another example, for Ground 2 the declaration states, without support, that it was known “for an alkali-free glass substrate to be fabricated using downdraw technique, the liquidus viscosity should be greater than or equal to 100,000 P (poise), equivalent to $10^{5.0}$ dPa·s (decipascal–seconds) in SI units.” EX1003, ¶158. Presumably, Dr. Ernst intended to cite the liquidus viscosity discussion in Miwa ’377 (cited in ¶¶117-119 of the declaration as supporting Ground 1). However, the correct Miwa—Miwa ’535 (the reference that forms the basis for the Ground 2)—has no such teaching. “This is appears to be accidental (and incomplete) reference to Miwa ’377 because Miwa ’535 does not discuss the concept of liquidus viscosity at all.” EX2009, ¶31. The Petition contains a similar error. *See* Pet., 36-37 (citing ¶119 of the declaration discussing Miwa ’377 in support of Ground 2 based on Miwa ’535).

It therefore appears that one of the Petition’s (and Dr. Ernst’s) theories of invalidity accidentally conflates two different Miwa references in Ground 2, and thus fails to identify a coherent obviousness combination. That is not the kind of error that can be fixed. *See, e.g., Nanobebe US Inc. v. Mayborn (UK) Ltd.*, IPR2023-00465, Paper 21 (P.T.A.B. Aug. 17, 2023); *Sweegen, Inc. v. Purecircle SDN BHD*, PGR2020-00070, Paper 9 (P.T.A.B. Sept. 22, 2020).

As another example, the Petition cites Embodiment 8 of Miwa ’377 for disclosing a “liquidus viscosity” of 1089 °C. Pet., 31-32. But Miwa ’377

Embodiment 8 has a liquidus *temperature* of 1089 °C. Celsius is not even a measure of viscosity. The declaration repeats this error verbatim. EX1003, ¶101. It is concerning that Dr. Ernst would confuse two physical properties so central to glass chemistry, especially in the portion of the opinion comparing the prior art directly to the liquidus temperature claim limitation.

Indeed, confusing basic principles is part of a consistent pattern throughout the Ernst declaration. Dr. Ernst repeatedly conflates SO₃ (sulfate) and CO₃ (carbonate). *See* EX1003, ¶¶216-218. These are distinct chemical species with different molar masses, properties, and effects on glass compositions. The Petition and declaration also contain identical errors stating that “693 °C, [] is less than 650 °C,” when obviously 693 °C is *greater than* 650 °C. Pet., 32; EX1003, ¶104. Additional errors throughout the declaration are noted in Section V.B.

The most plausible explanation for an expert declaration with so many egregious errors—errors that also appear *verbatim* in the Petition—is that Dr. Ernst had little involvement in preparing the declaration and was not given adequate time to review the declaration before signing it. The Board should not institute review of a Petition that is devoid of competent supporting evidence, because there is not substantial evidence to adopt any of the Petition’s arguments.

B. All Four Grounds Fail to Show Unpatentability

Each of the Grounds is facially and fatally flawed on the merits. Grounds 1 and 4 purport to present a theory of anticipation, but fail to identify all of the independent claim elements in Miwa '377 (Ground 1) or Peuchert '293 (Ground 4). Obviousness Ground 2 also fails to show every independent claim element in the cited art, in addition to failing to provide any substantive analysis of motivation to modify and combine the cited art or a reasonable expectation of success in doing so. Ground 3 fails to provide any substantive analysis for motivation to combine or reasonable expectation of success. In an IPR, “the burden of proving a proposition of unpatentability” is borne by (and remains at all times with) the petitioner. 35 U.S.C. §§ 314(a), 316(e); *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1375 (Fed. Cir. 2016). Defects in establishing a ground of unpatentability in a petition are not curable during trial since the petition cannot be corrected or enhanced during trial. *See Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018). The Board makes its determination regarding institution based on what the petition actually presents and not what it could have reasonably contained had it been drafted differently. *Magnum Oil*, 829 F.3d at 1381 (holding that the Board is not “free to adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner during [a

post-grant proceeding]”). The Board cannot “deviate from the grounds in the petition and raise its own” theories of invalidity. *Sirona Dental*, 892 F.3d at 1356.

For anticipation, the petitioner must establish that “every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros., Inc. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). A claim element argued as being inherent must be “necessarily present” in the prior art, and “may not be established by probabilities or possibilities.” *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 960 (Fed. Cir. 2014); *PAR Pharm., Inc. v. TWI Pharm., Inc.*, 773 F.3d 1186, 1195 (Fed. Cir. 2014); *Cont’l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1269 (Fed. Cir. 1991).

“An obviousness determination requires finding that [a Skilled Artisan] would have been motivated to combine or modify the teachings in the prior art *and* would have had a reasonable expectation of success in doing so.” *Regents of the Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291 (Fed. Cir. 2018); *Intelligent Bio-Sys.*, 821 F.3d at 1367–68; *see also, e.g., NJOY, LLC v. JUUL Labs, Inc.*, IPR2024-00536, Paper 17 (P.T.A.B. Aug. 12, 2024) (denying institution where petitioner did not show a reasonable expectation of success in combining the asserted references); *Honeywell Int’l Inc. v. DSM IP Assets, B.V.*, IPR2024-00493, Paper 7 (P.T.A.B. Aug. 21, 2024) (same).

In a properly formulated multi-reference obviousness ground, where a patent challenger identifies a primary reference that allegedly discloses some (but not all) limitations of the claims, the challenger must also identify which limitations are missing from the primary reference and where they can be found in the secondary reference. *See, e.g., Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966) (providing that identifying the differences between the prior art and the claims is a required step in the obviousness analysis). The challenger must also explain why a POSA would modify the primary reference to incorporate the teachings of the secondary reference. *See Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 888 (Fed. Cir. 2024) (emphasizing that the mere existence of the claim limitations in the prior art is not enough without a clear motivation to modify and combine).

