

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LG ELECTRONICS INC.,
Petitioner,

v.

IMMERVISION, INC.,
Patent Owner.

IPR2020-00195
Patent 6,844,990 B2

Before KRISTINA M. KALAN, WESLEY B. DERRICK, and
KIMBERLY MCGRAW, *Administrative Patent Judges*.

DERRICK, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

In this *inter partes* review, LG Electronics Inc. (“Petitioner”) challenges the patentability of claim 21 of U.S. Patent No. 6,844,990 B2 (Ex. 1001, “the ’990 patent”), owned by ImmerVision, Inc. (“Patent Owner”).

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, Petitioner has not shown, by a preponderance of the evidence, that claim 21 of the ’990 patent is unpatentable.

A. Procedural History

On November 27, 2019, Petitioner requested an *inter partes* review of claim 21 of the ’990 patent. Paper 2 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 5 (“Prelim. Resp.”). On May 13, 2020, we instituted an *inter partes* review of the challenged claim on all grounds raised in the Petition. Paper 6 (“Dec.”). Following institution, Patent Owner filed a Patent Owner Response (Paper 12, “PO Resp.”), Petitioner filed a Reply to the Patent Owner Response (Paper 16, “Pet. Reply”), and Patent Owner filed a Sur-Reply to Petitioner’s Reply (Paper 17, “PO Sur-Reply”).

Petitioner relies on the declaration testimony of Russell Chipman, Ph.D. (Exs. 1008, 1017, 1019) to support the Petition. Patent Owner took cross-examination via deposition of Dr. Chipman (Ex. 2002). Patent Owner relies on the declaration testimony of David Aikens (Ex. 2009). Petitioner took cross-examination via deposition of Mr. Aikens (Ex. 1018).

Oral hearing was requested by both parties. Papers 18, 19. We heard argument on February 8, 2021, and a transcript of the hearing has been entered into the record. Paper 25 (“Tr.”).

B. Real Parties-in-Interest

Petitioner LG Electronics Inc. identifies LG Electronics U.S.A., Inc. and LG Innotek Co. Ltd. as additional real parties-in-interest. Pet. 2. Patent Owner ImmerVision, Inc., identifies itself as the real party-in-interest. Paper 4, 2. The parties do not raise any issues about real parties-in-interest.

C. Related Proceedings

The parties identify two pending district court cases involving the '990 patent: *ImmerVision, Inc. v. LG Electronics U.S.A.*, No. 1-18-cv-01630 (D. Del.) and *ImmerVision, Inc. v. LG Electronics U.S.A.*, No. 1-18-cv-01631 (D. Del.). Pet. 2; Paper 4, 2–3. The '990 patent is also the subject of an *inter partes* review in IPR2020-00179. *See* IPR2020-00179, Paper 6.

In addition, the '990 patent: (1) was the subject of *Ex Parte* Reexamination Control No. 90/013,410; (2) was challenged in an *inter partes* proceeding, *Panasonic System Networks Co., Ltd. v. 6115187 Canada Inc.*, IPR2014-01438; and (3) was the subject of three other district court cases that are no longer pending. *See* Pet. 2–3; *see also* *Panasonic System Networks Co., Ltd. v. 6115187 Canada Inc.*, IPR2014-01438, Paper 11 (PTAB Nov. 26, 2014) (terminating proceeding prior to institution following settlement).

D. The '990 Patent (Ex. 1001)

The '990 patent is titled “Method for Capturing and Displaying a Variable Resolution Digital Panoramic Image” and issued on January 18, 2005, from an application filed on November 12, 2003. Ex. 1001, codes (22), (45), (54). The application for the '990 patent is a continuation of application No. PCT/FR02/01588, filed on May 10, 2002, and claims priority to foreign application FR 01 06261, filed May 11, 2001. *Id.* at codes (30), (63).

The '990 patent relates to capturing a digital panoramic image that includes using a panoramic objective lens having “a distribution function of the image points that is not linear relative to the field angle $[\alpha]$ of the object points of the panorama,” where the “distribution function F_{dc} . . . determines the relative distance dr of an image point in relation to the center of the image disk according to the field angle α of the corresponding object point.” *Id.* at code (57), 2:30–34 (as corrected by Jan. 18, 2005, Cert. of Correction). The image obtained using such a panoramic objective lens has at least one zone that is expanded and another zone that is compressed. *Id.* at code (57). The '990 patent further explains that an image zone is “expanded” when it covers a greater number of pixels on an image sensor than it would with a linear distribution lens. *Id.* at 3:66–4:10. The '990 patent also provides that an “expanded” zone and “compressed” zone can be illustrated by comparison to a linear distribution function, with a slope greater than that of the linear distribution indicating an expanded zone and a lesser slope indicating a compressed zone. *Id.* at 9:13–35; *see also id.* at 2:30–42 (describing how “Figure 4B represents the shape of the distribution function F_{dc} of a classical objective lens,” of ideal form, “a straight line of gradient K . . . in which the constant K is equal to $0.111 \text{ degree}^{-1}$ ($1/90^\circ$)”). Figure 9, reproduced below, depicts an image point distribution of a lens having a compressed zone between $\alpha=0^\circ$ and $\alpha=30^\circ$, an expanded zone between $\alpha=30^\circ$ and $\alpha=70^\circ$, and a compressed zone between $\alpha=70^\circ$ and $\alpha=90^\circ$.

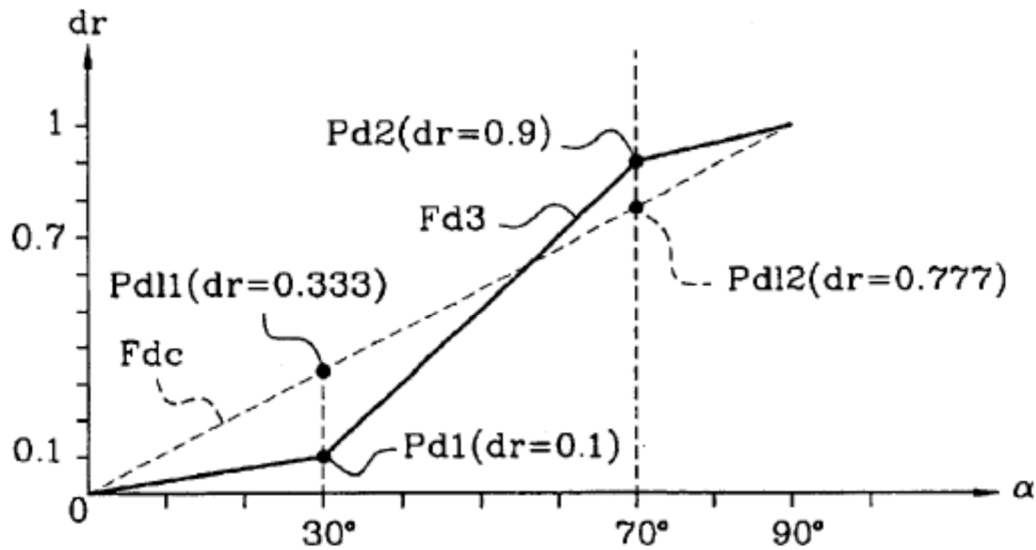


Fig. 9

Id., Fig. 9 (depicting plot of a non-linear distribution function of a panoramic objective lens). The patent further provides for correcting the non-linearity of the panoramic image initially obtained when using such lens. *Id.* at code (57).

The '990 patent was the subject of an *ex parte* reexamination. *Id.* at 25–27 (Ex Parte Reexamination Certificate (10588th)). The Reexamination Request—Control No. 90/013,410—was filed November 26, 2014. *Id.* at 25; Ex. 1003, 328–339 (“Request by Patent Owner for *Ex Parte* Reexamination of U.S. Patent No. 6,844,990”). Patent Owner requested an *ex parte* reexamination of claims 1–4, 6, 7, 10, 11, 15–20, 22, 23, and 25, which request was granted. Pet. 17–18; Ex. 1003, 52–63, 330, 341. The Patent Office issued an Office Action on January 29, 2015, rejecting independent claim 17—the base claim for claim 21. Ex. 1003, 30, 36–39. Patent Owner filed an Amendment on February 12, 2015, canceling claim 17. *Id.* at 19.

E. The Challenged Claim

Challenged claim 21 incorporates the limitations of cancelled claim 17, from which it depends. *See* MPEP § 2260.01 (“the content of the canceled base claim . . . [is] available to be read as part of the confirmed or allowed dependent claim”). Both claims are reproduced below.

