

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LUXOTTICA OF AMERICA INC.,
Petitioner,

v.

E-VISION OPTICS, LLC,
Patent Owner.

IPR2024-01071
Patent 8,905,541 B2

Before RICHARD H. MARSCHALL, JOHN D. HAMANN, and
SEAN P. O'HANLON, *Administrative Patent Judges*.

MARSCHALL, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

Petitioner Luxottica of America Inc. challenges claims 1–19 of U.S. Patent No. 8,905,541 B2 (Ex. 1001, “the ’541 patent”), which is assigned to Patent Owner e-Vision Optics, LLC. We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons set forth below, we determine that Petitioner proves by a preponderance of the evidence that claims 1–19 are unpatentable.

BACKGROUND

A. Summary of Filings

Petitioner filed a Petition requesting *inter partes* review of claims 1–19 of the ’541 patent. *See* Paper 1 (“Pet.”), 1–2. Patent Owner filed a Preliminary Response to the Petition. Paper 8. With our authorization, Petitioner filed a Preliminary Reply (Paper 9), and Patent Owner filed a Preliminary Sur-reply (Paper 11). Pursuant to 35 U.S.C. § 314, we instituted an *inter partes* review as to all challenged claims and all grounds raised in the Petition. Paper 13 (“Institution Decision” or “Inst. Dec.”).

After institution, Patent Owner filed a Response (Paper 20, “PO Resp.”), Petitioner filed a Reply (Paper 26, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 27, “PO Sur-reply”). The record includes a transcript of an oral hearing held on October 6, 2025. Paper 34.

B. Real Parties-in-Interest and Related Matters

Petitioner states that “Luxottica of America Inc. and Luxottica Group S.p.A. are the real parties in interest for Petitioner.” Pet. 85. Petitioner also identifies EssilorLuxottica S.A. as the parent company to these companies. *See id.* Patent Owner identifies itself as the only real party-in-interest. Paper 7, 1.

The parties indicate that the '541 patent is the subject of the following infringement actions: *e-Vision Optics, LLC et al. v. Luxottica Group S.p.A et al.*, No. 8:23-cv-02013 (C.D. Cal.) and *e-Vision, LLC et al. v. Lenovo Group Ltd. et al.*, No. 8:23-cv-01860 (C.D. Cal.). Pet. 85–86; Paper 7, 1.

C. The '541 Patent

The '541 patent relates to electronic spectacle frames that have a housing module attached to a structural member of the frame. Ex. 1001, codes (54), (57). An electronics module may be located within the housing module. *Id.* at code (57), 1:48–54. The “electronics module may further include at least any two of: a power source; a controller; and/or a sensing mechanism.” *Id.* at 2:3–5. “[A]n insulating layer may be disposed between one or more electronic components located within the electronics module and the frame of the first device” and the housing module itself “may comprise the insulating layer.” *Id.* at 2:6–12.

Figure 16 illustrates aspects of the invention disclosed in the '541 patent and is reproduced below.

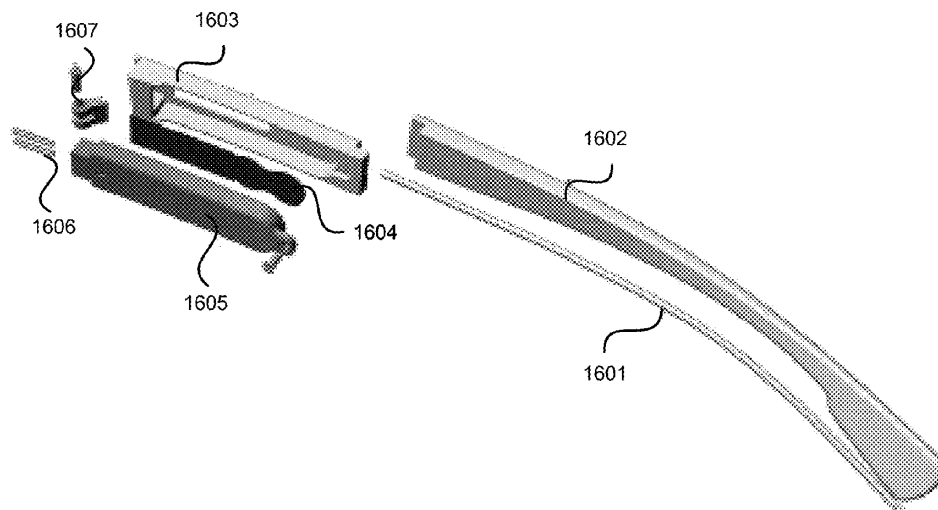


Figure 16 depicts an “assembly of a portion of an electro-active frame.” Ex. 1001, 5:56–57, 41:56–57. Figure 16 shows core element 1601, temple 1602, housing module 1603, switch 1604, and electronics module 1605. *Id.* at 41:62–42:8, 68:36–58. Housing module 1603 “may house (e.g. contain) the electronics module 1605 and be coupled to temple 1602.” *Id.* at 68:48–50. Housing module 1603 may be made of a conductive material, but “in some embodiments an insulating material may be disposed between the housing module 1603 and any electronic components of the electronic frames (e.g. the electronics module 1605).” *Id.* at 68:50–61. In Figure 16, housing module 1603 is disposed between a portion of temple 1602 and the lens housing. *Id.* at 69:5–7. The insulating material prevents short circuits and in some embodiments the electronics module and/or housing module may may be made from insulating material. *See id.* at 51:46–65.

In some embodiments, the housing module may include an opening through which the electronics module may be inserted and pressure-fit into position within the housing module so that it snaps into place. *See* Ex. 1001, 70:24–37, Fig. 27. Screws may also be used to secure the electronics module in place, or to secure the housing module to the frame. *Id.* at 69:25–28, 70:41–58.

D. Challenged Claims

Petitioner challenges all 19 claims of the ’541 patent, including independent claims 1 and 19. Claims 1 and 19 recite:

1. A first device, comprising:
 - a frame comprising a first temple and a second temple, wherein the frame comprises a housing module coupled to a structural member;
 - a first lens and a second lens coupled to the frame; and

an electronics module, wherein the electronics module is located within the housing module;
wherein the electronics module comprises at least any two of: a power source; a controller; and a sensing mechanism; and
wherein an insulating layer is disposed between one or more electronic components located within the electronics module and the frame of the first device.

19. A method of fabricating a device,
wherein the device comprises
a frame having a first temple and second temple; and
a housing module comprising:
a first end and a second end, wherein the first end comprises an opening; and
a body disposed between the first and second end wherein the body comprises a cavity;
wherein the method comprises inserting an electronics module into the opening of the first end of the housing module such that the electronics module is disposed in the cavity of the body of the housing module

Ex. 1001, claims 1, 19.

E. Asserted Grounds of Unpatentability

Petitioner challenges claims 1–19 on the following grounds (Pet. 13):

Claims Challenged	35 U.S.C. § ¹	Reference(s)/Basis
1–19	103	Howell-596, ² Howell-158 ³
16, 17	103	Howell-596, Howell-158, Hattori-913 ⁴
1–11, 13–19	103	Howell-596
16, 17	103	Howell-596, Hattori-913
1–9, 11, 13–19	103	Kokonaski-166, ⁵ Howell-158
1–9, 11, 13–19	103	Kokonaski-999, ⁶ Howell-158

In support of these challenges, Petitioner submits the Declaration of Dr. John Feland. *See* Ex. 1002. Patent Owner relies on the Declaration of Dr. James Oliver. *See* Ex. 2014.

¹ The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Because the ’541 patent issued from an application having an effective filing date before March 16, 2013, we apply the pre-AIA version of the statutory basis for unpatentability.

² US Patent Pub. No. 2005/0230596 A1, published October 20, 2005 (Ex. 1004, “Howell-596”).

³ US Patent Pub. No. 2006/0023158 A1, published February 2, 2006 (Ex. 1006, “Howell-158”).

⁴ Japanese Unexamined Patent Application Publication Number S58-113913, published July 7, 1983 (Ex. 1007, “Hattori-913”) (original at Ex. 1007, Ex. A; translation at Ex. 1007, Ex. B). We cite to the translation of Hattori-913 at Ex. 1007.

⁵ US Patent Pub. No. 2008/0273166 A1, published November 6, 2008 (Ex. 1008, “Kokonaski-166”).

⁶ WO 2010/080999 A1, published July 15, 2010 (Ex. 1009, “Kokonaski-999”).

ANALYSIS

A. Legal Standards

To prevail in its challenges, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d). “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 of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burdens of proof in an *inter partes* review).