Here, Petitioner falls short of carrying its burden of establishing a reasonable likelihood of prevailing to show that the claims challenged in Grounds 1-4 are anticipated or obvious for multiple reasons.

1. Ground 1 fails to show that Miwa ’377 anticipates, expressly or inherently, the claimed liquidus viscosity in claim 1.

As a preliminary matter, despite calling itself an anticipation argument for claims 1, 2, 7, 9, and 11, the Petition seems to mix and match embodiments of Miwa ’377 or use obviousness rationales to close gaps in the disclosure. For

example, the Petition cites paragraph 12 of Miwa '377 as disclosing the same liquidus viscosity as found in claim 1 of the '498 patent. Pet., 31. But paragraph 12 of Miwa '377 describes unspecified “prior art,” and not any of Miwa’s embodiments. None of the embodiments of Miwa '377 are disclosed as having the claimed viscosity, and indeed, there is no evidence to support that the liquidus viscosity of Miwa '377’s embodiments was even determined at all. EX2009, ¶¶27-28.

The only claim for which Ground 1 identifies itself as an obviousness analysis is claim 10, but the entirety of that analysis is: “If not anticipated, Claim 10 would at least have been obvious over Miwa '377 as requiring no more than routine optimization of the parameters disclosed therein. EX1003, ¶¶ 114-115.” Pet., 33. This cursory statement does not satisfy the Petitioner’s burden of identifying an obviousness theory with particularity. Obviousness is its own legal theory, not a one-sentence fallback for a poorly formulated anticipation challenge.

Furthermore, Ground 1 fails to show anticipation of claims 1, 2, 7, 9, and 11 (or obviousness of claim 10) because Miwa '377 does not disclose (or suggest) the claimed liquidus viscosity. EX2009, ¶¶11, 27-29. Petitioner relies on the disclosed method of making Miwa '377’s Embodiment 8 as anticipating claim 1. Pet., 29-31. In doing so, Petitioner argues that the glass of Miwa '377’s Embodiment 8 has a liquidus viscosity of greater than or equal to 100,000 poise. Pet., 31.

Petitioner does not make clear whether it relies on a theory of express or inherent anticipation to establish that the unspecified liquidus viscosity of Embodiment 8 is greater than or equal to 100,000 poise. But since Embodiment 8 has no express disclosure of a liquidus viscosity, it can only anticipate inherently. Indeed, Miwa '377 is silent with respect to the liquidus viscosity for any of its disclosed embodiments. EX2009, ¶28.

A finding of inherent anticipation requires more than “probabilities or possibilities.” *Cont’l Can Co.*, 948 F.2d at 1269. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art). Rather, “a prior art reference may anticipate without disclosing a feature of the claimed invention if that missing characteristic is *necessarily* present, or inherent, in the single anticipating reference.” *Schering Corp. v. Geneva Pharm., Inc.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003) (emphasis added). It is not enough that the allegedly inherent result would occur often, usually, or typically—the allegedly inherent result “must inevitably result from the disclosed steps.” *In re Montgomery*, 677 F.3d 1375, 1380 (Fed. Cir. 2012).

In purported support for the liquidus viscosity of Embodiment 8, Petitioner cites a discussion in paragraph 12, which is in the “*prior art*” heading of Miwa ’377, and paragraphs 95, 101, and 117 of Dr. Ernst’s declaration (EX1003). Pet., 31. The translation provided by Petitioner states, “in consideration of the temperature at which glass is formed using the downdraw method, the liquid phase temperature of the glass is preferably less than 1200 °C, and more preferably less than 1150 °C, and the liquid phase viscosity is preferably less than 10⁵ dPa·s, and more preferably 10^{5.5} dPa·s.” EX1004, ¶12. This citation to Miwa ’377’s discussion of the prior art falls well short of establishing that Miwa ’377’s Embodiment 8 inherently has a liquidus viscosity of greater than or equal to 100,000 poise for the following reasons.

First, a disclosure of what was “preferable” in the prior art does not imply that Embodiment 8 has a liquidus viscosity of greater than or equal to 100,000 poise. Miwa ’377 never discloses that Embodiment 8 has a certain liquidus viscosity, nor does Miwa ’377 specify that Embodiment 8 has a liquidus viscosity consistent with what is “preferable” in the prior art. EX2009, ¶28 (“Miwa ’377 never explicitly explains that its embodiments have a liquidus viscosity consistent with the prior art”).

Second, the quoted portion of Miwa ’377’s prior art description says that “the liquid phase viscosity is preferably *less than* 10⁵ dPa·s [100,000 poise], and

more preferably $10^{5.5}$ dPa·s.”¹ EX1004, ¶12 (emphasis added). So, even if this “prior art” discussion would inform a POSA’s understanding of Embodiment 8—which it likely would not—it suggests that the liquidus viscosity would be less than 100,000 poise, which would *not* fall within the claimed range.

Third, the citation to paragraphs 95, 101, and 117 of Dr. Ernst’s declaration on page 31 of the Petition does not cure the deficiencies in the Petitioner’s arguments. Paragraphs 95 and 117 simply quote paragraph 12 of Miwa ’377 verbatim. And paragraph 101 mistakenly refers to the liquidus viscosity as equal to 1089 °C, which, as discussed above, does not disclose even a valid unit of viscosity.