17. A panoramic objective lens comprising:
optical means for projecting a panorama into an image plane of the objective lens, the optical means having an image point distribution function that is not linear relative to the field angle of object points of the panorama, the distribution function having a maximum divergence of at least $\pm 10\%$ compared to a linear distribution function, such that a panoramic image obtained by means of the objective lens comprises at least one substantially expanded zone and at least one substantially compressed zone.

Ex. 1001, 20:51–61.

21. The panoramic objective lens according to claim 17, wherein the lens compresses the center of the image and the edges of the image, and expands an intermediate zone of the image located between the center and the edges of the image.

Id. at 21:7–11.

F. Instituted Grounds of Unpatentability at Issue

We instituted trial on all grounds of unpatentability proposed by Petitioner, as shown below:

Claim Challenged	35 U.S.C. §¹	Reference(s)/Basis
21	103	Tada ²
21	103	Tada, Nagaoka ³
21	103	Tada, Baker ⁴

II. ANALYSIS

A. Principles of Law

A claim is unpatentable under § 103 if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *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 skill in the art; and (4) when in evidence, objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284, 287–88 (2011), revised 35 U.S.C. § 103 effective March 16, 2013. Because the challenged patent was filed before March 16, 2013, we refer to the pre-AIA version of 35 U.S.C. § 103.

² US 5,861,999, issued January 19, 1999 (Ex. 1007).

³ US 6,128,145, issued October 3, 2000 (Ex. 1004).

⁴ US 5,686,957, issued November 11, 1997 (Ex. 1005).

Regarding the scope and content of the prior art, “[w]hat a reference teaches is a question of fact.” *In re Beattie*, 914 F.2d 1309, 1311 (Fed. Cir. 1992). A reference is prior art for what it discloses, even if it is in error, unless the error is an “obvious error,” in which case “it cannot be said to describe or suggest [what is disclosed in error] to those in the art.” *In re Yale*, 434 F.2d 666, 668–69 (CCPA 1970) (holding that an error in the statement of a chemical formula would have been obvious to one of ordinary skill in the art and thus would not have put them in possession of the compound because they would have disregarded it as an error or replaced it with the correct chemical formula); *see also In re Clark*, 420 F. App’x 994, 998 (Fed. Cir. 2011) (nonprecedential) (holding that “absent an obvious error on the face of a reference, a reference is prior art for what it discloses” and that the Board did not err in relying on such a disclosure where there was “nothing in the . . . publication indicating that the [relied-on] statements . . . were in error.”).

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)); *see In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

The Petition guides the proceeding. *See Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1335–36 (Fed. Cir. 2020). Our reviewing court explains that “[f]rom the outset, we see that Congress chose to structure a process in which it’s the petitioner, . . . who gets to define the contours of

the proceeding,” and that “the statute envisions that a petitioner will seek an inter partes review of a particular kind—one guided by a petition describing each claim challenged and the grounds on which the challenge to each claim is based.” *Id.* at 1335 (quoting *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018) (internal quotations omitted)) (alterations in original). “[T]he petitioner’s petition, not the Director’s discretion is supposed to guide the life of the litigation,” and that “the petitioner’s contentions, not the Director’s discretion, define the scope of the litigation all the way from institution through to conclusion.” *Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018) (quoting *SAS*, 138 S. Ct. at 1356–57 (internal quotations omitted)).

To prevail, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d) (2019). “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) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. National Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review).

B. Level of Ordinary Skill in the Art

In the Institution Decision, we adopted Petitioner’s description of the level of ordinary skill in the art, not contested at that time by Patent Owner, and determined that a person of ordinary skill in the art “would have had at

least a bachelor's degree in Physics, Optical Engineering, and/or Electrical Engineering, and at least five years' experience in developing and designing optical products or systems and have familiarity with image processing algorithms and optical design software.” Dec. 6; Pet. 20 (citing Ex. 1008 ¶ 41).

Patent Owner neither disputes Petitioner's articulation of the level of ordinary skill in the art nor presents its own articulation of the level of skill in the art, stating that “for purposes of this Response, Patent Owner does not object to Petitioner's proposed skill level.” PO Resp. 20.

On this record, we have no reason to fault Petitioner's definition of the level of ordinary skill. We further note that the prior art itself demonstrates the level of skill in the art at the time of the invention, and there is no apparent inconsistency with Petitioner's definition. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (explaining that “specific findings on the level of skill in the art . . . [are not required] ‘where the prior art itself reflects an appropriate level and a need for testimony is not shown’” (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985))). Accordingly, we adopt the level of ordinary skill set forth by Petitioner.

C. Claim Construction

We apply the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), following the standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b). Under *Phillips*, claim terms are afforded “their ordinary and customary meaning.” *Phillips*, 415 F.3d at 1312. “[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in

question at the time of the invention.” *Id.* at 1313. Only those terms that are in controversy need be construed, and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Before institution, Petitioner proposed constructions for particular claim terms, which Patent Owner, for the purposes of its Preliminary Response, did not contest. Dec. 8–9. On that record, and for the purpose of the Institution Decision, we adopted the constructions set forth by Petitioner, because the constructions appeared reasonable and were not contested. *Id.* at 9.

Following institution, Patent Owner again neither disputes Petitioner’s proposed constructions nor proposes its own, stating, “[w]hile not necessarily agreeing with the proposed constructions of those terms, ***solely*** for purposes of this Response, Patent Owner does not object to the constructions set out by Petitioner.” PO Resp. 20.

Considering again the proposed constructions, on this record, we adopt the definitions set forth by Petitioner: (i) “panoramic objective lens” means “a super-wide or ultra-wide objective lens”; (ii) “object points of the panorama” are “points of the object in the panorama being viewed by the lens”; (iii) “image point” means “a point of light projected by the lens onto an image plane, said light coming from the corresponding object point of a viewed object in the panorama”; (iv) “field angle of object points” are “the angles of incident light rays passing through the object points and through the center of the panorama photographed, relative to the optical axis of the objective lens”; (v) “maximum divergence” is defined by the formula “DIVmax %=[dr(Pd)-dr(Pdl)]/[dr(Pdl)]*100, in which dr(Pd) is the relative

distance in relation to the center of the point of maximum divergence Pd, and dr(Pdl) is the relative distance in relation to the center of the corresponding point on the linear distribution line”; (vi) “expanded zone” means “the portion of the image point distribution function where the gradient is higher than the gradient of the linear distribution function”; and (vii) “compressed zone” means “the portion of the image point distribution function where the gradient is lower than the gradient of the linear distribution function.” Dec. 8–9 (citing Ex. 1001, 1:18–20, 2:18–22, 7:2–5, 7:11–14, 8:38–43, 8:57–65; Ex. 1008 ¶¶ 44, 52, 57, 63).

We likewise consider again the construction of the “optical means for projecting . . .” limitation of cancelled claim 17, and agree it is a means-plus-function limitation that should be construed, as Petitioner contends, as ““a series of optical elements, e.g., as shown in Figs. 15, 16, and 18, and equivalents thereof” for performing the claimed function.” *Id.* at 9 (citing Prelim. Resp. 22–24).

We further determine that no additional claim construction is necessary to reach our decision in this case.

D. Asserted Obviousness over Tada

Petitioner challenges claim 21 as obvious over Tada. Pet. 33–57.

1. Overview of Tada (Ex. 1007)

Tada discloses a method for capturing a digital panoramic image, including by use of “a super wide angle lens system which can be used for a monitoring camera (CCTV) etc.” Ex. 1007, 1:7–9. Tada states that “[i]t is an object . . . to provide a retrofocus type super wide angle lens system . . . [having] an angle of view of approximately 120° to 140°.” *Id.* at 1:48–50. Tada identifies Figures 1, 6, 11, and 16 as schematic views “showing the lens arrangement” of a first, second, third, and fourth embodiment,

respectively, “of a super wide angle lens system. *Id.* at 3:18–20, 3:32–34, 3:44–46, 3:57–59, Figs. 1, 6, 11, 16. The third embodiment, depicted in Figure 11, reproduced below, “is substantially the same as the second embodiment,” depicted in Figure 6, which “is substantially the same as that of the first embodiment,” depicted in Figure 1. *Id.* at 6:2–3, 7:36–43, 8:58–62.