Petitioner relies on obviousness in its challenges. Pet. 13. A claim is unpatentable as obvious under 35 U.S.C. § 103 if the differences between the claimed invention and the prior art are such that the subject matter, as a whole, would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. 35 U.S.C. § 103; *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) where in evidence, so-called secondary considerations, also known as objective

indicia of nonobviousness.⁷ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The person of ordinary skill in the art is a hypothetical person presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In determining the level of ordinary skill in the art, we may consider certain factors, including: “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Best Med. Int’l, Inc. v. Elekta Inc.*, 46 F.4th 1346, 1353 (Fed. Cir. 2022) (quoting *Daiichi Sankyo Co. v. Apotex, Inc.*, 541 F.3d 1254, 1256 (Fed. Cir. 2007)). “The patent’s purpose can also be informative.” *Id.*

Petitioner contends that a person having ordinary skill in the art (“POSITA”) at the time of the invention would have had “at least a bachelor’s degree in mechanical or manufacturing engineering; mechatronics; electrical engineering plus coursework in mechanical engineering, manufacturing engineering, or mechatronics; or a similar technical degree,” and “at least 2 years of experience designing consumer electronics, such as eyewear with electronics.” Pet. 11–12 (citing Ex. 1002

⁷ Patent Owner does not rely on any objective indicia of nonobviousness in this proceeding.

¶¶ 30–34). Petitioner contends that “[w]ork experience could substitute for formal education and additional formal education could substitute for work experience.” *Id.*

Patent Owner contends that a “POSITA at the time of the invention of the ’541 patent would have had a bachelor’s degree in mechanical engineering, electrical engineering, or computer engineering, or an equivalent degree and, in addition, approximately two years of work experience with embedded electronic devices.” PO Resp. 6 (citing Ex. 2014 ¶¶ 31–35). Patent Owner also asserts that “[m]ore advanced degrees or training in a related discipline or both can compensate for shorter work experience” and that its expert, Dr. Oliver, “is qualified to offer opinions under this standard and the standard set forth by Petitioner.” *Id.*

We find that the proposals from the parties substantially overlap, such that it remains unclear whether any substantive difference exists. Notably, neither party argues that the minor differences in the proposals lead to a different outcome on any issues in this proceeding. Based on our review of the proposals, we apply Patent Owner’s proposal because it is consistent with the problems and solutions disclosed in the ’541 patent and prior art of record. *See, e.g., GPAC*, 57 F.3d at 1579 (approving the determination of the level of ordinary skill in the art by appeal to the references of record). The outcome of the issues addressed in this Decision would not change if we applied Petitioner’s proposal.

C. Claim Construction

Pursuant to 37 C.F.R. § 42.100(b), we apply the claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Under that standard, we give the words of a claim their plain and

ordinary meaning as would have been understood by one skilled in the art at the time of the invention and in the context of the entire patent disclosure. *Id.* at 1312–13. Only terms 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) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Here, Petitioner posits that “no claim terms require construction to resolve the obviousness challenges here.” Pet. 12. Patent Owner does not oppose Petitioner’s position or proffer any constructions of its own. *See generally* PO Resp. We determine that no express construction of any claim element is necessary to resolve the issues in this proceeding.

D. Obviousness Based on Howell-596 and Howell-158

Petitioner argues that the combination of Howell-596 and Howell-158 renders claims 1–19 obvious. Pet. 15–44. Patent Owner raises specific arguments against the challenge to claims 1, 12, and 18 and argues that the challenge to claims 2–11 and 13–17 fails for the same reasons. PO Resp. 15–34. Patent Owner does not argue that Petitioner fails to show that claim 19 would have been obvious based on Howell-596 and Howell-158. *See id.*; Pet. Reply 17; PO Sur-reply 2–18. We first provide a brief overview of the references and then address the parties’ arguments.

1. Overview of Howell-596

Howell-596 discloses an electronic circuit within eyewear that allows a user to monitor its exposure to radiation, such as ultraviolet or infrared radiation or light. Ex. 1004, code (57).

We reproduce Figure 1 of Howell-596 below.

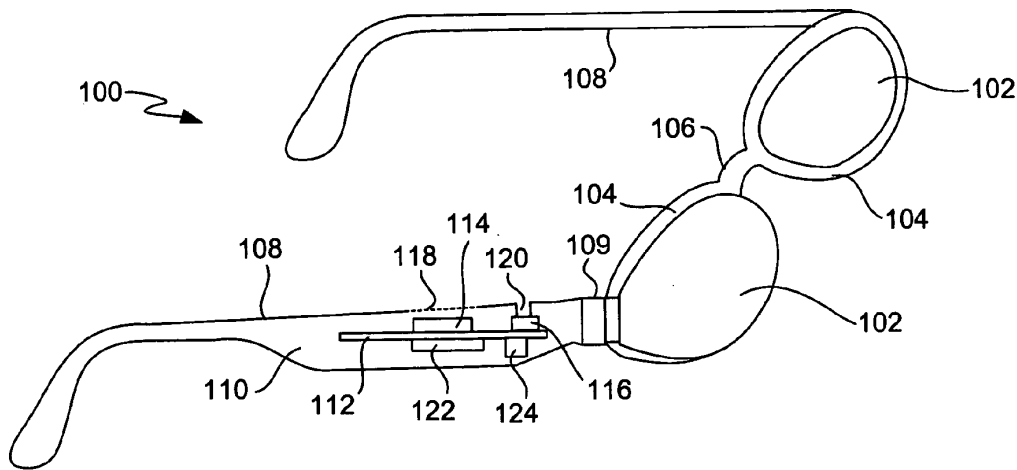


Figure 1 shows “a perspective view of UV monitoring glasses according to one embodiment of the invention.” Ex. 1004 ¶ 15. Figure 1 depicts glasses 100 that include a frame having lens holders 104 and a pair of temples 108. *Id.* ¶ 73. Temples 108 include circuit board 112 within internal cavity 110. *Id.* Solar cell 114 and UV detector 116 are provided within cavity 110. *Id.* Circuitry 122 and display device 124 may be coupled to circuit board 112. *Id.*

Howell-596 discloses embodiments that include further details of module housings. In one embodiment, module housing 1700 houses UV detection system 1500 that includes UV sensor 1506, electrical circuitry 1508, display device 1510, and power supply 1504, such as a solar cell. Ex. 1004 ¶¶ 184, 194, Fig. 17A. Module housing 1700 may include vents or holes so that air can circulate through the housing, or, “[a]lternatively, the module housing 1700 does not include vents or holes, so as to be water-resistant or water-proof.” *Id.* ¶ 194. Howell-596 states that module housing 1700 is “placed into an opening, cavity or container of an eyewear housing, such as a temple region of the eyewear housing.” *Id.* ¶ 195. In one embodiment, eyewear housing 1720 has an opening, cavity or container

1721 for receiving the module housing 1700, with module housing 1700 contained by the eyewear housing 1720. *Id.* ¶ 196, Fig. 17B.

2. Overview of Howell-158

Howell-158 relates to a “pair of glasses with one or more electrical components partially or fully embedded in the glasses.” Ex. 1006, code (57). The electrical components may include a speaker, a storage medium, and a processor. *Id.*

We reproduce an excerpted version of Howell-158’s Figure 1 to show the key features of the glasses.

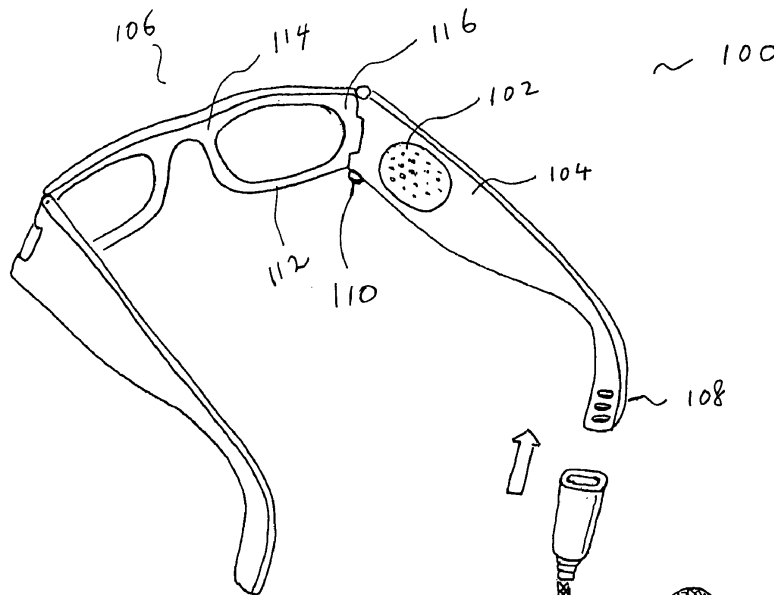


Figure 1 shows glasses 106 having a speaker 102 at least partially embedded in one of temples 104 of glasses 106. Ex. 1006 ¶ 49, Fig. 1. Figure 1 depicts speaker 102 closer to the hinge and lens holder of glasses 106 than free end 108 of temple 104. *Id.* ¶ 49. Howell-158 teaches that “[f]or glasses with metallic frames, to prevent circuits from being shorted or to reduce leakage current,” an “insulating layer” may be provided “between the electrical components or circuit board and the metallic frames.” *Id.* ¶ 53.