Not once does Petitioner or Dr. Ernst provide technical evidence or rationale to establish that the glass of Miwa ’377’s Embodiment 8 necessarily has a liquidus viscosity as claimed. EX2009, ¶29. Petitioner has not met its burden of showing inherent anticipation because it has not even purported to demonstrate that the

¹ The English translation of Miwa ’377 submitted with a related Petition in IPR2025-01017 says the opposite: “liquid phase viscosity is preferably *no less than* 10^5 dPa·s, and more preferably *no less than* $10^{5.5}$ dPa·s.” See IPR2025-01017, EX1008, ¶12. To the extent the exhibit submitted here may be a mistranslation, that failure is resolved against Petitioner as the party bearing the burden of proof.

liquidus viscosity of Embodiment 8 is *necessarily* greater or equal to 100,000 poise. For at least these reasons, the claimed liquidus viscosity limitation is missing from Miwa '377's Embodiment 8, and there can be no anticipation.

2. Ground 2 fails to show obviousness.

Ground 2 fails to show obviousness of claims 1 and 3-11 for three reasons. First, the proposed prior-art combination fails to disclose or suggest the claimed liquidus viscosity. EX2009, ¶12. Second, the Petition fails to provide a motivation to modify or combine the references as proposed. EX2009, ¶12. Third, the Petition does not even attempt to establish a reasonable expectation of success for Ground 2.

a. Petitioner fails to establish the combination of Miwa '535 and JP '741 discloses or suggests a glass comprising the liquidus viscosity recited in claim 1.

Ground 2 presents a combination of Miwa '535 and JP '741 for claims 1, 3, and 5-11, and adds Peuchert '469 only for claim 4. The Petition addresses “motivation to combine” only once, Pet., 29, paying lip service to the legal requirements with no explanation or support for its conclusion. The Petition promises that motivation-to-combine analysis will be “set forth [] in more detail with respect to certain specific [claim] limitations,” but it never does. That introductory paragraph is the entirety of the analysis. Pet., 29.

In any case, Petitioner relies *only* on Miwa '535 for the recited method of making a glass with “a liquidus viscosity of greater than or equal to 100,000 poise.” Pet., 36-37. There is no analysis as to why a POSA would look to JP '741 or what that reference contributes to the obviousness analysis. It appears that JP '741 was added to the Ground solely so Petitioner could claim that the cited prior art *combination* was not previously considered by the Office. See Pet., 11-13. Miwa '535 was applied in a rejection and overcome during prosecution.

But Miwa '535 does not disclose or suggest the claimed liquidus viscosity. Indeed, Miwa '535 does not disclose or discuss liquidus viscosity values or the concept of liquidus viscosity at all. EX2009, ¶31. To the extent Petitioner is relying on a theory of inherent disclosure, the Petition does not provide sufficient rationale to establish that the glass of Miwa '535 (or the glass resulting from the combination of Miwa '535 and JP '741) necessarily has a liquidus viscosity of greater than or equal to 100,000 poise. EX2009, ¶¶32-37.

In a failed attempt to argue Miwa '535 discloses the claimed liquidus viscosity, Petitioner alleges that a liquidus viscosity of greater than or equal to 100,000 poise is required for a glass to be fabricated using a downdraw technique allegedly disclosed by Miwa '535. Pet., 36. But Petitioner provides no support for this assertion. “[E]ven a general suggestion that the liquidus viscosity ‘should’ be greater than or equal to 100,000 (poise) would not necessarily imply that Miwa

'535's Embodiment 15, or the combination of Miwa '535 and JP '741, has a certain liquidus viscosity." EX2009, ¶32. Creditable technical evidence or data is needed to substantiate the liquidus viscosity of a glass composition. EX2009, ¶32.

Instead, Petitioner copies and pastes language from its expert declaration, which similarly fails to provide any corroborating evidence. As such, there is nothing other than the *ipse dixit* of the expert to support the proposition that Miwa '535 uses a downdraw technique that requires a liquidus viscosity of greater than or equal to 100,000 poise. *Cf. TQ Delta*, 942 F.3d at 1362. In fact, multiple statements made by Dr. Ernst are demonstrably false.

Dr. Ernst argues, without evidence, that "liquidus viscosity of a glass is a direct consequence" of Miwa '535's glass composition that allegedly satisfies limitation 1[p] and limitation 1[a]² of the '498 patent. EX1003, ¶158. This is an unsupported, and demonstrably false, statement concerning the liquidus viscosity of a broad class of glass compositions that can be formed using any of a "slot-die draw method, overflow-die draw method, float method, and roll-out method"

² Limitation 1[p] and 1[a] recite a "method for producing alkali-free glass sheets by a downdraw process comprising: selecting, melting, and fining batch materials so that the glass making up the sheets comprises SiO₂, Al₂O₃, B₂O₃, MgO, and CaO[.]" EX1003, ¶¶121, 125, Pet., 56 (Appendix A).

according to Miwa '535's disclosure (EX1005, ¶[0036]). EX2009, ¶33. Miwa '535's disclosure of an alkali-free glass composition comprising SiO₂, Al₂O₃, B₂O₃, MgO, and CaO does not necessarily imply that the composition has a liquidus viscosity of greater than or equal to 100,000 poise. EX2009, ¶33.

For example, each of the glass compositions discussed in Dr. Ernst's Exhibit 1008 (U.S. Patent No. 6,319,867; Chacon) vary in liquidus viscosity by more than an order of magnitude—from 2.40×10^5 P (Embodiment 20) to 2.97×10^6 P (Comparative Example). EX1008, Table 1. While Chacon's embodiments show that liquidus viscosity increases by an order of magnitude, it is possible that modifications in glass compositions could cause the opposite change—a reduction of liquidus viscosity by an order of magnitude. EX2009, ¶34. Even small changes in glass composition can result in significant changes in resulting glass properties. EX2009, ¶34.