FIG. 11

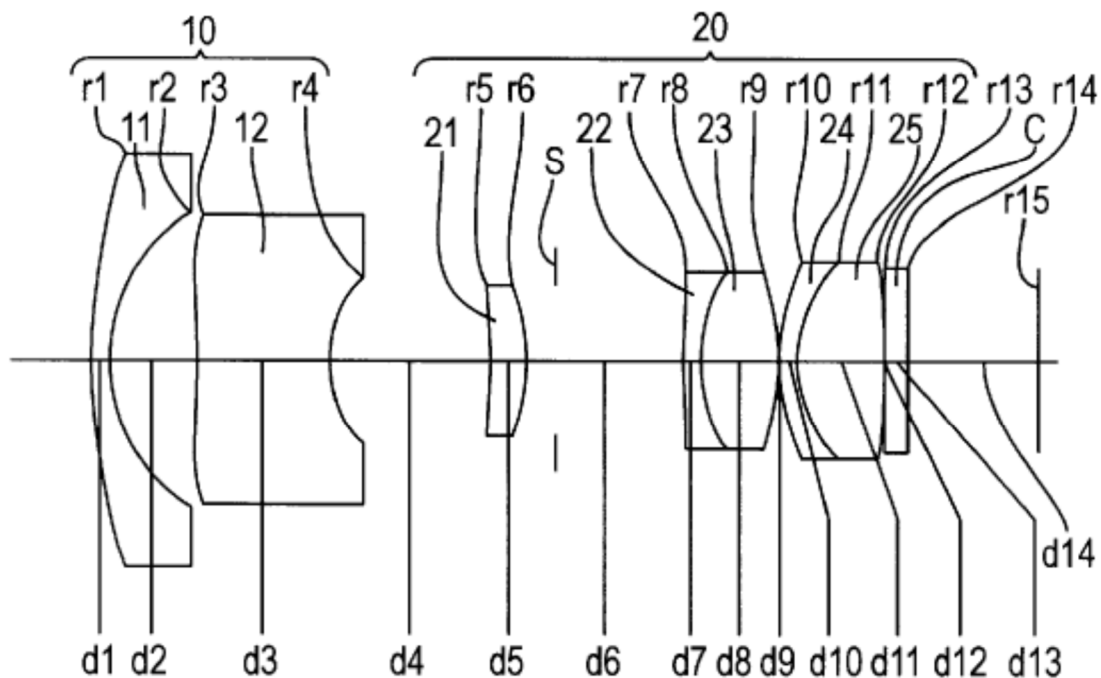


Figure 11 depicts the lens arrangement of a super wide angle lens system. *Id.* at 3:44–46, Fig. 11. The depicted super wide angle lens system consists of front lens group 10 and rear lens group 20. *See id.* at 6:4–5 (identifying elements in reference to Figure 1). Figure 11 also depicts features of a CCD⁵ (charge-coupled device) used to capture an image; element C refers to

⁵ Although neither Tada nor the Petitioner define “CCD,” we understand CCD to be a “charge-coupled device.” *See, e.g.,* Ex. 2001 ¶ 595.

“a glass cover of the CCD” and “surface No. 15 refers to the image pickup surface of the CCD.” *See id.* at 6:26–32 (identifying elements in reference to Figure 1). Tada sets forth that its Figures 5 and 6 disclose numerical data regarding the third embodiment, including “[t]he surface figure, paraxial spherical amount and aspherical amount of surface No. 3.” *Id.* at 8:63–9:57. Tada similarly sets forth that its Tables 1 and 2 disclose numerical data regarding the first embodiment (*id.* at 6:28–32, 6:36–7:29), Tables 3 and 4 disclose numerical data regarding the second embodiment (7:42–8:53), and Tables 7 and 8 disclose numerical data regarding the fourth embodiment (9:63–10:50). Tada also sets forth “[v]alues of the ratios defined in conditions (1) through (8) for the four embodiments” in its Table 9. *Id.* at 10:53–11:12.

2. *Analysis*

Claim 21, which incorporates the limitations of cancelled claim 17 from which it depends, is directed to an improved panoramic objective lens. In general, claim 17 requires that the panoramic objective lens has optical means for projecting a panorama into an image plane of the objective lens, the optical means having an image point distribution function that is not linear to the field angle of the object points of the panorama, having a maximum divergence that is at least $\pm 10\%$ compared to a linear distribution function. Ex. 1001, 20:51–67. Claim 21 further requires that “the lens compresses the center of the image and edges of the image, and expands an intermediate zone of the image located between the center and the edges of the image.” *Id.* at 21:7–11.

a) *Overview of Ground Based on Tada*

Petitioner contends that Tada discloses the claimed panoramic objective lens in its “third embodiment of a super wide angle lens system”

that compresses the center of the image and edges of the image and expands an intermediate zone of the image located between the center and edges of the image. Pet. 33–42; Pet. Reply 2–3, 10–19. Petitioner asserts that Tada’s “Figure 11. . . shows a third embodiment of a super wide angle lens system” and that Table 5 provides for the “prescription of the third embodiment lens,” i.e., “[n]umerical data regarding the third embodiment.” Pet. 33–35, 37. Dr. Chipman testifies that he reconstructed the lens of Figure 11 using the numerical data information in Table 5. Ex. 1008 ¶ 46; *see also id.* ¶ 49 (stating Tada’s disclosure of, *inter alia*, schematic views of the lens arrangements and tables of measurements of the lens allows one of ordinary skill in the art to reconstruct the exact lens system described in Tada). In particular, Dr. Chipman testifies that he input certain information from Table 5 (i.e., the FNO and W values, the values in the R, D, Nd, and vd columns, and the “aspherical data” information) into an “optical design program called Code V” and that Code V then generated a depiction of the lens system corresponding to the lens prescription in Table 5. *Id.* ¶ 46; *see also id.* ¶ 50 (stating numerical data regarding Tada’s third embodiment is shown in Table 5). Dr. Chipman also testifies that he used the Code V program to calculate the characteristics of the lens system to test and show how it would function by providing plots of the various characteristics of the lens system. Ex. 1008 ¶ 51. Dr. Chipman also testifies that he plotted the image point distribution function for the lens system at six wavelengths, and that the function is not linear in any of them (*id.* ¶¶ 52–53), that the maximum deviation from a linear distribution function is at least 8.12% to 9.88%, depending on the wavelength (*id.* ¶¶ 57–58), and that the lens “compresses the center of the image and the edges of the image and expands

an intermediate zone of the image located between the center and the edges of the image” (*id.* ¶ 68).

Petitioner relies on these calculations and plots of Tada’s third embodiment lens system of Figure 11 with the prescription set forth in Table 5 to show that Tada’s third embodiment meets the limitations of claim 21, and of claim 17 from which it depends. Pet. 35–57 (citing Ex. 1007, Fig. 11, Table 5); Pet. Reply 1–19. That is, Petitioner relies on the lens prescription set forth in Table 5 for the lens system depicted in Figure 11, and calculations of that lens system’s properties showing it (1) “compresses the center of the image and the edges of the image, and expands an intermediate zone of the image located between the center and edges of the image,” as required by claim 21, and (2) for it to have an image point distribution that is not linear relative to the field angle of object points of the panorama, having a maximum divergence that is at least $\pm 10\%$ compared to a linear distribution function, as required by independent claim 17 from which claim 21 depends. Pet. 35–57.

b) Patent Owner’s Contention of Obvious Error in Tada

Patent Owner contends that Tada’s third embodiment, as set forth in Table 5, has a readily apparent error (i.e., the aspherical data). PO Resp. 1–3. Patent Owner argues that the grounds of unpatentability set forth in the Petition fail because the disclosure including an apparent error should be disregarded or corrected, and it is only in relying on the disclosure in error that Petitioner arrives at a lens that compresses the center and edges and expands an intermediate zone of an image as required by claim 21. *Id.* at 1–3, 8–14, 24–40; PO Sur-Reply 1–7. Patent Owner relies on *Yale* for its holding that “[w]here a prior art reference contains ‘an error obvious to one of ordinary skill in the art, it cannot be said to describe or suggest’ the

erroneous feature.” *Yale*, 434 F.2d at 668–669. In identifying the error, Patent Owner contends that Tada’s “ratios (2)–(4) in Table 9 should respectively match Table 5’s A₄, A₆, and A₈, but do not.” PO Resp. 13 (citing Ex. 2002, 47:22–50:24 (cross-examination testimony of Dr. Chipman); Ex. 2009 ¶ 69 (testimony of Mr. Aikens that identified “values do not match the values in Table 5 because Table 5 is in error”)). Patent Owner’s declarant Mr. Aikens also testifies on cross-examination that “[b]ecause the focal length is 1 [in each of the four embodiments], Table 9 rather conveniently gives you the aspheric coefficients for each of the four embodiments, and it matches correctly for 1, 2 and 4 and is totally wrong for 3.” Ex. 1018, 136:11–15. Patent Owner also sets forth calculations by Mr. Aikens for Embodiment 3 using aspherical data information from Tada’s Japanese priority application JP 06-201903⁶, which Patent Owner contends is the correct lens prescription, and determines that the “compressed zone at the edge of the lens across the visible wavelength spectrum” is missing. PO Resp. 32–38 (citing Ex. 2009 ¶¶ 73, 88, 90–100). Patent Owner further contends that Petitioner failed to “explain why a [person of ordinary skill in the art] would have modified [the lens system according to the correct prescription] to include a compressed edge zone.” *Id.* at 40 (emphasis omitted).