Howell-158 states that in “[o]ne example” the “insulating layer is a tape to encapsulate the electrical components” and further states that the insulating layer may be “dielectric tape” and that “the dielectric tape can be double-sided sticky tape.” *Id.* Howell-158 states that the electrical components may fit within a cavity formed between two halves of temples 104. *Id.*; *see also id.* at claims 26 (referring to a “functional module” including electrical components and a cavity within the frame), 27 (referring to the functional module “removably” provided within the cavity).

3. *Claim 1*

For claim 1, Petitioner points to specific portions of Howell-596 and Howell-158 to support its assertions that the references disclose the limitations of claim 1 and argues that a POSITA would be motivated to combine the references. Pet. 15–24. Petitioner relies on the testimony of Dr. Feland to support its assertions. *See id.* Patent Owner does not dispute Petitioner’s assertion that its proposed combination discloses all of the limitations of claim 1, and instead argues that Petitioner fails to provide a sufficient motivation to combine the references. *See* PO Resp. 15–23. We first address Petitioner’s argument that the references teach the claim limitations, and then address the parties’ arguments as to motivation to combine.

a. Disclosure of the Limitations of Claim 1

For the preamble, reciting a “first device,” Petitioner contends that Howell-596 discloses glasses that meet the “first device” language. Pet. 15 (citing Ex. 1004 ¶ 73, Fig. 1). Assuming that the preamble limits the claim, we find that Petitioner establishes that Howell-596 discloses the preamble.

Claim 1 further recites a “a frame comprising a first temple and a second temple, wherein the frame comprises a housing module coupled to a structural member.” Ex. 1001, claim 1. Petitioner asserts that Howell-596 discloses a frame, shown in Figure 1 reproduced above, having temples 108. Pet. 15 (citing Ex. 1004 ¶ 73, Fig. 1). Petitioner also contends that Howell-596 discloses the claimed “housing module” because Howell-596’s Figure 17B depicts “eyewear housing 1720 at the temple, which ‘has an opening, cavity, or container 1721 for receiving the module housing 1700.’” *Id.* at 16–17 (citing Ex. 1002 ¶¶ 60–61; Ex. 1004 ¶¶ 73, 194–196, Fig. 1). Petitioner also argues that “Howell-596’s eyewear housing 1720 is coupled to the lens holder 104 (Fig. 1) of the eyeglass frame, which is a structural member of the eyeglass frame.” *Id.* at 18. We find that Petitioner establishes that Howell-596 discloses the claimed frame, first and second temple, and a housing member coupled to a structural member.

Claim 1 also recites “a first lens and a second lens coupled to the frame; and an electronics module, wherein the electronics module is located within the housing module; wherein the electronics module comprises at least any two of: a power source; a controller; and a sensing mechanism.” Ex. 1001, claim 1. Petitioner argues that Howell-596 discloses glasses having two lenses 102 coupled to the frame of the glasses. Pet. 18 (citing Ex. 1004 ¶ 73, Fig. 1). Petitioner also contends that Howell-596’s electronics module has a module housing 1700 with electronics such as UV detection system 1500 within the housing. *Id.* at 19–20 (citing Ex. 1004 ¶¶ 184, 194–196, Figs. 15A, 17A, 17B). According to Petitioner, UV detection system 1500 includes components such as power source 1504, UV sensor 1506, and a microcontroller that meets the “power source,” “sensing

mechanism,” and “controller” limitations, respectively. *Id.* at 20–21 (citing Ex. 1004 ¶¶ 184, 192, 194–195, Fig. 15A). We find that Petitioner establishes that Howell-596 discloses the claimed lenses and an electronics module within the housing module that includes a power source, sensor, and controller.

Finally, claim 1 recites “wherein an insulating layer is disposed between one or more electronic components located within the electronics module and the frame of the first device.” Ex. 1001, claim 1. Petitioner argues that Howell-158 discloses these limitations because it describes using “an ‘insulating layer between the electrical components or circuit board and the metallic frames’” to “‘prevent circuits from being shorted’ and to ‘reduce leakage current’ in glasses with metallic frames.” Pet. 22 (citing Ex. 1006 ¶ 53). Petitioner also points to the specific examples Howell-158 describes for an insulating layer, including dielectric tape that can be double-sided sticky tape. *Id.* We find that Petitioner establishes that Howell-158 discloses the claimed insulating layer in the claimed location and that Petitioner’s proposed combination of Howell-596 with Howell-158’s insulating layer teachings would also teach these limitations.

Based on the foregoing, Petitioner proves by a preponderance of the evidence that its proposed combination of Howell-596 and Howell-158 discloses all of the limitations of claim 1.

b. Motivation to Combine Howell-596 and Howell-158

Petitioner provides several reasons in support its combination of Howell-596 and Howell-158, and in particular the use of Howell-158’s insulating layer between Howell-596’s electronics and frame. *See* Pet. 21–24. Petitioner first notes the overlapping nature of the references and

asserts that Howell-158, like Howell-596, discloses various methods of embedding electronics within eyewear, including speaker 102 within temple 104 of Howell-158's glasses. *Id.* at 21 (citing Ex. 1006 ¶¶ 8, 48–49, 51, 106, 112, 170, claim 26). Petitioner also contends that “Howell-158 incorporates by reference Howell-596 and expressly instructs the POSITA to consider their ‘related’ disclosures,” including suggesting that the Howell-158 eyeglasses should be used with Howell-596's UV radiation detection system. *Id.* at 22 (citing Ex. 1006 ¶¶ 3, 18, 167).

Petitioner provides several reasons why one of ordinary skill in the art “would have been motivated to apply Howell-158's insulating layer between the electronics and other components located within Howell-596's electronics module and its frame.” Pet. 22 (citing Ex. 1002 ¶ 66). These reasons include (1) “Howell-158 incorporates by reference Howell-596, so it expressly instructs the POSITA to combine the disclosures of the two references”; (2) adding Howell-158's insulating layer would have provided the benefits Howell-158 indicates (preventing circuits from being shorted and reducing current leakage); (3) insulating electric components was standard practice; (4) Howell-158 describes several ways to incorporate well-known insulating layers, such that one of ordinary skill in the art would have had a reasonable expectation of success in applying an insulating layer to Howell-596's glasses; (5) metallic frames were one of only three frame material types and metallic frames have advantages over other materials, such that selecting metallic frames would have been obvious; and (6) “[a]pplying Howell-158's insulating layer represents nothing more than the simple addition of one known element (insulating layer) to another known element (temple containing electronics) to obtain predictable results

(electrically insulating the electronics from the temple ‘to prevent circuits from being shorted or to reduce leakage current’).” *Id.* at 22–23 (citing Ex. 1002 ¶¶ 66–69; Ex. 1006 ¶ 53; Ex. 1011, 57).

Patent Owner argues that “a POSITA would not have been motivated to implement Howell-158’s alleged disclosure of an insulating layer within the context of Howell-596” for a number of reasons. PO Resp. 15–23. For example, Patent Owner asserts that (1) Petitioner fails to “specify how” Howell-158’s insulating tape would be applied; (2) “Ppetitioner overreaches in its assertion that Howell-158 ‘expressly instructs the POSITA to combine the disclosures of the two references’”; (3) “Ppetitioner invents an insulation problem where none exists” because “Howell-596 does not teach use of metal frames” and a POSITA would not seek to use metal frames; (4) “Howell-158’s use of double-sided tape is incompatible with Howell-596’s UV detection module,” which requires “maximum exposure to its surroundings”; (5) Petitioner fails to account for added weight, complexity, components, and impact on aesthetics; and (6) Howell-596 does not need an insulating layer due to its embodiment using an “air gap” in the form of vents or holes and the fixed positions of its components. *Id.* at 16–23.