Further, examples in the '498 patent explicitly disprove Dr. Ernst's overly broad suggestion about the liquidus viscosity for alkali-free glass compositions. EX2009, ¶35. Examples 44, 45, and 46 in the '498 patent have liquidus viscosities less than 100,000 poises. EX1001, 14:52-53, 14:66-15:1, Table 1. As shown in Table 1, all three of these examples are alkali-free and comprise SiO₂, Al₂O₃, B₂O₃, MgO, and CaO, yet the liquidus viscosities are 52,000, 59,000, and 58,000 poises, respectively.

To make matters worse, a citation provided in the Petition for allegedly supporting Petitioner's arguments cites to the *wrong* Miwa reference—Miwa '377, rather than Miwa '535. EX2009, ¶31. In the sentence bridging pages 36 and 37 of the Petition, Petitioner states “[t]he preferred viscosity of $10^{5.5}$ dPa·s specified by Miwa corresponds to 316,000 [poise].” However, Miwa '535 does not disclose this allegedly preferred viscosity. The only possible source for Petitioner's citation is Miwa '377, which is not part of Ground 2. This erroneous citation not only fails to support Petitioner's Ground 2, it also makes unclear what prior art is actually being cited in this Ground. It is possible that Petitioner intended to add Miwa '377 to create a three-reference obviousness combination, but never provided the requisite analysis. Because Miwa '535 does not disclose or even discuss liquidus viscosity values at all, the mix-up cannot simply be a typographical error.

Finally, in an even more blatant failure to establish Miwa '535 discloses the claimed liquidus viscosity, Petitioner states that a “liquidus temperature of 1120 °C also indicates a viscosity of higher than 100,000 poise *as demonstrated in the specification of the '498 patent,*” implying that the liquidus temperature disclosure suggests a liquidus viscosity as claimed. Pet., 37 (emphasis added). Once again, Petitioner provides no evidentiary support for the proposition that liquidus temperature and liquidus viscosity are connected in this way. The Petition fails to even cite to the expert declaration for this technical statement. In fact, liquidus

viscosity and liquidus temperature are not always related in this simplistic, predictable way. EX2009, ¶36. Without more information, a POSA cannot accurately predict a glass composition's liquidus viscosity from its liquidus temperature. EX2009, ¶36. Even small changes in composition can have a notable impact on liquidus temperature and/or liquidus viscosity. EX2009, ¶¶36-37.

And to the extent Petitioner is relying on disclosure from the '498 patent, this is improper. Petitioner must "specify where each element of the claim is found *in the prior art patents or printed publications* relied upon." 37 C.F.R. § 42.104(b)(4) (emphasis added).

The Board cannot credit conclusory assertions about highly technical properties of glass without any corroborating evidentiary support. Much less can the Board determine what a POSA would or would not have understood about these properties in the absence of disclosure in the cited art, without some evidentiary basis beyond a naked expert statement.

The Petition does not purport to rely on the teachings of any other reference in the combination for that limitation. JP '741 is only used to allegedly teach an As₂O₃-free glass composition and thus does not cure the issues with Miwa '535 for at least this claim element. Pet., 35-36. The combination therefore fails. This missing limitation precludes any likelihood of success for Ground 2.

b. Ground 2 lacks the required rationale to establish that it would have been obvious to combine Miwa '535 with JP '741 to arrive at claim 1.

Petitioner provides cursory, irrelevant, and uncited evidence regarding motivation to combine Miwa '535 and JP '741 to arrive at the claimed invention. This flawed analysis cannot support Petitioner's burden of proving obviousness.

The full extent of Petitioner's *KSR* rationale is simply that "a POSITA would have found combining those references as described herein to be a small set of a finite number of identified means for obtaining the desired non-alkali low-density glass useful as substrates in display technologies and would have had a reasonable expectation of success in making such combinations. EX1003, ¶ 76." Pet., 29. When reviewing the cited paragraph 76 of Exhibit 1003, however, the only discussion therein relates to the substitution of BaO and SrO for one another. That substitution is completely irrelevant to the proposed combination of Miwa '535 and JP '741, which concerns (nominally) modifying the mol% for As₂O₃, and not BaO or SrO. EX2009, ¶40. Compounding this problem, the cited paragraph cites an unidentified "EX##." EX1003, ¶76. It is not even clear whether Dr. Ernst actually has relevant testimony on this point or what it might be.

With specific reference to the Miwa '535 and JP '741 combination, Petitioner cites JP '741 as "describ[ing] the need to reduce the use of As₂O₃" in Miwa '535. Pet., 35-36. But the cited embodiment of Miwa '535 in Ground 2

(Embodiment 15) already contains no As_2O_3 . Pet., 35; EX1005, 10, Table 3.

Petitioner thus provides no *Graham* analysis as to what is actually lacking in Miwa '535's Embodiment 15, or why a POSA would look to JP '741 to modify Embodiment 15 to arrive at what is claimed. Because Miwa '535's Embodiment 15 does not contain any As_2O_3 to start with, there is no reason a POSA would have modified it to reduce As_2O_3 . EX2009, ¶39. It is unclear how Petitioner proposes to combine the two references and what role JP '741 plays in the combination.

Petitioner provides no motivation for why it would have been obvious to modify Miwa '535 Embodiment 15 to have “at most 0.005 mole percent Sb_2O_3 ” as recited in claim 1. EX2009, ¶38. The Petition states that Miwa '535 describes that the glass can have a mass% of 0-1%, Pet., 36, but fails to provide any motivation that a POSA would have to reduce the Sb_2O_3 content of Miwa '535's Embodiment 15. Petitioner also fails to describe how or why a POSA would have modified Embodiment 15 to have “at most 0.005 mole percent Sb_2O_3 ,” while also staying within all of the other numeric ranges that Embodiment 15 allegedly discloses, including the liquidus viscosity limitation. EX2009, ¶38 (“Without evidence or rationale establishing the final, modified version of Miwa's '535's composition, it is not possible to conclusively establish properties of that composition, such as liquidus viscosity.”).