c) Petitioner’s Argument There is No Obvious Error

In its Reply, Petitioner does not dispute that Dr. Chipman relies on the data in Tada’s Table 5 to reconstruct a lens it contends satisfies all of the limitations of claim 21, including the “three zone” limitations that require

⁶ The JP 09-201903 application was published as JP H10115778. Ex. 2007, 1; Ex. 2008, 2. Patent Owner provides an English language translation. Ex. 2008, 1–2.

compression of the center and edges and expansion of an intermediate zone of the image obtained by means of the lens (i.e., (1) a central compressed zone, (2) an intermediate expanded zone, and (3) a compressed edge zone). *See generally* Pet. Reply. Petitioner also does not dispute that if the purported error in Tada's Table 5 was corrected using the aspherical data from the Japanese priority application, that a lens reconstructed using the Japanese priority application data would not satisfy a limitation of claim 21 because the lens would not compress the edges of the produced image, and thus would not have a compressed edge zone. *Id.* Petitioner contends, rather, that the alleged error in the aspherical data in Tada's Table 5 is irrelevant because it was not apparent or obvious upon reading the reference. *Id.* at 3–10 (citing *Yale*, 434 F.2d at 669). Petitioner argues that Tada's Table 5, accordingly, should be considered as it reads, neither disregarding nor correcting its disclosure, and that Table 5 itself, as written, discloses and enables a lens meeting the requirements set forth for Tada's invention. *Id.*

Petitioner further argues that the error in Table 5 would not have been “readily apparent” because “there is nothing in Table 5 that would lead a [person of ordinary skill in the art] to believe that there is an error.” *Id.* at 3. Petitioner contends that Table 5 “includes all of the information necessary to enable a complete lens” (*id.* at 4 (citing Ex. 1019 ¶¶ 5–8), 2), and that “[t]he lens of Table 5 as analyzed by Dr. Chipman discloses all of the elements . . . of claim 21” (*id.* at 3). Petitioner further contends that even if a person of ordinary skill in the art “were to check Table 5 with other parts of Tada, it would have taken many hours to conclude there was an error.” *Id.* at 4 (citing Ex. 1018, 132:1–15, 136:5–137:12). To support its argument that the error would not have been readily apparent, Petitioner quotes testimony of Patent Owner's declarant Mr. Aikens that he “had figured out that something

was wrong probably within two to three hours. Then modeling the other embodiments, that took time. And then continuing to try to understand how to recreate the surface, that took more time.” *Id.* (quoting Ex. 1018, 137:8–12).

Petitioner argues that this case differs from those in which errors were determined to be “obvious on their face and detectable with little effort.” *Id.* at 5. Specifically, Petitioner argues that “any purported ‘error’ in Table 5 of Tada” would not have been like the obvious error in *Yale*, and, thus, that this is not a case “such that a [person of ordinary skill in the art] would ‘mentally disregard [the information in Table 5] as a misprint or mentally substitute [the information in Tables 6 and 9] in its place.’” *Id.* at 4–5 (citing *Yale*, 434 F.2d at 669). Petitioner relies on the court’s reasoning in *Yale* “that the error was such that ‘[t]he public is not put in possession of the compound; thus it would not be obvious to use,’” and argues that here, in contrast, Tada puts the public in possession because “Table 5 ‘describes’ the claimed invention” and “a [person of ordinary skill in the art] would have been able to make the Table 5 lens.” *Id.* at 5–6 (citing *In re Elsner*, 381 F.3d 1125, 1128 (Fed. Cir. 2004); *Yale*, 434 F.2d at 669). Petitioner further contends that the “‘error’ . . . in Tada’s Table 5 is more like the errors that courts have found do not rise to the level of being excluded.” *Id.* at 7–8 (citing *In re Garfinkel*, 437 F.2d 1005, 1008 (CCPA 1971); *In re Borst*, 345 F.2d 851, 853 n.2 (CCPA 1965); *Clark*, 420 F.App’x at 998).

d) Analysis of Tada’s Disclosure

On this record, we find that there is an obvious error on the face of Tada, in Table 5, and that this error cannot be relied on to support the grounds of unpatentability set forth by Petitioner.

As mentioned above, Tada sets forth numerical data for prescribing the lens systems of each of its first, second, third, and fourth embodiments in Tables 1, 3, 5, and 7, respectively. *See* Ex. 1007, 6:36–63 (Table 1), 7:50–8:25 (Table 3), 9:1–29 (Table 5), 10:1–29 (Table 7). These tables include values for aspherical data (coefficients) for surface No. 3 of the second lens element, with each table setting forth K (a conic constant), A4 (representing a fourth-order aspherical factor), A6 (representing a sixth-order aspherical factor), A8 (an eighth-order aspherical factor), and A10 (a tenth-order aspherical factor). *Id.* at 5:63–67, 6:59–61 (Table 1, first embodiment), 8:21–23 (Table 3, second embodiment), 9:25–27 (Table 5, third embodiment), 10:25–27 (Table 7, fourth embodiment).

Tada’s Table 9 also sets forth “[v]alues of the ratios defined in conditions (1) through (8) for the four embodiments.” *Id.* at 10:53–11:12. Of these, conditions (2), (3), and (4) specify the condition on the fourth-, sixth-, and eighth-order aspherical factors of the aspherical surface. *Id.* at 4:60–61, 5:3–5.

There is a readily apparent inconsistency in the aspherical coefficients A4, A6, and A8, in Tables 1, 3, 5, and 7, and of values for conditions (2), (3), and (4) for each of the four embodiments, in Table 9. The portion of each of Tables 1, 3, 5, and 7 setting forth the “Aspherical Data” for “Surface No. 3” is reproduced below, as is Table 9:

From Table 1 (Embodiment 1)
Aspherical Data:
No.3: $K = 0.00$, $A4 = 0.41500 \times 10^{-1}$, $A6 = -0.72169 \times 10^{-2}$, $A8 = 0.10529 \times 10^{-2}$, $A10 = 0.70513 \times 10^{-4}$

From Table 3 (Embodiment 2)

Aspherical Data:

No.3: $K = 0.00$, $A4 = 0.30330 \times 10^{-1}$, $A6 = -0.43125 \times 10^{-2}$, $A8 = 0.46329 \times 10^{-3}$, $A10 = -0.24092 \times 10^{-4}$

From Table 5 (Embodiment 3)

Aspherical Data:

No.3: $K = 0.00$, $A4 = 0.30330 \times 10^{-1}$, $A6 = -0.43125 \times 10^{-2}$, $A8 = 0.46329 \times 10^{-3}$, $A10 = -0.24092 \times 10^{-4}$

From Table 7 (Embodiment 4)

Aspherical Data:

No.3: $K = 0.00$, $A4 = 0.88810 \times 10^{-1}$, $A6 = -0.27110 \times 10^{-1}$, $A8 = 0.79690 \times 10^{-2}$, $A10 = -0.61180 \times 10^{-3}$

TABLE 9

	Embodiment 1	Embodiment 2
Condition (1)	-7.296	-6.981
Condition (2)	4.1500×10^{-2}	3.0330×10^{-2}
Condition (3)	-7.2169×10^{-3}	-4.3125×10^{-3}
Condition (4)	1.0529×10^{-3}	4.6329×10^{-4}
Condition (5)	2.549	2.907
Condition (6)	2.400	2.479
Condition (7)	529.729	25.228
Condition (8)	4.118	4.178

TABLE 9-continued

	Embodiment 3	Embodiment 4
Condition (1)	-8.060	-10.108
Condition (2)	2.0485×10^{-2}	8.8810×10^{-2}
Condition (3)	-2.5925×10^{-3}	-2.7110×10^{-2}
Condition (4)	2.4634×10^{-4}	7.9690×10^{-3}
Condition (5)	3.022	2.691
Condition (6)	2.425	2.512
Condition (7)	27.255	25.229
Condition (8)	4.229	4.543

The portions of Tables 1, 3, 5, and 7 set forth “aspherical data,” and Table 9 sets forth values for conditions (1)–(8) for Embodiments 1–4. *Id.* at 6:59–61, 8:21–23, 9:25–27, 10:25–27, 10:57–11:12.