Petitioner replies by reiterating that Howell-158 incorporates Howell-596 by reference and that a POSITA would have been motivated to add Howell-158’s insulating layer to prevent “short circuits and reduce leakage currents in eyeglasses with metallic frames.” Pet. Reply 3. As to Patent Owner’s specific arguments, Petitioner contends that (1) Patent Owner already admits that Howell-158 teaches positioning its insulating layer between the metal frames and electrical components and the Petition explains that the same layer would be placed “between the electronics and

other components located within Howell-596's electronics module and its frame"; (2) the references need not expressly teach a combination of the insulating layer within Howell-596's eyeglasses in an obviousness challenge; (3) Howell-158 expressly teaches the use of metal frames and doing so would have been obvious given the limited number of material options; (4) the expressly stated advantage of using the insulating layer within metal frames support the combination even if there are disadvantages in the design; (5) the combination does not impede Howell-596's UV detection system because the claims do not require the layer to cover all components and Patent Owner improperly suggests that double-sided tape from Howell-158 must be used in the combination; and (6) a POSITA is not an automaton and would know how to incorporate an insulating layer without impeding the UV detection system or causing problems with the overall design or aesthetics of the eyeglasses. *Id.* at 3–11 (emphasis omitted).

In its Sur-reply, Patent Owner argues that Petitioner fails to refute the arguments in its Response, and relies too heavily on the knowledge of a POSITA in its analysis, which lacks specificity. *See* PO Sur-reply 2–4. Patent Owner also asserts that (1) Howell-158's use of metal frames is one of many options and the failure of the reference to incorporate its insulating layer with Howell-596's embodiment in the manner Petitioner proposes undermines Petitioner's position; (2) "Petitioner ignores disadvantages of incorporating metal frames into Howell-596's eyeglasses" such as conducting electricity and heat; (3) Petitioner fails to explain how its combination would not impede the UV detection system; and (4) Petitioner fails to give proper weight to the negative impacts of metal frames and

Howell-596's ability to avoid short circuits without an insulating layer. *Id.* at 4–12.

Based on our review of the record, we find Petitioner's arguments and evidence as to the motivation to combine Howell-596 and Howell-158 persuasive. Importantly, the references themselves support the combination because Howell-158 expressly teaches the advantages of using an insulating layer with metal frames and incorporates by reference Howell-596 and its embodiments that disclose all but the insulating layer limitations of claim 1. *See* Pet. 15–21. While Patent Owner correctly notes that the references do not expressly teach the use of the insulating layer in the Howell-596 embodiments, the references do not teach away from that approach and at least implicitly support Petitioner's proposed combination, which involves using an advantageous design element (an insulating layer) with another embodiment incorporated into the same document. *See id.*; Ex. 1006 ¶¶ 3 (incorporating Howell-596), 52–53 (disclosing the use of metal frames and the advantages of using an insulating layer with metal frames). Patent Owner does not dispute that the stated advantages of the insulating layer—preventing short circuits and reducing leakage current—would apply to the embodiments of Howell-596 when those designs incorporate a metal frame. *See* PO Resp. 18 (arguing that the advantages of the insulating layer only apply if metal frames are implemented in Howell-596's system). In short, the references themselves amply support Petitioner's motivation to combine arguments and the expert testimony Petitioner relies on in support of those arguments. *See* Pet. 21–24; Pet. Reply 2–10; Ex. 1002 ¶¶ 63–69.

Patent Owner raises a number of arguments against the combination, but we find those arguments less persuasive than Petitioner's arguments and

evidence. First, Patent Owner argues that Petitioner’s proposed combination lacks specificity, but the claims merely require “an insulating layer disposed between *one or more* electronic components within the electronics module and the frame,” Patent Owner does not dispute that Howell-158 discloses this limitation, and Patent Owner does not dispute that applying that teaching to Howell-596 would result in a combination that discloses the limitation, i.e., an insulating layer in the claimed location. Ex. 1001, 89:4–6; Pet. 21–24; PO Resp. 15–23 (addressing only motivation to combine arguments as to claim 1). Because the claim limitation merely requires an insulating layer between one component and the frame, Howell-158 indisputably teaches the limitation, and the Petition sets forth an argument in support of “apply[ing] Howell-158’s insulating layer between the electronics and other components located within Howell-596’s electronics module and its frame,” no more specificity was required to satisfy the claim limitations. *See* Pet. Reply 3–4.

Second, Patent Owner argues that “Petitioner overreaches in its assertion that Howell-158 ‘expressly instructs the POSITA to combine the disclosures of the two references.’” PO Resp. 17. To the extent Petitioner relies on an express statement to combine Howell-158’s insulating layer with the embodiments of Howell-596, we agree with Patent Owner, but the law does not require an express instruction to combine the references to establish obviousness. As noted above, Howell-158 supports Petitioner’s position because it includes the insulating layer arranged as claimed, explicitly states advantages of using such a layer, and incorporates embodiments of Howell-596.

Third, Patent Owner argues that “Petitioner invents an insulation problem where none exists” because “Howell-596 does not teach use of metal frames” and a POSITA would not seek to use metal frames. PO Resp. 18–19. We disagree. Howell-596 need not teach the use of metal frames when Howell-158 already does so, and we agree with Petitioner that a POSITA would seek to use metal frames in certain circumstances as one of a limited number of frame material options. *See* Pet. 23–24. Howell-158’s disclosure of three materials for the frames, one of them metal, supports Petitioner’s position and related expert testimony. *See* Ex. 1006 ¶¶ 51–54 (disclosing frames made of plastic, metal, and hard rubber); Ex. 1002 ¶ 68 (“A POSITA would have understood that metallic frames have several advantageous properties,” including “malleability, strength, ductility, light weight, plate-ability (the ability to be ‘overlaid over a base metal’), and corrosion resistance. Ex. 1015 at 11-12. Further, a POSITA would recognize that there are a limited number of identified materials for making Howell-158 and Howell-596’s eyeglass frames such that selecting metallic frames for use would have been obvious.”); Pet. Reply 5–6. The advantages of metal frames in some situations motivates their use, and once a metal frame material is selected the advantages of adding Howell-158’s insulating layer are readily apparent. *See* Ex. 1006 ¶ 53.

Fourth, Patent Owner contends that “Howell-158’s use of double-sided tape is incompatible with Howell-596’s UV detection module,” which requires “maximum exposure to its surroundings.” PO Resp. 18, 20–21. We disagree. As an initial matter, Petitioner does not premise its argument on incorporating the specific “example” of double-sided tape in its proposed combination, as Patent Owner implies. *See* Pet. 21–23; Ex. 1006 ¶ 53; PO

Resp. 20–21; *see also In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012) (“It is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements.”). In addition, Howell-158 expressly suggests incorporating its design with UV radiation sensors, undermining Patent Owner’s argument that the use of an insulating layer would be incompatible with such a detector. *See* Ex. 1006 ¶¶ 18, 167. Patent Owner acknowledges that Howell-158 discloses the use of such sensors and the references teach how to accommodate them by introducing windows to allow them to work, but Patent Owner fails to explain why a POSITA would fail to use similar measures to implement Howell-158’s insulating layer in the Howell-596 embodiments while maintaining the functionality of the UV detection module. PO Resp. 20. We agree with Petitioner that a POSITA would know how to implement the insulating layer, which need only occupy a space between a single electrical component and the frames to meet the claim limitation, without interfering with the operation of Howell-596’s UV detection module. *See* Pet. Reply 7–8; *KSR*, 550 U.S. at 421 (“A person of ordinary skill in the art is also a person of ordinary creativity, not an automaton.”).

Fifth, Patent Owner asserts that Petitioner’s proposed combination fails to account for the added weight, complexity, components, and their impact on aesthetics. PO Resp. 21. Patent Owner seems to suggest that a POSITA would not implement the combination because it would seek to avoid the added weight and components necessary to implement a UV detection system, but this ignores the presence of a UV detection system in both Howell-158 and Howell-596. *See id.* To the extent that Patent Owner

meant to direct the argument to the additional weight to account for metal frames and an insulating layer, the argument fails to address or give adequate weight to the advantages of metal frames noted above as well as an insulting layer, as Howell-158 itself suggests. Ex. 1006 ¶¶ 52–53 (describing metal frames as made from a “relatively light metal” and noting advantages of insulating layer).

Finally, Patent Owner contends that Howell-596 does not need an insulating layer due to its embodiment using an “air gap” in the form of vents or holes and the fixed positions of its components. PO Resp. 22–23. Even if Howell-596’s design includes a design that lessens the need for an insulating layer, that fact alone would not teach away from or undermine the proposed combination, which would further inhibit short circuits and current leakage as Howell-158 teaches. See Ex. 1006 ¶ 53. This argument, like the majority of Patent Owner’s arguments, at best suggests that there may be potential disadvantages in Petitioner’s proposed combination without giving proper weight to the advantages Petitioner cites that support the motivation to combine. See *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (Although a modification may impede one benefit, “[a] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” (alteration in original))

Based on the foregoing, Petitioner proves by a preponderance of the evidence that a POSITA would have been motivated to combine Howell-596 and Howell-158 in the manner Petitioner proposes. We determine that Petitioner proves by a preponderance of the evidence that claim 1 would have been obvious based on Howell-596 and Howell-158.