Making matters worse, Petitioner cites paragraphs 150-155 of Dr. Ernst's declaration in support of Ground 2. Pet., 34, 37. These paragraphs of the declaration are directed to the prior-art references Takase and Chacon, which are not part of Ground 2. This only confuses the issue of what is actually lacking in Miwa '535 Embodiment 15, or why a POSA would look to JP '741 to modify Embodiment 15 to arrive at what is claimed. Petitioner does not provide a motivation to combine Miwa '535, JP '741, Takase, and Chacon. This four-reference combination is not set forth in the Petition or Declaration.

c. Petitioner does not even attempt to establish a reasonable expectation of success for Ground 2.

The Board properly denies institution where the petitioner does not show a reasonable expectation of success in combining asserted references. *See, e.g., NJOY*, IPR2024-00536, Paper 17; *Honeywell*, IPR2024-00493, Paper 7; *see also Eli Lilly & Co. v. Teva Pharm. Int'l GmbH*, 8 F.4th 1331, 1344 (Fed. Cir. 2021) (finding that a patent challenger in an *inter partes* review had demonstrated a motivation to combine references does not necessarily imply that the challenger had also met its burden of showing a reasonable expectation of success in achieving a claimed method of treatment). Further, importantly, the literature need not demonstrate an expectation of *failure* in the claimed features in order for the patent to withstand Petitioner's challenge—it is enough that the prior art supports no expectations one way or the other. *See Honeywell Int'l Inc. v. Mexichem*

Amanco Holding S.A., 865 F.3d 1348, 1355 (Fed. Cir. 2017) (reversing a P.T.A.B. obviousness finding for improperly requiring the patentee to show an expectation of failure, instead of properly finding no expectation of success—and thus nonobviousness—where the prior art gave no expectations one way or the other).

Petitioner gives lip service to a reasonable expectation of success only once in the Petition, arguing simply that “a POSITA ... would have had a reasonable expectation of success in making such combinations.” Pet., 29. Petitioner surmises, without evidence, that combining the references would have been “a small set of a finite number of identified means” to obtain non-alkali, low-density glass for display technologies. Pet., 29. This falls well short of establishing a reasonable expectation of success in modifying Miwa ’535 in view of JP ’741 as proposed by Petitioner.

Indeed, as discussed above, Petitioner does not substantiate how or why the mol% for As₂O₃ and/or Sb₂O₃ in Miwa ’535’s Embodiment 15 would be modified. EX2009, ¶¶38-40. “[T]o have a reasonable expectation of success, one must be motivated to do more than merely to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (cleaned up). Petitioner does

not offer any evidence to show that a POSA would have been guided to modifying Miwa '535 in view of JP '741 to arrive at the claimed glass composition.

“Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR Int’l v. Teleflex Inc.*, 550 U.S. 398, 418 (2007); *see also Qiagen North American Holdings, Inc. v. HandyLab, Inc.*, 2021 WL 5024387, at *2-4 (Fed. Cir. 2021) (affirming Board’s denial of obviousness when “Petitions offered only a single conclusory statement regarding the POSA’s alleged reasonable expectation of success”). Here, Petitioner does not provide a single meaningful articulation or rational underpinning to support a finding of a reasonable expectation of success.

For at least these reasons, Petitioner’s unpatentability arguments for Ground 2 are facially deficient. It would be a waste of Board resources to institute trial based on Petitioner’s cursory and unsupported arguments.

3. Ground 3 fails to show obviousness.

Ground 3 fails to show obviousness of claims 1 and 4-11 for at least two reasons. First, Petitioner fails to provide valid *KSR* analysis regarding how Chacon is modified in view of Takase. EX2009, ¶13. Second, Petitioner does not even attempt to establish a reasonable expectation of success for Ground 3.

a. Petitioner's arguments in Ground 3 lack the required rationale to establish that it would have been obvious to combine Chacon with Takase to arrive at claim 1.

Petitioner fails to identify a starting point (for example, a specific embodiment or example) in Chacon, the differences between that starting point and claim 1, or the proposed modification of that starting point in view of Takase. Pet., 42-43. The entirety of the analysis identifying the purportedly relevant teaching in Takase for claim 1, and combining it with Chacon, is three sentences. *Id.* None of those sentences explain what is missing from Chacon, why one would look to the SnO₂ amount in Takase, how or why one would modify or be motivated to modify Chacon in view of Takase, or why one would have an expectation of success in doing so. *Id.* There is simply no analysis or explanation in the Petition or Declaration as to why this purported combination satisfies the legal standards for obviousness. Without these crucial components of the legal analysis, Ground 3 cannot prevail.

Additionally, the Petition relies on Miwa '535 for the proposition that Chacon discloses the production of alkali-free glass by a downdraw process, even though Miwa '535 is not part of the Ground, does not relate to what Chacon discloses, and does not support the statements for which it is cited. *See* Pet., 42-43 (citing EX1005, col. 5, lines 42-49; EX1003, ¶¶202, 203).

Petitioner's failure to propose a starting point in Chacon is also troubling because none of Chacon's 32 examples summarized in Table 1 come particularly close to meeting the claims. For example, only one of Chacon's 32 examples (#21) has greater than or equal to 1 mol% MgO as claimed. This example has no SnO₂ and a RO/Al₂O₃ ratio less than 1.0.