Comparison of aspherical coefficients A4, A6, and A8, in Tables 1, 3, 5, and 7, and of values for conditions (2), (3), and (4) for each of the four embodiments in Table 9 shows the inconsistency. The values of aspherical coefficients A4, A6, and A8 in Tables 1, 3, and 7, for Embodiments 1, 2, and 4, and the corresponding values for conditions (2), (3), and (4), for Embodiments 1, 2, and 4, are identical. *Compare id.* at 6:59–61, *with id.* at 10:57–62 (Embodiment 1); *compare id.* at 8:21–23, *with id.* at 10:57–62 (Embodiment 2); *compare id.* at 10:25–27, *with id.* at 11:2–8 (Embodiment 4). The values of aspherical coefficients A4, A6, and A8 in Table 5, however, differ from the corresponding values for conditions (2), (3), and (4) for Embodiment 3. *Compare id.* at 9:25–27, *with id.* at 11:2–8. This indicates that there is an error for Embodiment 3 in either Table 5 or in Table 9. Still looking only at the Tables, it is also apparent that the values set forth for aspherical coefficients, including A4, A6, and A8, of Embodiment 3 in Table 5 are identical to those for Embodiment 2 in Table 3. *Compare id.* at 8:21–25, *with id.* at 9:25–29. That these aspherical coefficients are identical is incongruous with the differences in the values of other data for the lens systems, including the radius of curvature (R) of lens surfaces and the distances between lens surfaces (D), prescribing these two lens systems. *Id.* at 5:48–49, 7:50–8:25 (Table 3), 9:1–29 (Table 5); *see also id.* at 6:36–63 (Table 1), 10:1–29 (Table 7).

The inconsistency between Tada’s Table 5 and Table 9 makes it apparent that there is an error in Table 5’s recitation of the aspherical coefficients. As discussed above, a comparison of the values for aspherical

coefficients A4, A6, and A8 in Table 5 (Embodiment 3) and conditions (2), (3), and (4) for Embodiment 3 in Table 9 indicates that the data in one of Table 5 and Table 9 is in error. Mr. Aikens opines that “[b]ecause the focal length is 1 [in each of the four embodiments], Table 9 rather conveniently gives you the aspheric coefficients for each of the four embodiments, and it matches correctly for 1, 2 and 4 and is totally wrong for 3.” Ex. 1018, 136:11–15; Pet. Reply 4 ((citing Ex. 1018, 136:5–137:12); *see also* PO Resp. 13 (“ratios (2)–(4) in Table 9 should respectively match Table 5’s A₄, A₆, and A₈, but do not.” (citing Ex. 2002, 47:22–50:24 (cross-examination testimony of Dr. Chipman))); Ex. 2009 ¶ 69 (testimony of Mr. Aikens that identified “values do not match the values in Table 5 because Table 5 is in error”)). We are persuaded by Dr. Aikens’ testimony that a person of ordinary skill in the art would readily ascertain, from the Specification alone, that the error is in the aspherical data in Table 5. Ex. 2009 ¶ 69. As discussed above, the aspherical data from Table 5 matches that in Table 3 and, if the error is in Table 5, this can be explained as a simple transcription error, inadvertently duplicating the aspherical data from Table 3. If the error as to Embodiment 3 is in Table 9, however, then the error is more difficult to explain in the context of the lens systems of Embodiments 1–4. As set forth in Tables 3 and 5, the aspherical coefficients, including A₄, A₆, and A₈, are identical in Embodiments 2 and 3, despite these lens systems differing throughout with respect to the lens surface’s radius of curvature (R) and distances between the lens surfaces (D). The lens systems of Embodiments 1 and 4 each also differ from every other embodiment with respect to the aspherical coefficients and the values of R and D.

Tada provides that “Japanese Patent Application Nos. 08-222394 . . . and 09-201903 . . . are expressly incorporated herein by reference in their

entireties.” Ex. 1007, 3:9–13; *see* PO Sur-Reply 6–7 (noting Tada expressly incorporates the Japanese priority application by reference, citing Ex. 2007 (JP H115778)). The cited Japanese priority application for Tada—JP 09-201903—also includes a Table 3 with the same data as within the body of Tada itself, including the aspherical data (Ex. 2007, 5–6 ¶ 29; Ex. 2008, 13–14 ¶ 29; Ex. 1007, 7:50–8:25), and a Table 9 with the same values for conditions (2), (3), and (4) of all four embodiments⁷ (Ex. 2007, 9 ¶ 37; Ex. 2008, 20 ¶ 37; Ex. 1007, 10:56–11:12). Importantly, as to Table 5, the JP 09-201903 application has different values for “aspherical surface data,” including for A4, A6, and A8, than those for “[a]spherical data” in Tada itself. *See* Ex. 2007, 7 ¶ 32; Ex. 2008, 16 ¶ 32; Ex. 1007, 10:25–29. Also, unlike in Tada itself, the values for A4, A6, and A8 in JP 09-201903 Table 5 are identical to the values for conditions (2), (3), and (4) for Embodiment 3. Ex. 2007, 7 ¶ 32, 9 ¶ 37; Ex. 2008, 16 ¶ 32, 20 ¶ 37; Ex. 1007, 9:25–27, 11:6–8. The correspondence of Tables 1, 3, 7, and 9 between the JP 09-201903 application and Tada itself is apparent, even prior to translation, as is the inconsistency as to the aspherical data for Table 5.

In sum, we find that one of ordinary skill in the art considering Tada would have reasonably considered the entire document, including the Japanese priority application incorporated by reference. Having done so, one of ordinary skill in the art would have readily ascertained that there was an error in the aspherical data of Table 5. The discrepancy between the data in Table 5 and Table 9 would have been apparent and obvious, because one of ordinary skill in the art would have appreciated that the values for

⁷ We find no distinction in JP 09-201903 referring to Tada’s “four embodiments” as “working examples.”

aspherical data A4, A6, and A8 and for conditions (2), (3), and (4), respectively, should be identical, but were not identical, for Embodiment 3. Further, one of ordinary skill in the art also would have reasonably appreciated, considering the remainder of Tada's disclosure, the error to be in Table 5. The Japanese priority application incorporated by reference into Tada—JP 09-201903—confirms the error. All in all, we find it apparent that the discrepancy is grounded on a transcription error in the values for A4, A6, and A8 in Tada's Table 5, namely, inadvertent duplication of the values for the aspherical data in Table 3.

e) Analysis of Petitioner's Arguments Regarding Obvious Error

Petitioner's case-based arguments that the error was not an "obvious error" fall short. In *Yale*, the error was the listing of a particular compound, i.e., CF(3)CF(2)CHClBr, in a figure plotting characteristics of different compounds, which compound was not disclosed elsewhere in the reference, and where the value of a characteristic for the compound listed in error in that figure was identical to the value for a different compound, i.e., CF(3)CHClBr, disclosed in another figure.⁸ *Yale*, 434 F.2d at 667. The court determined that "[a]ny number of these individually or cumulatively would, . . . alert one of ordinary skill in the art of the typographical error" and "that the one [the court] immediately noted was the inconsistency between Figs. 1 and 3 of [the reference]." *Id.* at 669. Petitioner argues that the error in Table 5 would not have been "readily apparent" because nothing

⁸ The Appellant in *Yale* also contended an error would be apparent because, other than the compound listed in error, only known compounds were discussed in the article. *Yale*, 434 F.2d at 667. Also, the appellant in *Yale* submitted two letters, a letter sent to the author of the reference inquiring whether the compound was listed in error, and a letter in response that the listing was a typographical error. *Id.*

in Table 5 itself would lead a person of ordinary skill in the art to believe there was an error, but the circumstances here appear to be essentially the same as in *Yale*, where the court relied on an inconsistency between different portions of the disclosure. *Id.*

Petitioner further argues that Table 5 “includes all of the information necessary to enable a complete lens.” Pet. Reply 3 (citing Ex. 1019 ¶¶ 5–8). The court in *Yale*, however, determined that one of ordinary skill in the art, recognizing a disclosure to be an obvious error, would simply disregard it and not even get so far as to consider whether they knew how to make it. *Yale*, 434 F.2d at 669.

Petitioner’s reliance on *Elsner* in arguing that Tada put the public in possession of the invention because “Table 5 ‘describes’ the claimed invention” and “a [person of ordinary skill in the art] would have been able to make the Table 5 lens” (Pet. Reply 5–6 (citing *Elsner*, 381 F.3d at 1128)) fails because, as discussed above, the issue is not whether the prior art disclosure is enabled, but rather whether it would be recognized as an obvious error and simply disregarded (*see Yale*, 434 F.2d at 669). Similarly, we give little weight to Dr. Chipman’s testimony that the error would not have been readily apparent because Table 5 enables a person of ordinary skill in the art to make a complete lens because it is grounded on an incorrect understanding of the law. Ex. 1019 ¶¶ 5, 7–8; *cf. Integra Lifesciences I, Ltd. v. Merck KGaA*, 496 F.3d 1334, 1342 (Fed. Cir. 2007) (holding that “when an expert witness’ statement of the law is incorrect, that view of the law cannot be relied upon to support the verdict.”). As discussed above, the issue is not whether Table 5 enables the lens it describes, but rather whether the disclosure would be recognized as an obvious error. Dr. Chipman’s

expressed opinion grounded on an incorrect understanding that this is the law fails to support Petitioner's case.