4. *Claim 12*

Claim 1 requires a “a housing module coupled to a structural member” and an “electronics module . . . located within the housing module,” while claim 12 depends from claim 1 and further recites: “wherein the structural member comprises a cavity in the first temple; and wherein the housing module is configured to be selectively placed within the cavity.” Ex. 1001, 88:62–63, 90:1–4. The specification of the ’541 patent states that “a ‘housing module’ may refer to a component that may house (e.g. contain, substantially contain, surround, surround a portion of, encircle, etc.) of the electronics (and/or an electronics module) of the electronic spectacles.” *Id.* at 50:40–44.

For claim 12, Petitioner notes that it “maps the disclosures of Howell-596 and Howell-158 in a slightly different way only for the limitations ‘housing module,’ ‘structural member,’ and ‘electronics module.’” Pet. 33. Petitioner alleges that Howell-596’s “[m]odule housing 1700 qualifies as the claimed housing module . . . because it is ‘a housing for the UV detection system 1500’ including its electrical circuitry.” *Id.* (citing Ex. 1001, 50:40–48; Ex. 1004 ¶¶ 184, 194). Petitioner contends that “module housing 1700 is coupled to a cavity 1721 in eyewear housing 1720 (structural member) at the temple.” *Id.* at 33–34 (citing Ex. 1004 ¶ 196, Fig. 17B). Petitioner also asserts that Howell-158’s “insulating layer qualifies as the claimed electronics module including because it ‘encapsulate[s] the electrical components’ to provide both insulation and ‘mechanical stiffness.’” *Id.* at 34 (citing Ex. 1001, 7:45–51; Ex. 1002 ¶ 103; Ex. 1006 ¶ 53) (alteration in original).

Patent Owner argues that, given Petitioner's mapping of the prior art and claim 12, Howell-158's insulating layer cannot meet both the "insulating layer" of claim 1 and the "electronics module" of claim 12. PO Resp. 27–28. Patent Owner also repeats its argument as to claim 1 that Petitioner fails to explain how it would implement the insulating layer from Howell-158 into the proposed combination to "encapsulate" the electronics, why a POSITA would be motivated to do so, or how a POSITA would do so without interfering with Howell-596's UV detection system. *Id.* at 28–29. According to Patent Owner, "a POSITA would not have been motivated to encapsulate Howell-596's UV detection system 1500 in double-sided sticky tape before placing it into the module housing 1700 and, in turn, placing that module housing 1700 within eyewear housing 1720. *Id.* at 29 (citing Ex. 2014 ¶¶ 62–63). Patent Owner also contends that "Petitioner identifies no need for—and a POSITA would not have understood a need to exist for—yet another layer of protection for the UV detection system." *Id.*

Petitioner replies by asserting that Howell-158's insulating layer can satisfy the insulating layer and electronics module limitations simultaneously because "the '541 patent expressly discloses that its 'insulating layer may comprise the exterior wall of the electronics module.'" Pet. Reply 10–12 (citing Ex. 1001, 2:20–21, 7:45–51, 58:50–55, 59:18–19; Ex. 1018, 27:7–22). Petitioner also attempts to anticipate an argument Patent Owner makes in the context of a different ground, where Patent Owner relies on the prosecution history in an attempt to read the claim as excluding the embodiment having an the electronics module also satisfy the insulating layer limitation. *Id.* at 12–13. Petitioner further contends that its assertions are clear because it relies on the same structure in Howell-158 as

the claimed “insulating layer” for both claims 1 and 12. *Id.* at 13–14. Petitioner also argues that Patent Owner incorrectly assumes that the insulating layer would encapsulate Howell-506’s UV sensor, when Petitioner’s “rationale for combining the references does not depend on Howell-158’s insulating layer encapsulating the sensor.” *Id.* at 14.

In its Sur-reply, Patent Owner argues that Howell-158 “neither discloses nor suggests that an insulating layer can ‘function as a housing or container’” and a POSITA would have understood that Howell-158’s insulating layer cannot function as a housing or container.” PO Sur-reply 12–13 (citing Ex. 1004 ¶ 53) (emphasis omitted). Patent Owner contends that Petitioner fails to establish that a POSITA would have understood Howell-158’s tape “to provide sufficient stiffness to house an electronics module” or that any insulating layer would fall within the scope of the claimed “electronics module.” *Id.* at 13–14. As to Petitioner’s prosecution history disclaimer arguments, which Patent Owner raises in the context of a different ground, Patent Owner asserts that it “does not rely on its disclaimer argument in responding to ground 1.” *Id.* at 14. Finally, Patent Owner argues that Petitioner fails to provide an adequate motivation to use Howell-158’s insulating layer as a module and improperly relies on a motivation that would encapsulate Howell-596’s UV sensor. *Id.* at 15–16.

As an initial matter, we see no ambiguity in Petitioner’s arguments as to claim 12, where the Petition clearly maps the prior art to each limitation of the claim, identifies where the arguments differ from the arguments made with respect to claim 1, and notes that all other arguments remain the same. *See* Pet. 33. After Petitioner reiterated these points in its Reply, including its reliance on Howell-158’s insulating layer to meet two limitations in the

claim, Patent Owner did not substantively respond by indicating where the Petition lacked clarity. *See* Pet. Reply 10–12; PO Sur-reply 12–13.

We also agree with Petitioner that it may properly rely on a single structure as satisfying the “insulating layer” and “electronics module” given that the ’541 patent itself discloses such an embodiment. *See* Ex. 1001, 58:50–55 (“[W]here an electronics module comprises an exterior wall . . . that is made of . . . an insulating material, the exterior wall may be considered as the insulating layer disposed between the electronic components (that are disposed within the electronics module) and the frame.”), 2:20–21 (“the insulating layer may comprise a portion of the electronics module”); Pet. 34; Pet. Reply 10–12. Patent Owner does not argue that claim 12 fails to encompass this embodiment for purposes of this challenge, but even if it did, the intrinsic evidence strongly supports Petitioner’s reading of the claim. *See* PO Sur-reply 12–14. In addition, as noted above when addressing claim 1, Patent Owner also does not dispute that Howell-158’s “insulating layer” discloses the “insulating layer” limitation of claim 1, and we agree with Petitioner that Howell-158 discloses the limitation. *See* Pet. 21–22; Ex. 1006 ¶ 53.

We now turn to whether Petitioner establishes that Howell-158’s insulating layer also meets the “electronics module” limitation. Howell-158 teaches, in one embodiment, insulating “tape to encapsulate the electrical components” and “provide mechanical stiffness.” Ex. 1006 ¶ 53. We find that Petitioner adequately establishes that Howell-158’s insulating tape, that “encapsulate[s]” electrical components on a circuit board with a degree of stiffness, falls within the scope of the claimed “electronics module.” The language of claim 1 and the ’541 patent supports this finding because neither

suggest that the electronics module must fully encapsulate all electrical components or suggest that the module have a particular degree of stiffness or strength to satisfy the “module” requirement. The claims include no such limitations, and the ’541 patent indicates that the electronics module encompasses “a housing or container” that includes electrical components. Ex. 1001, 7:45–47. Other portions of the ’541 patent describing various modules, such as the housing module, state that a module “may refer to a component that may house (e.g. contain, substantially contain, surround, *surround a portion of*, encircle, etc.)” and that a “module need not fully encapsulate.” *Id.* at 50:41–46 (emphasis added); *see also id.* at 70:59–61 (“[A] housing module as defined above may be used to cover or *encapsulate portions* of the electronics module.” (emphasis added)). While not determinative, the fact that the claims lack specificity and the specification refers to housing modules that include those that encapsulate portions of the structure within the module, using the same “encapsulate” language as Howell-158, supports Petitioner’s position that Howell-158’s insulating layer also satisfies the “electronics module” limitation of claim 1.

We disagree with Patent Owner’s argument that a POSITA would not be motivated to encapsulate the electronics given that such an approach would interfere with Howell-596’s UV detection system. PO Resp. 28–29. As we noted above in the context of our discussion of claim 1, a POSITA would still be motivated to combine the references even with the presence of the UV detection system because Howell-158 already contemplates the use of a UV sensor in its system and a POSITA would know how to accommodate such a sensor by not including an insulating layer in that portion of the device. *See* Ex. 1006 ¶¶ 18, 53, 167; Ex. 1002 ¶¶ 64–66.