In fact, each of Chacon's examples would require *multiple* changes to the glass composition disclosed, rather than a single substitution of fining agents. *Contra* Pet., 43. In overlooking what Chacon teaches in its examples, Petitioner fails to identify any of the claim limitations that an embodiment or example of Chacon lacks, or how such an embodiment or example would have been modified in view of Takase. Rather, Petitioner references broad swaths of Chacon's disclosure and summarily argues it would have been obvious to modify the process in Chacon to avoid the use of toxic fining agents. Pet., 42-43.

Petitioner also does not identify what the final glass composition would be once the proposed modification is made. Petitioner alleges that the combination would "avoid the use of toxic fining agents and, instead, use SO₃ and SnO₂ as fining agents," but does not explain how or why. Pet., 42-43. This is particularly problematic because it fails to explain how the nebulous combination of Chacon and Takase would meet the other claim limitations, such as MgO mol% and liquidus viscosity. EX2009, ¶¶44-45. Not once does Petitioner attempt to establish

that the final, modified glass composition in the Chacon-Takase combination would have a liquidus viscosity of greater than or equal to 100,000 poise as claimed. EX2009, ¶48.

After modifying the composition “chosen by [him]” to add 0.022 mol% SnO₂ in view of Takase (EX1003, ¶219), Dr. Ernst does not address the effect that the proposed modification would have on other features of the composition, including the MgO mol% and liquidus viscosity. EX2009, ¶44. This is problematic because Dr. Ernst’s addition of fining agents (SnO₂ and SO₃) to the composition would necessarily reduce the MgO concentration to below the 1 mol% starting point chosen by Dr. Ernst. EX2009, ¶45. The degree to which the MgO mol% would be reduced is left unaddressed by Dr. Ernst. EX2009, ¶45. This is particularly problematic because, as discussed below, addition of 0.022 mol% SnO₂ would not be enough to replace the at least 0.1 mol% As₂O₃ and/or Sb₂O₃ within Chacon’s examples (the missing 0.078 mol% is left unaddressed). EX2009, ¶45.

Instead of providing valid *KSR* analysis, the Petition relies heavily on the declaration of Dr. Ernst to fill the gaps in its analysis. *See, e.g.*, Pet., 47 (one sentence citing to four pages of technical analysis). That reliance is problematic for several reasons stemming from a variety of fatal flaws in the declaration itself.

First, the math that Dr. Ernst uses to justify the statement in the Petition “the SnO₂ fining agent is 0.05–2 ms%, which overlaps with a mole fraction of at least 0.02 mol%” is tortured at best and incomprehensible at worst. Pet., 43; EX1003, ¶¶214-219, The bulk of this analysis, including (1) the initial glass composition allegedly taught by Chacon, (2) the proposed modification in view of Takase, and (3) the composition of the final modified product are not disclosed or even summarized in the Petition. *Compare* Pet., 43, *with* EX1003, ¶¶214-219.

Second, Dr. Ernst’s entire argument is plagued by hindsight bias. The analysis follows the claims as a blueprint to bend the prior art *ad hoc* around each limitation. For example, Dr. Ernst presents “one particular glass composition, chosen by me” as a starting point to which he adds his proposed fining agents. EX1003, ¶218. The numeric values of SnO₂ and SO₃ (or CO₃, as the wording is ambiguous) he adds to the starting point draw no support from the disclosure itself, and are also simply “chosen by [him].” EX1003, ¶218. Dr. Ernst does not explain how or why he (or a POSA) would have selected the particular glass composition featured in his analysis. EX2009, ¶¶41-43. Dr. Ernst also does not explain why he (or a POSA) would have selected the respective amounts of 0.05% and 0.001% of SnO₂ and SO₃, or why both SnO₂ and SO₃ would have been selected when only 2 out of 6 Takase samples use both.

With the exception of B_2O_3 , Dr. Ernst selects a composition that contains mol% values at the very extremes of Chacon's ranges reported in the table in paragraph 218 of the declaration. EX2009, ¶43. Dr. Ernst does not justify picking values at the extreme endpoints of the ranges for any of the oxides, much less all but one of them. EX2009, ¶43.

Dr. Ernst also does not even mention that he made the decision to completely remove Sb_2O_3 and/or As_2O_3 from the original glass composition, further confusing the explanation of his proposed modification. In other words, Dr. Ernst's explanation for his proposed modification to the composition is incomplete because it does not account for (much less justify) all of the changes that he made.

Instead of providing the requisite analysis, Dr. Ernst suggests that it would have been reasonable to add 0.02 mol% SnO_2 to Chacon. EX1003, ¶215. This suggestion is both legally and factually deficient. EX2009, ¶¶46-48.

Legally, it does not speak to the standard whether it would be "reasonable" to make a particular modification to the prior art. The relevant questions are whether a POSA would have been motivated to do so, and why. *See, e.g., In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) ("The mere fact that the prior art may be modified in the manner suggested ... does not make the modification obvious unless the prior art suggested the desirability of the modification.").

Factually, this addition of 0.02 mol% SnO_2 would not be enough to replace the at least 0.1 mol% As_2O_3 and/or Sb_2O_3 within Chacon's examples (0.078 mol% is left unaddressed). EX2009, ¶45. In fact, a POSA would have recognized that the addition of 0.022 mol% SnO_2 would have been insufficient to replace the at least 0.1 mol% As_2O_3 and/or Sb_2O_3 within Chacon's compositions. EX2009, ¶45. A POSA would have understood that As_2O_3 and Sb_2O_3 are generally better fining agents than SnO_2 , and as such more SnO_2 must be added in place of As_2O_3 and Sb_2O_3 to achieve suitable fining (bubble mitigation). EX2009, ¶47.