Petitioner contends that even if a person of ordinary skill in the art “were to check Table 5 with other parts of Tada, it would have taken many hours to conclude there was an error.” Pet. Reply 4 (citing Ex. 1018, 132:1–15, 136:5–137:12). Petitioner supports this contention with the testimony of Dr. Chipman (*id.* at 3 (citing Ex. 1019 ¶¶ 5–8)), including that “the purported error that Mr. Aikens alleges is not obvious on its face and detectable with little effort” that relies on the reasoning that “Mr. Aikens had to spend many hours, going through a convoluted process” (Ex. 1019 ¶ 6). The relevant question is whether the error was an obvious error to one of ordinary skill in the art, not whether Mr. Aikens happened to take a circuitous route to determine that the aspherical data in Table 5 was, in fact, in error. *Yale*, 434 F.2d at 669. As laid out above, we find that one of ordinary skill in the art considering Tada would have ascertained a discrepancy between the values of aspherical data A4, A6, and A8 in Table 5 and the corresponding values for conditions (2), (3), and (4) for embodiment 3 in Table 7, and discerned an error in Table 5 through no more than considering the disclosure of Tada as a whole.

The particular manner in which Mr. Aikens determined that there was an error in Table 5, as laid out in Patent Owner's Response, does not diminish that there is an obvious error in Tada within the meaning of *Yale*. Tada's disclosure indicates on its face that there is obvious, likely typographical, error apparent upon considering the values of aspherical data A4, A6, and A8 in Table 5, and the corresponding values for conditions (2), (3), and (4) for Embodiment 3 in Table 9, and that this is confirmed by the Japanese priority application incorporated by reference into Tada.

Dr. Chipman's testimony does not address how this discrepancy between the data in Table 5 and Table 9, and the disclosure incorporated by reference, would not be sufficient indication of an obvious error. Ex. 1019 ¶ 5–8. Accordingly, we give little weight to his testimony that the “purported ‘error’ in Table 5 of Tada would not have been an error obvious to one of ordinary skill in the art.” *Id.* ¶ 6; *Velander v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003) (“It is within the discretion of the trier of fact to give each item of evidence such weight as it feels appropriate.”); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 294 (Fed. Cir. 1985) (“Lack of factual support for expert opinion going to factual determinations, however, may render the testimony of little probative value in a validity determination.”). Indeed, Mr. Aikens' cross-examination testimony cited by Petitioner includes testimony that confirms that the presence of an error would have been immediately apparent because Mr. Aikens recognized that the values for conditions (2), (3), and (4) set forth in Table 9 do not match the aspheric coefficients for Embodiment 3 as defined in Table 5. *See* Ex. 1018, 136:11–15 (“Because the focal length is 1, Table 9 rather conveniently gives you the aspheric coefficients for each of the four embodiments, and it matches correctly for 1, 2 and 4 and is totally wrong for 3.”).

Petitioner also argues that the alleged error in Tada's Table 5 is like the errors that the courts did not exclude in *Clark*, *Garfinkel*, or *Borst*. Pet. Reply 7–9. In *Clark*, the court found that reference incorrectly stated that a particular system used an FM transmitter and signal, but that nothing in the publication indicated that the statements were in error. *Clark*, 420 F. App'x at 998. Thus, while it is correct that “absent an obvious error on the face of the reference, a reference is prior art for what it discloses,” here there is an

“obvious error on the face of the reference,” as discussed above. *Id.* In *Garfinkel*, the court did not disregard the teaching of a reference, despite the fact that an applicant had submitted an affidavit that a reference’s teaching was in error, because “the error, if it exist[ed], was not apparent or obvious from reading the publication.” *Garfinkel*, 437 F.2d at 1008; Pet. Reply 7–8. But here, again, the error is apparent and obvious from reading Tada. In *Borst*, the court found a prior art document to be enabling despite a possible error; Petitioner argues that, because Tada’s disclosure of a lens in its Table 5 is enabling, the disclosed lens should be considered. Pet. Reply 8–9. As discussed above, however, the issue is not whether the disclosure is enabling, but rather whether there is an obvious error, such that the disclosure is simply disregarded. Even to the extent that *Borst* appears to indicate that there was an error in the disclosure of the relied-on reference in that case, there is no indication that it was an obvious error such that it informs the outcome where, as here, the error is an obvious error. *Borst*, 345 F.2d at 853 n.2 (noting that “Appellant does argue that there is a mathematical defect in the Samsel disclosure”). As such, *Borst* does not support Petitioner’s argument that one of ordinary skill in the art would have relied on the aspherical data from Tada’s Table 5 when that data is an obvious error. And the same can be said of *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1357 (Fed. Cir. 2003), that Petitioner relies on as supporting that “a reference need not be enabled; it qualifies as prior art, regardless, for what is disclosed therein” (Pet. Reply 10), because regardless of what is enabled, the disclosure cannot be said to describe or suggest that which is an error obvious to one of ordinary skill in the art (*Yale*, 434 F.2d at 669).

f) Conclusion

On this record, we find that the disclosure of aspherical coefficients in Table 5 of Tada is an obvious error and that, consequently, Tada cannot be said to describe or suggest the lens system according to the prescription that includes those aspherical coefficients. Because Petitioner relies wholly on the lens system of Embodiment 3, as set forth in Tada's Table 5, to meet the limitations of the recited objective lens that compresses the center and edges and expands an intermediate zone of an image, Petitioner has not established by a preponderance of the evidence that the lens of claim 21 would have been obvious.

E. Asserted Obviousness over Tada in View of Nagaoka

Petitioner challenges claim 21 as obvious over the combined teachings of Tada and Nagaoka. Pet. 57–68.

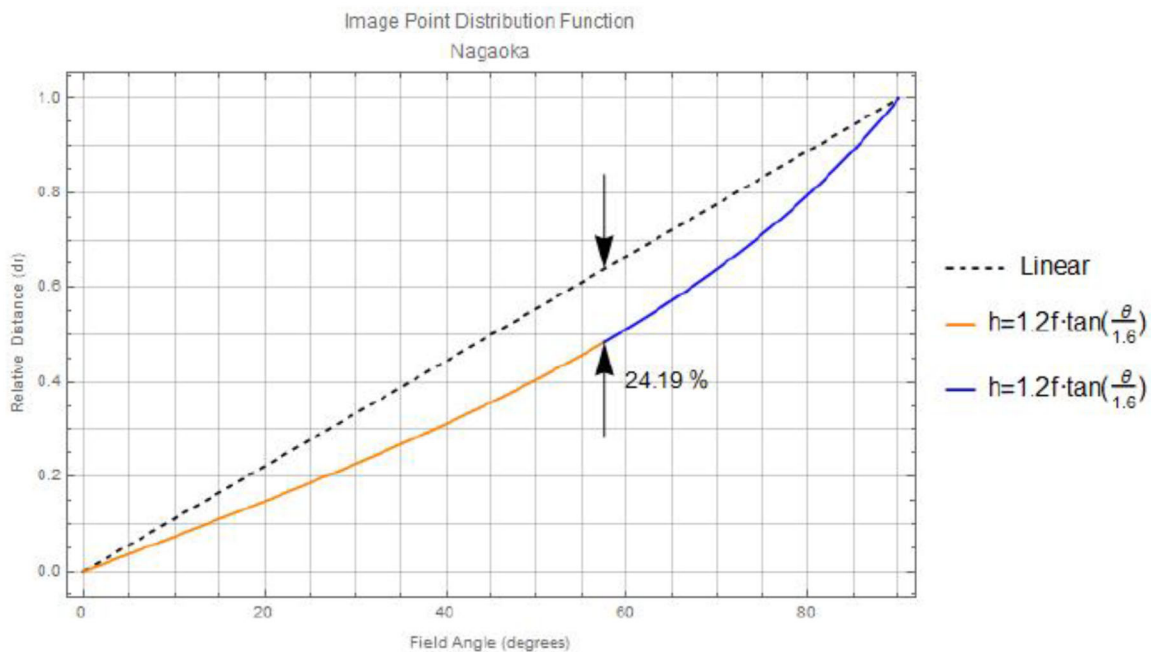
1. Overview of Nagaoka (Ex. 1004)