While such an arrangement may allow for openings or windows in the insulating material/electronics module in Petitioner’s proposal, we do not read the claimed “electronics module” as requiring an entirely closed module with no openings. As noted above, the ’541 patent makes clear that the “modules” may have access openings. *See* Ex. 1001, 50:40–44 (describing a “housing module” as a component that may “house” electronics by merely “surround[ing] a portion of” the electronics), 69:21–23 (“the electronics module housing 1603 may have an opening that may allow a wearer to interact with switch 1604”), 70:26–28 (“The exemplary housing module 2701 is shown as having an opening 2702 in one end in which the electronics module may be selectively inserted.”); *see also id.* at 52:11–14 (describing insulating material as disposed between housing module and electronics module, “or a portion” of the electronics module, suggesting that the insulating layer need not fully encapsulate the electronics), 70:59–61 (describing housing module that “encapsulate[s] portions of the electronics module”); Pet. Reply 14 (arguing that its rationale for the combination does not require encapsulating the UV sensor in Howell-596).⁸

We also disagree with Patent Owner’s argument that Petitioner’s arguments fail because they do not explain “what degree of mechanical stiffness might be necessary for an electronics module.” PO Sur-reply 13–14. Patent Owner did not raise this particular argument until its Sur-reply, depriving Petitioner a chance to meaningfully respond. *See id.*; PO

⁸ Patent Owner raises additional motivation to combine arguments, such as Petitioner’s alleged failure to show a need for the insulating tape, that are similar to Patent Owner’s arguments we address in the context of claim 1. *See* PO Resp. 29–30.

Resp. 28–29 (noting Petitioner’s reliance on the tape’s “mechanical stiffness” without arguing that a particular degree of stiffness was required). Even if Patent Owner did not forfeit this argument, we find it unpersuasive because the claim does not require any degree of stiffness, and Patent Owner fails to explain how the claim language or the ’541 patent requires an electronics module with a particular degree of stiffness that double-side insulating tape lacks. On the whole, we are persuaded by Petitioner’s showing that Howell-158 discloses both the insulating layer and electronics module. *See* Pet. 34; Ex. 1002 ¶ 101; Ex. 1006 ¶ 53.

Patent Owner does not dispute that Petitioner’s proposed combination fails to disclose any of the remaining limitations of claim 12, and, based on our review, we find that Petitioner establishes that the proposed combination discloses those limitations. *See* Pet. 33–34; PO Resp. 26–30. Based on the foregoing, we determine that Petitioner proves by a preponderance of the evidence that claim 12 would have been obvious based on Howell-596 and Howell-158.

5. Claim 18

Claim 18 depends from claim 1 and further recites: “wherein the housing module has a thickness that is less than or equal to approximately 0.7 mm.” Ex. 1001, 90:18–20.

Petitioner argues that claim 18 “adds nothing to claim 1 other than a range for the thickness of a side of the housing module” and that the “range is the result of routine optimization, not invention.” Pet. 41 (citing Ex. 1002 ¶ 122). According to Petitioner, a “POSITA would have been motivated to have the thickness of the housing module be as thin as possible because space within eyewear is limited by ergonomic and aesthetic considerations.”

Id. Petitioner asserts that “[w]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *Id.* (quoting *In re Aller*, 220 F.2d 454, 456 (CCPA 1955)). Petitioner also contends that “POSITAs would have been long aware that” Howell-596’s eyewear housing or Howell-158’s temple (i.e., its housing module) “could have a thickness that is less than or equal to approximately 0.7 mm” because “multiple references disclosed temples whose entire widths were less than approximately 0.7 mm thick,” including Dudli⁹ and Della.¹⁰ *Id.* at 42 (citing Ex. 1002 ¶ 123; Ex. 1012, claim 2; Ex. 1013, 9, Figs. 1–3). Petitioner asserts that “Dudli explicitly disclosed a temple for spectacles ‘preferably with a thickness of 0.2 to 0.5 mm’” and “Della explicitly disclosed temples with a forward portion 13a having a thickness of ‘around 0.7 mm.’” *Id.* According to Petitioner, a “POSITA would have been motivated to minimize housing module thickness to maintain design ergonomics and aesthetics of the electronic eyewear” and cites statements in Howell-596 and Kokonaski-166 in support of its arguments. *Id.* at 42–43 (citing Ex. 1002 ¶ 124; Ex. 1004 ¶¶ 7, 68; Ex. 1008 ¶¶ 6–7, code (57)).

Patent Owner argues that Petitioner fails to point to anywhere in Howell-596 or Howell-158 that discloses the thickness limitation of claim 18. PO Resp. 32. In addition, Patent Owner contends that Petitioner’s reliance on Dudli and Della that disclose the thickness limitation lacks relevance because those references “disclose spectacles having no electrical

⁹ EP 1 785 763 A1, published May 16, 2007 (Ex. 1012, “Dudli”).

¹⁰ Italian App. No. 102001900931684, published Nov. 22, 2002 (Ex. 1013, “Della”).

components whatsoever” and Petitioner provides insufficient motivation to use those references to arrive at the claimed invention. *Id.* at 32–33 (citing Ex. 2014 ¶¶ 65–66). Patent Owner also asserts that Petitioner’s stated motivation based on aesthetics lacks support because Petitioner proposes retaining electronics such as Howell-596’s UV detection system, which thickens the frame and detracts from the aesthetics. *See id.* at 33–34 (citing Ex. 2014 ¶ 67).

In its Reply, Petitioner reiterates its “routine optimization” obviousness argument, which Petitioner characterizes as unrebutted by Patent Owner, and contends that “[n]either Howell-596 nor Howell-158 is required to disclose the precise claimed range for the Petition to establish obviousness.” Pet. Reply 14–15. According to Petitioner, it satisfied its burden by pointing to references that disclose the claimed thickness and that Patent Owner did not dispute its argument “that thickness is a result-effective variable and that optimizing it would have been within a POSITA’s capabilities.” *Id.* at 15–16 (citing Ex. 1002 ¶¶ 124–125). Petitioner also contends that it uses additional references such as Dudli and Della to demonstrate what a POSITA would have understood as the desired proportions of the eyewear components in the prior art and to support Dr. Feland’s opinion that a POSITA would have been motivated to maintain those proportions in eyeglasses having electronic components. *Id.* at 16 (citing Ex. 1002 ¶¶ 122–125).

In its Sur-reply, Patent Owner argues that Petitioner’s reliance on routine optimization circumvents its burden by failing to address how to incorporate internal electronic components into eyeglasses or why a POSITA would have been motivated to do so while meeting the claimed

thickness requirements. PO Sur-reply 16–17. Patent Owner also alleges that Petitioner and its expert oversimplify the task of meeting the claimed thickness in the result-effective variable analysis, which overlooks the “delicate balance between providing structural support while not impeding the highly sensitive sensing mechanism and insulating layer as claimed.” *Id.* at 17 (citing Ex. 1001, 66:15–34). According to Patent Owner, even though prior art shows eyeglasses having the claimed thickness, “Petitioner’s generalized statements of vague potential benefits do not sufficiently articulate motivation to combine.” *Id.*

Based on our review of the record, Petitioner establishes that a POSITA would have found it obvious, through routine optimization, to select a housing module with the claimed thickness of less than or equal to 0.7 mm. *See Aller*, 220 F.2d at 456; *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980) (“[D]iscovery of an optimum value of a result effective variable . . . is ordinarily within the skill of the art.”); *see also Power-Kennedy Contracting Corp. v. Concrete Mixing & Conveying Co.*, 282 U.S. 175, 184–85 (1930) (“[O]bviously a mere change in proportion would involve no more than mechanical skill and would not amount to invention.”). Several reasons support Petitioner’s arguments, which we address in turn.

First, contrary to Patent Owner’s arguments, the prior art of record supports Petitioner’s argument that a POSITA would be motivated to modify the proposed combination to make the housing module as thin as possible and would arrive at the claimed thickness. *See* PO Resp. 32–33; PO Sur-reply 16–17; Pet. 41–43; Pet. Reply 14–16. For example, Petitioner and its expert rely on Howell-596, which focuses on reducing “disturbance to design features of the eyewear” and Kokonaski-166, which emphasizes

integrating electronic components into an electro-active frame in a “*cosmetically pleasing manner*.” Pet. 42–43 (citing Ex. 1004 ¶¶ 7, 68; Ex. 1008, code (57)) (emphasis added). Kokonaski-166 also emphasizes the importance of finding “ways to incorporate electronics into eyewear without harming the *aesthetics and functionality* of the eyewear,” without “limit[ing] the fashion design of the eyeglass frame,” and with the “desire[] to avoid . . . a *thick temple or frame housing* electronics that distracts from the aesthetic appearance of the eyeglass.” *Id.* (citing Ex. 1008 ¶¶ 6–7) (emphasis added). Teaching avoidance of a thick frame points a POSITA toward use of a thinner frame. *See id.* These passages support the argument that a POSITA would seek to minimize the thickness of the housing module for ergonomic and aesthetic reasons. *See id.*; Ex. 1002 ¶¶ 122, 125.