Dr. Ernst does not explain why he selected the given amounts of fining agents to add to his initial composition or why those amounts of fining agents are sufficient to replace the As_2O_3 and/or Sb_2O_3 . EX2009, ¶47 (“Dr. Ernst fails to describe the amount of original fining agents (As_2O_3 and/or Sb_2O_3) present in Chacon that would be replaced by SnO_2 in his hypothetical composition.”). Instead, Dr. Ernst proposes replacing approximately 0.9 wt% As_2O_3 in Chacon with a minuscule 0.05 wt% SnO_2 —nearly twenty times less than that in Chacon's glasses. EX2009, ¶47. But a POSA would not have been motivated to modify Chacon to include such a small amount of 0.022 mol% SnO_2 because a POSA would have expected such a modified composition to contain many more bubbles (inclusions). EX2009, ¶47. Given the less effective nature of SnO_2 as a fining

agent, a POSA would have not arrived at the 0.022 mol% for SnO₂ suggested by Dr. Ernst. EX2009, ¶48.

b. Petitioner does not even attempt to establish a reasonable expectation of success for Ground 3.

As discussed above for Ground 2, Petitioner gives lip service to a reasonable expectation of success only once in the Petition—arguing that simply that “a POSITA ... would have had a reasonable expectation of success in making such combinations.” Pet., 29. This falls well short of establishing a reasonable expectation of success in modifying Chacon in view of Takase as proposed by Petitioner.

Petitioner does not provide a single meaningful articulation or rational underpinning to support a finding of a reasonable expectation of success. For example, as discussed above, Petitioner does not substantiate how or why the proposed amount of SnO₂ and/or SO₃ fining agents are sufficient to replace the As₂O₃ and/or Sb₂O₃ in Chacon’s glass with a reasonable expectation of success. In fact, a POSA would have excepted such a small amount of less effectively fining agents to a result in a glass containing many more bubbles (inclusions). EX2009, ¶¶46-47.

For at least these reasons, Petitioner’s unpatentability arguments for Ground 3 are facially deficient. It would be a waste of Board resources to institute trial based on Petitioner’s cursory and unsupported arguments.

4. Ground 4 fails to show that Peuchert '293 anticipates, expressly or inherently, the claimed liquidus viscosity in claim 1.

As a preliminary matter, the Petition is ambiguous regarding which claims are allegedly obvious and which are allegedly anticipated by Peuchert '293. The Petition appears to present primarily obviousness rationales despite calling its theories anticipation. *See, e.g.*, Pet., 50-51 (stating that processes not disclosed in the allegedly anticipating reference would be well known). Meanwhile, the expert declaration appears to contain both anticipation and obviousness analyses that are not reflected in the Petition. *Compare, e.g.*, Pet., 20 (describing Ground 4 as an anticipation argument for claims 1, 2, 4, and 9, and an obviousness argument for claim 10), 48 (describing Ground 4 as a purely anticipation argument for claims 1, 2, 4, and 9, without any analysis of claim 10), *with* EX1003, iv, ¶¶285-290 (describing Ground 4 as an anticipation argument for claims 1, 2, 4, and 9, and an obviousness argument for claim 10, with several paragraphs of analysis that appear to be an inherency-type argument but are labeled as obviousness in the heading and table of contents).

Additionally, the Petition points to Peuchert's Example 7 as disclosing the claimed SnO₂ limitation, but is unclear as to what SnO₂ concentration—0.13 or 0.1—it attributes to Peuchert's Example 7. *See* Pet., 50-51. The corresponding declaration paragraphs contain no reference to the value 0.13 mol%. It is therefore

unclear how Peuchert allegedly discloses this limitation. Similarly, the Petition states that “[t]he liquidus viscosity of a glass is a direct consequence of the glass composition” and “Peuchert ‘293 describes substantially similar compositions [as the ‘498 patent] having the same properties and, consequently, a POSITA would expect that Example 7 of Peuchert ‘293 has a liquidus viscosity that is greater than or equal to 100,000 poise.” Pet., 50-51. There is no citation for this technical argument and no proof provided. It is not clear what technical basis Petitioner has for such a statement. And, if anything, such technical basis comes *from the ‘498 patent*, which cannot be cited in support of Petitioner’s invalidity challenge.

Regardless, Ground 4 fails to show anticipation of claims 1, 2, 4, and 9 because Peuchert ‘293 fails to disclose a liquidus viscosity of greater than or equal to 100,000 poise. EX2009, ¶11. Petitioner cites the method of making the glass of Example 7 in Peuchert ‘293 as anticipating claim 1. Pet., 50-51. Peuchert ‘293 does not explicitly disclose a liquidus viscosity of greater than or equal to 100,000 poise for Example 7. EX2009, ¶¶11, 50. Indeed, liquidus viscosity is not reported for any of the embodiments disclosed in Peuchert ‘293. EX2009, ¶50.

Once again, like Ground 1, Patent Owner can only infer that Petitioner means to present an inherent anticipation theory, because there is simply no express disclosure of liquidus viscosity in Peuchert ‘293. But Petitioner does not provide any meaningful, technically supported rationale to establish that the glass

of Example 7 *necessarily* has a liquidus viscosity of greater than or equal to 100,000 poise.

Instead, Petitioner claims, without any citation or supporting evidence, that “[t]he liquidus viscosity of a glass is a direct consequence of the glass composition.” Pet., 36. “The ’498 patent describes certain glass compositions in Limitation 1[p] and Limitation 1[a].” Pet., 50-51. The Petition cites no prior art, no portion of the specification, and no technical evidence for the proposition that liquidus viscosity of at least 100,000 poise is a direct consequence of Peuchert ’293’s Example 7 glass composition. Just because the same oxides listed in Petitioner’s identified Limitation 1[a] (SiO_2 , Al_2O_3 , B_2O_3 , MgO , CaO) are present in a glass composition, does not mean the glass will necessarily have a liquidus viscosity of at least 100,000 poise. EX2009, ¶51.