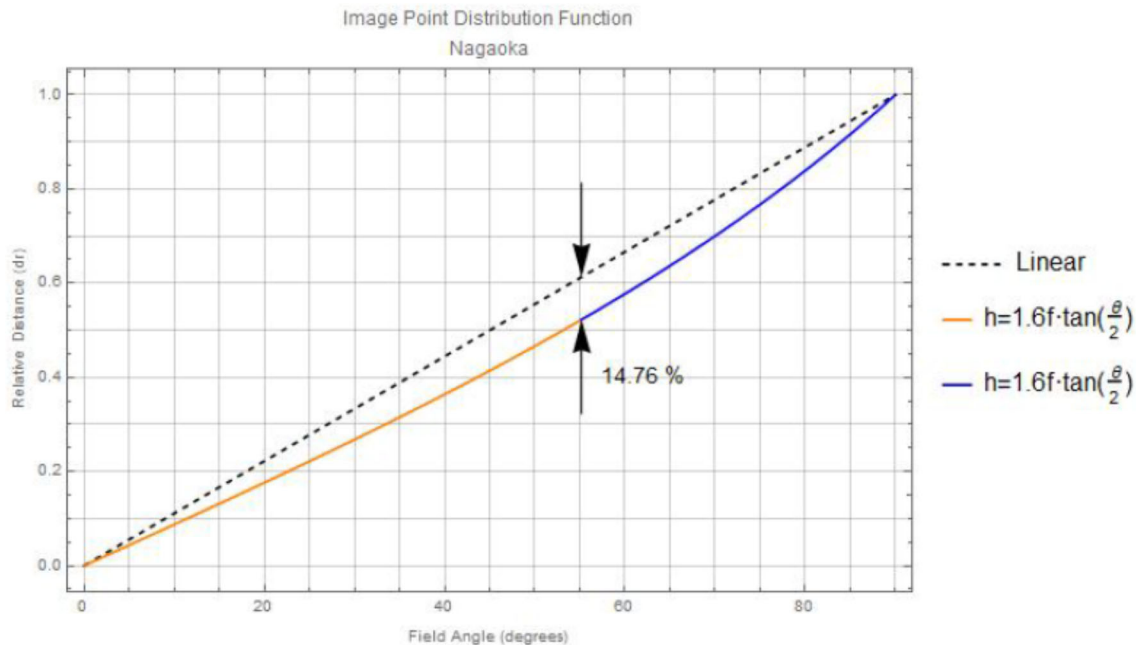
Nagaoka is directed to a monitoring system using a camera having a fisheye lens. Ex. 1004, 1:6–10, 1:11–14. Nagaoka discloses a number of different fisheye lenses having a nonlinear distribution function of image points relative to the field angle of the object points of the panorama. *Id.*, Figs. 3A–3B.

2. Analysis

Petitioner relies on “Tada explicitly disclos[ing] all of the elements of dependent claim 21 and independent claim 17,” but adds that to the extent that Patent Owner argues that Tada falls short of disclosing “that the distribution function [has] a maximum divergence of ‘at least $\pm 10\%$ ’ compared to a linear distribution function,” as set forth in claim 17, that this is remedied by Nagaoka. Pet. 57–68. As set forth by Petitioner, Nagaoka discloses a fisheye lens having a nonlinear distribution function, including

two examples— $h=1.2f \cdot \tan(\theta/1.6)$ and $h=1.6f \cdot \tan(\theta/2)$. *Id.* at 54–58 (citing Ex. 1004, Fig. 3B). Petitioner calculates “a plot of the relative distance of an image point in relation to the center of the image according to the field angle of the corresponding object point” for each of these two functions “with a focal length of $f=1$ ” and overlays these with a linear distribution to demonstrate that the lens having the function $h=1.2f \cdot \tan(\theta/1.6)$ has a maximum divergence -24.19% and a lens having the function $h=1.6f \cdot \tan(\theta/2)$ has a maximum divergence of at least -14.76%. *Id.* at 61–63 (citing Ex. 1008 ¶¶ 79–82). These plots are reproduced below:





The depicted plots of Nagaoka’s functions include two regions, a first with a slope less than “linear” indicating “compression” (highlighted yellow) and a second with a slope greater than “linear” indicating “expansion” (highlighted blue). *Id.* at 62 (reproducing figures plotting the image point distribution function of two different, non-linear image point distribution functions). Petitioner relies on Nagaoka as teaching that it is desirable to have a lens system with a maximum divergence much larger than what Tada discloses. *Id.* at 66; Pet. Reply 23.

Petitioner relies wholly on Tada for compressing the edges of the image: “Tada teaches [a lens system having] three zones like claim 21 (compression, expansion, and compression).” Pet. Reply 24. Petitioner makes its reliance on Tada for this feature clear in stating that “[t]he fact that Nagaoka teaches two zones (compression and expansion) . . . is immaterial for a [person of ordinary skill in the art] looking for guidance on possible maximum divergence for lenses for CCTV cameras.” *Id.* In other words, because Petitioner concedes that Nagaoka teaches only two zones, Petitioner

is relying on Tada for disclosing the three zones. But as we explained above, Petitioner does not establish that Tada teaches or suggests three zones, so Petitioner's arguments for this ground are unpersuasive.

On this record, Petitioner has not established by a preponderance of the evidence that the panoramic objective lens of claim 21 would have been obvious over Tada in view of Nagaoka. Tada, due to its obvious error, cannot be said to describe or suggest the three zones (compression, expansion, and compression), as discussed above. Nagaoka only teaches two zones (compression and expansion). Thus, there is no basis in the ground set forth for an objective lens, as recited in claim 21, that "compresses . . . the edges of the image."

F. Asserted Obviousness over Tada in View of Baker

Petitioner challenges claim 21 as unpatentable for having been obvious over the combined teachings of Tada and Baker. Pet. 68–77. In particular, Petitioner asserts that to the extent Tada does not teach or suggest that "the distribution function [has] a maximum divergence of *at least* $\pm 10\%$ compared to a linear distribution function" as required by claim 21 by virtue of its dependence on claim 17, that Baker teaches this limitation and that it would have been obvious to modify Tada in view of Baker to arrive at the subject matter of claim 21. Pet. 69, 72–77.

1. Overview of Baker (Ex. 1005)

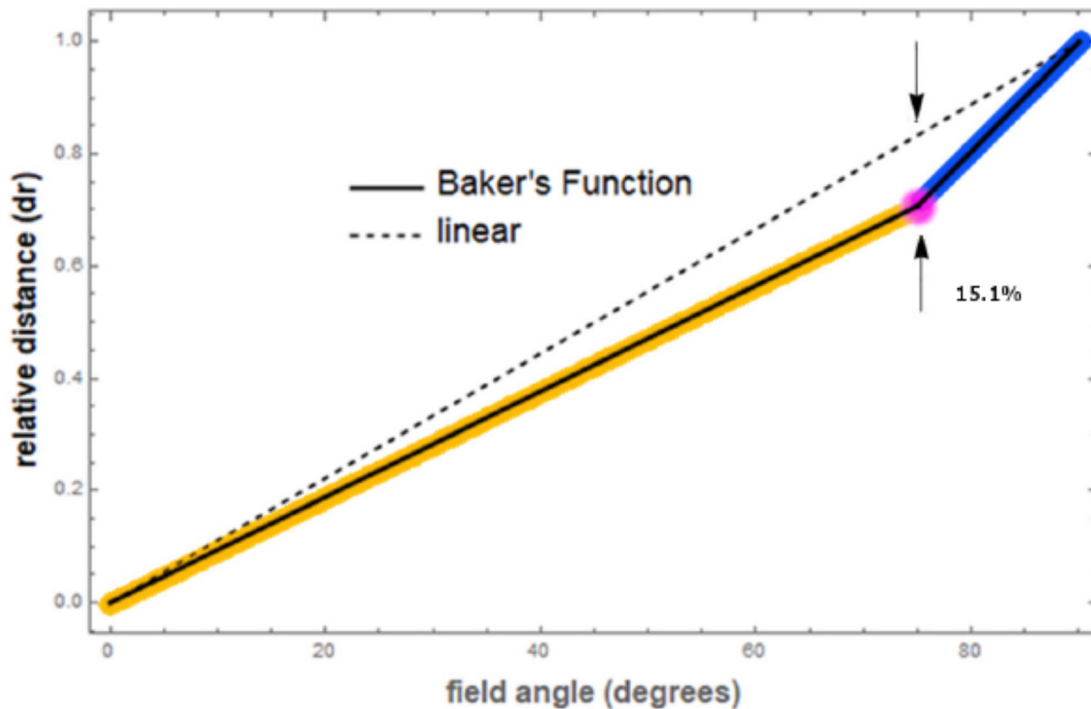
Baker is directed to a videoconference system using a lens system that provides a panoramic display. Ex. 1005, Abstract. Baker discloses wide angle lenses that have "a fairly significant portion of the imaging surface dedicated to the peripheral field [of the field of view], and consequently less of the surface dedicated to the central field" than "typical with commercially

available wide-angle, fish-eye, or other conventional lenses.” *Id.* at 11:47–48, 12:30–32.