Second, those same prior art passages support Petitioner’s argument that a POSITA would seek to mimic the design of traditional, non-electronic eyeglasses to preserve the ergonomic and aesthetic advantages of those eyeglasses. *See* Pet. Reply 16; Ex. 1002 ¶ 124 (opining that “a POSITA would have been well aware of the demands of design aesthetics of electronic eyewear” and would have sought to “maintain[] the proportions of the components of the electronic eyewear similar to those of traditional eyewear” and “maintaining the weight of traditional eyewear”). Petitioner (and Dr. Feland) reasonably interpret the passages as implicitly referencing traditional eyewear when they seek “ways to incorporate electronics into eyewear without harming the aesthetics and functionality of the eyewear” and avoiding “disturbance to design features of the eyewear” and avoiding “thick” frames. Pet. 42–43 (citing Ex. 1004 ¶¶ 7, 68; Ex. 1008 ¶¶ 6–7).

Third, Petitioner persuasively relies on Dudli and Della as providing reference points for desired thickness found in the ergonomics and aesthetics of traditional, non-electronic eyeglasses. *See* Pet. 42 (citing Ex. 1002 ¶ 123; Ex. 1012, claim 2; Ex. 1013, 9, Figs. 1–3). These references teach that a frame thickness of 0.7 mm or less was known in the eyeglass art, further supporting a motivation to seek a module housing that would result in frames having that thickness. *See id.*; Pet. Reply 16; Ex. 1002 ¶ 123. Patent Owner argues that Dudli and Della are “irrelevant” due to their lack of electronics, but fails to acknowledge their more general teachings of known desired thicknesses in the eyeglass prior art. *See* PO Resp. 32–33. Because a POSITA would seek “ways to incorporate electronics into eyewear without harming the aesthetics and functionality” of traditional eyewear, as discussed above, the thickness of traditional eyewear that lacks electronics would be highly relevant and supports Petitioner’s position that a POSITA would arrive at the claimed thickness, already known in the eyeglass art, via routine experimentation. *See* Pet. 42–43 (citing Ex. 1004 ¶¶ 7, 68; Ex. 1008, ¶¶ 6–7).

Fourth, Petitioner supports its argument with applicable case law such as *Aller*, *Boesch*, and *Power-Kennedy*, which support a finding of obviousness here. *See* Pet. 41–42; Pet. Reply 15. Petitioner also persuasively relies on *In re Applied Materials, Inc.*, 692 F.3d 1289 (Fed. Cir. 2012), which applied *Aller* and *Boesch* and held that certain claimed dimensions were result-effective variables. *See id.* at 1295–98. Similarly here, Petitioner persuasively contends that the claimed module housing thickness is a result-effective variable, with thinner module housings

generally leading to better ergonomics (less size and weight) and aesthetics, as noted above.

Patent Owner does not persuasively distinguish Petitioner’s case law or argue that a POSITA would not have known that thinner frames have positive impacts on ergonomics or aesthetics. *See* PO Resp. 32–34; PO Sur-reply 16–17. Patent Owner relies on *ModernaTx, Inc. v. Arbutus Biopharma Corp.*, 18 F.4th 1364, 1373 (Fed. Cir. 2021) for the proposition that “the Federal Circuit has ‘never before applied the presumption of obviousness for overlapping ranges in a case in which the prior art does not contain an express disclosure of a range,’” but, as Petitioner points out, it does not rely on an overlapping range presumption of obviousness. *See* PO Resp. 32; Pet. Reply 16 n.3; *see also Pfizer Inc. v. Sanofi Pasteur Inc.*, 94 F.4th 1341, 1347–48 (Fed. Cir. 2024) (rejecting argument that the “result-effective variable doctrine” only applies in cases involving an overlap in a claimed range and a range in the prior art; affirming obviousness determination even though prior art did not disclose the limitation in question). Patent Owner does not provide persuasive evidence or legal authority challenging Petitioner’s position that thinner module housings and frames lead to improved aesthetics and ergonomics. *See* PO Resp. 32–34; PO Sur-reply 16–17; *see also E.I. DuPont de Nemours & Company v. Synvina C.V.*, 904 F.3d 996, 1008–11 (Fed Cir. 2018) (reversing Board decision in part due to erroneous finding that variables were not result-effective; “if the prior art does recognize that the variable affects the relevant property or result, then the variable is result-effective”).

The pertinent case law also directly refutes Patent Owner’s arguments. For example, Patent Owner argues that Petitioner fails to explain how to

achieve the claimed thickness, but “the prior art need not provide the exact method of optimization for the variable to be result-effective” and a “recognition in the prior art that a property is affected by the variable is sufficient to find the variable result-effective.” *Applied Materials*, 692 F.3d at 1297; *E.I. DuPont de Nemours*, 904 F.3d at 1009 (same); PO Resp. 33; PO Sur-reply 16–17. We are more persuaded by Petitioner’s argument that a POSITA would have arrived at the claimed thickness through routine optimization. *See* Pet. 41–42; Ex. 1002 ¶ 122.

Patent Owner also argues that “the thickness limitations recited in the ’541 Patent strike a delicate balance between providing structural support while not impeding the highly sensitive sensing mechanism and insulating layer as claimed.” PO Sur-reply 17 (citing Ex. 1001, 66:15–34). Patent Owner forfeited this argument based on the specification by raising it for the first time in the Sur-reply. Nevertheless, the cited portion of the specification merely describes electronics that tend to perform worse at housing module thickness “greater than 0.7 mm” and that decreased thickness may weaken the structural support of the housing, with a thickness “less than or equal to approximately 0.5 mm” or “0.3 mm” preferred. *See* Ex. 1001, 66:15–34. Patent Owner does not argue that these teachings of a range of preferred dimensions show the criticality of the claimed dimension or that some unexpected result is achieved at thicknesses less than or equal to 0.7 mm. *See Applied Materials*, 692 F.3d at 1297 (“The outcome of optimizing a result-effective variable may still be patentable if the claimed ranges are ‘critical’ and ‘produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art.’” (citing *Aller*, 220 F.2d at 456)); *Boesch*, 617 F.2d at 276–78 (reviewing test

data and concluding that Patent Owner failed to establish unexpected results). In addition, “a claim to a product does not become nonobvious simply because the patent specification provides a more comprehensive explication of the known relationships between the variables and the affected properties.” *Applied Materials*, 692 F.3d at 1297. Patent Owner’s arguments and evidence fail to show that this case falls into the “narrow” exceptions to the general rule that “the discovery of an optimum value of a variable in a known process is normally obvious.” *E.I. DuPont de Nemours*, 904 F.3d at 1009.¹¹

Based on the foregoing, we find that Petitioner proves by a preponderance of the evidence that the limitations of dependent claim 18 would have been obvious through routine optimization.

6. Claims 2–11, 13–17, and 19

Petitioner argues that claims 2–11, 13–17, and 19 would have been obvious based on Howell-596 and Howell-158. *See* Pet. 24–32, 35–41, 43–44. As noted above, for claims 2–11 and 13–17, which ultimately depend from claim 1, Patent Owner relies on its arguments for claim 1, which we found unpersuasive for the reasons provided above, and Patent Owner does not address Petitioner’s contentions as to claim 19. *See* PO Resp. 23–26, 30–31.

¹¹ Patent Owner also argues that Petitioner “directly contradicts” its rationale of minimizing thickness by incorporating Howell-596’s UV detection system in its proposed combination. *See* PO Resp. 33–34. We see nothing inconsistent with Petitioner’s positions, and do not read Howell-596 as presenting an “either/or” choice of retaining the UV detection system and failing to seek thinner designs, or vice versa. Patent Owner presents no evidence that the claimed thickness could not be achieved while retaining Howell-596’s UV sensors. *See id.*

We have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that the limitations in claims 2–11, 13–17, and 19 are disclosed by the combination of Howell-596 and Howell-158 for the reasons set forth in the Petition, which we adopt as our own. *See* Pet. 24–32, 35–41, 43–44.¹² Accordingly, we find that Petitioner has established, by a preponderance of the evidence, that claims 2–11, 13–17, and 19 would have been obvious over the combination of Howell-596 and Howell-158.