Petitioner cannot simply assume that a limitation is necessarily met by a reference that is silent on that limitation. It is telling that the Petition states “a POSITA would expect that Example 7 of Peuchert ’293 has a liquidus viscosity that is greater than or equal to 100,000 poise,” Pet., 51, but cited paragraph 276 in Dr. Ernst’s declaration says nothing about an expected liquidus viscosity of Example 7.

For at least these reasons, the claimed liquidus viscosity limitation is missing from Peuchert ’293’s Example 7, and there can be no anticipation.

C. Grounds 2 and 3 fail *Graham* factor four based on substantial objective indicia of non-obviousness.

“The objective indicia of non-obviousness play an important role as a guard against the statutorily proscribed hindsight reasoning in the obviousness analysis.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1328 (Fed. Cir. 2016). Indeed, as noted by the court in *WBIP*, “evidence of secondary considerations may often be the most probative and cogent evidence in the record.” *Id.* (citing *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983)).

Obviousness is a question of law based on underlying findings of fact. *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1372 (Fed. Cir. 2019) (quoting *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000)) Those underlying findings of fact include: (1) the scope and content of the prior art, (2) differences between the prior art and the claims at issue, (3) the level of ordinary skill in the pertinent art, and (4) the presence of evidence of secondary considerations, such as commercial success, long felt but unsolved needs, failure of others, and unexpected results. *Id.* (cleaned up). In the present case, objective indicia of non-obviousness includes evidence of at least long-felt need, commercial success, and industry praise.

1. Nexus

To accord substantial weight to secondary considerations, “the evidence of secondary considerations must have a ‘nexus’ to the claims, *i.e.*, there must be ‘a legally and factually sufficient connection’ between the evidence and the patented

invention.” *Fox Factory*, 944 F. 3d at 1373 (*quoting Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019)). A patentee is entitled to a presumption of nexus for objective considerations when the patentee shows that the asserted objective evidence is tied to a specific product and that product is the invention disclosed and claimed in the patent. *See WBIP*, 829 F. 3d at 1329.

In the present case, Corning’s EAGLE XG Glass embodies the claimed glass produced by a downdraw process and comprising the mole percentages and oxide ratios recited in at least independent claim 1 of the ’498 patent. EX2014, 1-4. Further, there is a nexus between the claimed glass made by downdraw, the commercial success of EAGLE XG Glass, and the long-felt need for a defect-free LCD panel glass made without the use of toxic arsenic (As) or antimony (Sb) for glass fining. As discussed above in Section II, the claimed glass, with the claimed magnesium oxide (MgO) mol% and the ratio of divalent metal oxides (RO) to aluminum oxide (Al₂O₃), allowed a small amount of tin oxide (SnO₂) to function as an effective fining agent—a result that no one in the industry expected would achieve a viable glass for LCD panels, solved the long-felt need for an LCD panel glass made without arsenic (As) or antimony (Sb), and lead directly to commercial success and industry praise of EAGLE XG Glass. EX2015; EX2016.

2. Long-felt Need

“Evidence of a long felt but unresolved need tends to show non-obviousness

because it is reasonable to infer that the need would have not persisted had the solution been obvious.” *WBIP*, 829 F.3d at 1332. In the present case, the claimed glass produced by a downdraw process and embodied by EAGLE XG Glass solved an industry wide decade-plus long search for an LCD panel glass made without arsenic (As) or antimony (Sb). Starting in the early 1990s, with the introduction of Corning’s Code 1737 glass, panel makers were yearning for a defect-free, lightweight glass made without arsenic or antimony. It was only after Corning’s introduction of EAGLE XG Glass in 2006 that this need was met. EX2015; EX2016. In 2007, “EAGLE XG [was] the first liquid crystal display substrate to contain no added heavy metals such as arsenic, antimony and barium ... making it the most environmentally friendly LCD glass on the market.” EX2003, 1.

3. Commercial Success

“Demonstrating that an invention has commercial value, that it is commercially successful, weighs in favor of its non-obviousness.” *WBIP*, 829 F.3d at 1337. In the present case, the claimed glass produced by a downdraw process and embodied by EAGLE XG Glass is wildly commercially successful. Since its introduction in 2006, EAGLE XG Glass has become the industry standard among the world’s leading LCD panel makers. EX2015; EX2016. Corning has produced more than 25 billion square feet of EAGLE XG Glass—enough to pave the Great

Wall of China 25 times, or cover nearly 390,000 football fields—to meet the needs of its customers. EX2017.

4. Industry Praise

“Evidence that the industry praised a claimed invention or a product which embodies the patent claims weighs against an assertion that the same claim would have been obvious. Industry participants, especially competitors, are not likely to praise an obvious advance over the known art.” *WBIP*, 829 F.3d at 1334. After its introduction, the industry immediately praised the uniqueness and importance of EAGLE XG Glass. In 2007, Eagle XG Glass won the Display Component of the Year; Gold Award, and the Advanced Display of the Year (ADY) Award. EX2002, 0014; EX2003, 1.

VI. CONCLUSION

The Board should deny institution of the Petition for *inter partes* review of the '498 patent.

Respectfully submitted,

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CERTIFICATE OF WORD COUNT (37 C.F.R. § 42.24(d))

1. This Patent Owner Preliminary Response complies with the type-volume limitation of 14,000 words, comprising 10,265 words, excluding the parts exempted by 37 C.F.R. § 42.24(a)(1).

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CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e))

I certify that the above-captioned **PATENT OWNER PRELIMINARY RESPONSE** and associated Exhibits 2009-2017 were served in their entirety on August 27, 2025, upon the following parties via electronic mail:

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