2. Analysis

In the Petition, Petitioner relies on Tada as set forth above in the ground based on Tada alone (*compare* Pet. 72–77, *with id.* at 33–57) and further on Baker for teaching the maximum deviation of at least $\pm 10\%$ (*id.* at 74–76). Petitioner contends that Baker teaches the limitations of claim 17 (*id.* at 68–72 (citing Ex. 1005, 6:48–56, 8:32–36, 12:6–11; Ex. 1008 ¶¶ 92, 94–96)), and that Patent Owner “provided a clear and unambiguous admission in the reexamination that claim 17 is taught by Baker” (*id.* at 68–69 (citing Ex. 1003, 331); *see also id.* at 71–72 (citing Ex. 1003, 240)). Petitioner does not contest that “Tada was relied on for disclosing the three zones and Baker was relied on essentially or solely for the magnitude of . . . deviation,” as Petitioner’s counsel responded to this characterization with “[y]ou’re absolutely correct, . . . That was how the petition was laid out.” Tr. 40:2–7.

Petitioner’s reliance on Baker in the Petition is limited to the degree of deviation from a linear image point distribution. Pet. 68–72. Petitioner relies on Baker’s disclosure of a fisheye lens having a nonlinear distribution function, a plot of such a lens showing its nonlinearity, and that “[t]o maximize data collection and resolution for analysis and/or display . . . , it is desirable to maximize the dedication of the available image detection area to this peripheral field portion.” Pet. 69–71; Ex. 1005, 6:48–56, 8:32–36, 12:6–11; Ex. 1008 ¶¶ 92, 94–96. Petitioner relies particularly on a plot it contends “corresponds to the description of the lens in Baker” and “would have a maximum deviation of **15.1%**.” Pet. 70–71; Ex. 1008 ¶ 95. The plot is reproduced below:



The depicted plot of Baker's function includes two regions, a first with a slope less than "linear" indicating "compression" (highlighted yellow) and a second with a slope greater than "linear" indicating "expansion" (highlighted blue). Pet. 71 (reproducing a figure plotting the image point distribution function of "Baker's [non-linear image point distribution] function" overlying a linear image point distribution function).

The ground set forth in the Petition relying on Tada in view of Baker fails. As discussed above, the necessary disclosure in Tada to support a lens system having the three zones (compression, expansion, and compression), i.e., Table 5's aspherical data (coefficients), includes an obvious error and, thus, Tada cannot be said to describe or suggest such a lens system, and there is no basis set forth in the Petition for Baker remedying this deficiency.

Patent Owner responds that Baker teaches away from the claimed lens. PO Resp. 66, 68–70.

Petitioner, in its Reply, makes a new argument that Baker discloses all three zones, and relies on portions of Baker not originally cited and relied on in the Petition to support this argument. *Compare* Pet. Reply 20–22 (citing Ex. 1005, 1:52–58, 2:10–16, 5:37–44, 13:60–65, 19:9–13 (claim 10)), *with* Pet. 68–75 (citing Ex. 1005, 2:59–61, 2:65–3:3, 6:44–56,⁹ 8:32–36, 8:60–62, 10:38–41, 12:6–11, 13:11–17, 12:48–55, Fig. 3BA). This shift in Petitioner’s argument and its new reliance on Baker is reflected in the cited testimony of Dr. Chipman and Mr. Aikens. Dr. Chipman’s original declaration filed in support of the Petition does not address the portions of Baker only cited in Petitioner’s Reply. *See* Ex. 1008 ¶¶ 90–104. Petitioner relies on new testimony in support of its Reply; cross-examination testimony of Mr. Aikens, relating to portions of Baker not relied on in the Petition (Pet. Reply 21 (citing Ex. 1018, 268:14–269:4)), and further testimony of Dr. Chipman, also relating to portions of Baker not relied on in the Petition (*id.* (citing Ex. 1019 ¶ 27)). The cited cross-examination testimony of Mr. Aikens relates to the “[l]ast paragraph of Column 13” in Baker (Ex. 1005, 13:56 *et seq.*), and most particularly to Baker, column 13, lines 60 to 65, cited in Petitioner’s Reply. Ex. 1018, 262:16–269:4. Dr. Chipman’s testimony in support of Petitioner’s Reply (Ex. 1019), paragraph 27, cites Baker (Ex. 1005), column 13, lines 60 to 65 and column 19, lines 9 to 13.

In its Reply, Petitioner newly argues that Baker discloses a lens having three zones, including an expanded intermediate zone. Pet. Reply 20–22. At oral hearing, Petitioner’s counsel conceded that the Petition does

⁹ The Petition mis-cites relied-on material from column 6, lines 48 to 56, as from Exhibit 1002. Pet. 65.

not rely on Baker for disclosing three zones (Tr. 40:2–7) and that the relevant portions of Baker—column 13, lines 60 to 65 and claim 10 (column 19, lines 9 to 12)—were not cited until Petitioner’s Reply (*id.* at 39:11–16). Petitioner’s counsel argues, however, that there is an admission Baker discloses three different zones and that this cannot be ignored. *Id.* at 40:8–12.

Patent Owner responds that the argument that Baker discloses a lens having three zones is new, having been argued for the first time in Petitioner’s Reply, and that it is contrary to what Baker actually discloses. PO Sur-Reply 19–21. At oral hearing, Patent Owner’s counsel contended that we should disregard the newly-cited portions of Baker and purported admission that Baker discloses three different zones because the Petition’s original grounds do not rely on Baker for disclosing or suggesting a lens having three different zones. Tr. 42:11–16.

Petitioner’s counsel argued in rebuttal that Petitioner’s argument raised as to Baker disclosing three zones was only that there was no teaching away, and that it is properly raised for that point. *See id.* at 67:19–22 (“Baker is talking about three zones in some of the embodiments and therefore there is no teaching away and that’s really the only point we wanted to make with respect to Baker is that there is no teaching away”), 68:5–6 (“our only point is that there is no teaching away”).

The argument in Petitioner’s Reply that Baker does not teach away from the claimed lens was not improper; Petitioner reasonably raised it in response to Patent Owner’s arguments, and Patent Owner had notice that Baker was in play as potentially relevant evidence. *See Genzyme Therapeutic Prods. Ltd. P’ship v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1366–67 (Fed. Cir. 2016) (finding that the Board may consider a prior art

reference not included in an instituted ground to show the state of the art where the parties had notice of the reference).

That said, Petitioner's arguments that Baker discloses a lens with the recited three zones in the Reply raises a new theory of unpatentability, relying on newly cited portions of the reference. Such a new theory offered in the Reply cannot remedy the deficiency in the ground set forth in the Petition because "it is the petitioner's contentions" in "petitioner's petition" that "define the scope of the litigation all the way from institution through to conclusion." *Sirona*, 892 F.3d at 1356; *see also Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1330–31 (Fed. Cir. 2019) ("an IPR petitioner may not raise in reply 'an entirely new rationale' for why a claim would have been obvious"). As discussed above, the ground of unpatentability set forth in the Petition is based wholly on Tada disclosing the three zones, and not at all on Baker disclosing three zones, and the disclosures from Baker now contended by Petitioner to disclose or teach three zones are not cited in the Petition.

In sum, this proceeding is guided by the Petition, which did not assert the portions of Baker contended to disclose or teach the three zones recited in claim 21, or present any theory of obviousness grounded on Baker disclosing or teaching the three zones. Also, because the ground fails due to the obvious error in Tada, whether Baker teaches away from the claimed invention is moot. Thus, it is unnecessary for us to consider whether Baker discloses or teaches any embodiment having three zones, and we decline to do so.

On this record, for the reasons discussed above, we find that Petitioner has not established by a preponderance that the lens of claim 21 would have been obvious over Tada in view of Baker.

III. CONCLUSION

For the reasons set forth above, we determine that Petitioner has not established, by a preponderance of the evidence, that the subject matter of claim 21 of the '990 patent is unpatentable.

Claim	35 U.S.C. §	References	Claims Shown Unpatentable	Claims Not Shown Unpatentable
21	103	Tada		21
21	103	Tada, Nagaoka		21
21	103	Tada, Baker		21
Overall Outcome				21

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has *not* demonstrated by a preponderance of the evidence that claim 21 of the '990 patent is *unpatentable*; and

FURTHER ORDERED that because this is a Final Written Decision, any party to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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