*E. Obviousness Based on Howell-596, Howell-158, and Hattori-913*¹³

Petitioner argues that claims 16 and 17 would have been obvious based on Howell-596, Howell-158, and Hattori-913. *See* Pet. 45–46. Claims 16 and 17 ultimately depend from claim 1. *See* Ex. 1001, 90:13–17. Patent Owner argues that “Petitioner’s challenge of dependent claims 16 and 17 also fails for the reasons” Patent Owner provides in the context of claim 1, which we found unpersuasive for the reasons provided above. *See* PO Resp. 34.

¹² Aside from adopting Petitioner’s arguments and evidence as our own, we do not set forth separate formal findings as to Petitioner’s undisputed assertions. *See In re NuVasive, Inc.*, 841 F.3d 966, 974 (Fed. Cir. 2016) (“Although the Board did not make findings as to whether any of the other claim limitations . . . are disclosed in the prior art, it did not have to: NuVasive did not present arguments about those limitations to the Board. . . . The Board . . . was not required to address undisputed matters.”); Paper 14, 10–11 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.” (emphasis removed)).

¹³ Although we have already determined that Petitioner proves that all challenged claims are unpatentable based on the first ground, for completeness we continue to address the remaining grounds.

We have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that the limitations in claims 16 and 17 are disclosed by the combination of Howell-596, Howell-158, and Hattori-913 and that a POSITA would have been motivated to combine the references, for the reasons set forth in the Petition, which we adopt as our own. *See* Pet. 45–46. Accordingly, we find that Petitioner has established, by a preponderance of the evidence, that claims 16 and 17 would have been obvious over the combination of Howell-596, Howell-158, and Hattori-913.

F. Obviousness Based on Howell-596

Petitioner argues that Howell-596 alone renders claims 1–11 and 13–19 obvious. Pet. 47–52. Petitioner’s challenge here incorporates by reference many aspects of its challenge to the same claims based on Howell-596 and Howell-158. *See id.* Patent Owner raises specific arguments against the challenge to claim 1 and argues that the challenge to claims 2–11 and 13–18 fails for the same reasons. PO Resp. 34–37; Pet. Reply 19–20; PO Sur-reply 20. Patent Owner does not separately address the challenge to independent claim 19. *See id.* Accordingly, we focus our analysis of claim 1.

Petitioner addresses the “insulating layer” of claim 1 differently here than in the previous challenge to claim 1. *See* Pet. 47–49. Rather than rely on Howell-158’s insulating layer, in this challenge Petitioner argues that Howell-596’s electronics module has a “module housing 1700” and that “[i]t would have been obvious for a POSITA to select an insulating material for module housing 1700.” *Id.* at 47–48 (citing Ex. 1002 ¶ 143; Ex. 1004 ¶¶ 184, 194, Fig. 17A). Petitioner relies on a document titled “2003 Generic

Standard on Printed Board Design” to argue that a POSITA would know that “metal-cased components shall be ‘insulated from adjacent electrically conductive elements’” and that “[f]iber or plastic insulators should be incorporated where adequate clearance from circuitry cannot be provided.” *Id.* at 48 (citing Ex. 1011, 57, 64) (alteration in original). Petitioner also argues that “selecting an insulating material for module housing 1700 is the result of simple design choice, not invention,” because “plastic is one of a finite number of identified, predictable materials for Howell-596’s module housing 1700” and “was commonly used for insulation, including in eyewear frames that house electronics.” *Id.* at 49 (citing Ex. 1002 ¶ 144; Ex. 1006 ¶ 51; Ex. 1011, 64. According to Petitioner, based on the foregoing, “a POSITA would have had a reasonable expectation of success in using plastic for Howell-596’s module housing 1700.” *Id.* (citing Ex. 1002 ¶ 144).

Petitioner also asserts that its reliance on Howell-596’s electronics module made from an insulating material for both the claimed “insulating layer” and “electronics module” finds support in the specification of the ’541 patent. *See* Pet. 47 (citing Ex. 1001, 58:50–55). Petitioner relies on an embodiment described in the specification where the exterior wall of the electronics module, made of “an insulating material,” “may be considered as the insulating layer disposed between the electronic components (that are disposed within the electronics module) and the frame.” *Id.*

Patent Owner argues that Petitioner cannot rely on Howell-596’s electronics module to satisfy both the insulating layer and electronics module limitations of claim 1. *See* PO Resp. 35. Patent Owner notes that the portion of the specification Petitioner relies on discloses such an

embodiment, but asserts that it “disclaimed this embodiment during prosecution when it noted that the prior art cited by the Examiner—which was formed of a non-conductive material to prevent short circuit—did not disclose or require the claimed ‘insulating layer’ element.” *Id.* More specifically, Patent Owner contends that during prosecution, it distinguished Kokonaski-166 on the basis that Kokonaski-166 did not inherently disclose an insulating layer and that a non-conductive frame could be used to prevent short circuits rather than an insulating layer. *Id.* at 35–36 (citing Ex. 1003, 66, 76–77). Patent Owner asserts that Howell-596 lacks any disclosure of a metal frame and could also obviate the need for an insulating layer by using a plastic frame. Patent Owner further contends that even if Petitioner can rely on the same prior art element to satisfy both limitations, “a POSITA’s general knowledge that plastic may be used to insulate electrical components does not explain why a POSITA would have been motivated to specifically use plastic for module housing 1700, as opposed to some other material or some other component.” *Id.* at 36–37.

Petitioner replies by reiterating that “[t]he ’541 patent expressly describes an embodiment in which the housing of an electronics module serves as an insulating layer” that tracks Howell-596’s embodiment that Petitioner relies on. Pet. Reply 17–18 (citing Ex. 1001, 58:50–55; Ex. 1002 ¶¶ 143–144; Ex. 1004 ¶¶ 194–195). Petitioner also contends that Patent Owner’s “prosecution statements fall far short of the clear and unmistakable disclaimer required to exclude the embodiment from the scope of claim 1.” *Id.* at 18–19. As to the motivation to use plastic as an insulating material for Howell-596’s module housing 1700, Petitioner points to Dr. Feland’s testimony that plastic may be a desirable insulator for use on printed circuit

boards when “adequate clearance from circuitry cannot be provided.” *Id.* at 19 (citing Ex. 1002 ¶¶ 143–144).

In its Sur-reply, Patent Owner asserts that “Petitioner misunderstands Patent Owner’s argument, which noted the petition’s failure to explain why a POSITA would have been motivated to incorporate an insulating layer into the eyewear of Howell-596.” PO Sur-reply 18–19. Patent Owner also contends that “Howell-596’s exterior wall does not insulate anything because there is no electrically conductive material in the eyewear housing to insulate the UV detection system from” and that “a non-conductive material is not an ‘insulating layer’ if there is no conductive material to insulate the electrical components from.” *Id.* at 19 (citing Ex. 2014 ¶ 74). According to Patent Owner, Petitioner improperly “assumes the use of metal frames in Howell-596’s eyeglasses” and “fails to address Patent Owner’s argument that Howell-596 teaches alternatives to insulating layers (such as air gaps) that obviate the need for insulation even if Howell-596’s UV detection module were metal-cased.” *Id.* at 19–20 (citing Ex. 1004 ¶ 194; Ex. 2014 ¶¶ 74–75).

We first address whether Petitioner may rely on a single structure in Howell-596—an electronics module having an insulated housing wall—to satisfy both the “insulating layer” and “electronics module” limitations in claim 1. Pet. 47–49. As Petitioner correctly points out (and Patent Owner does not dispute), the specification clearly describes an embodiment consistent with Petitioner’s position by stating that “where an electronics module comprises an exterior wall . . . that is made of . . . an insulating material, the exterior wall may be considered as the insulating layer disposed between the electronic components (that are disposed within the electronics

module) and the frame.” Ex. 1001, 58:50–55; Pet. 47; PO Resp. 35.

Accordingly, the specification strongly support Petitioner’s position.

Patent Owner argues that it disclaimed this embodiment during prosecution, but we disagree. *See* PO Resp. 35–36. During prosecution, the Patent Owner merely argued that Kokonaski-166 fails to inherently disclose an insulating layer by disclosing wires that “can have” insulating materials, given that Kokonaski-166 could have implemented “other ways” to “prevent a short circuit,” such as using a non-conductive frame. *Id.*; Ex. 1003, 66, 76–77. These statements do not reference the embodiment in the ’541 patent in question and do not state that the claims do not cover such an arrangement. *See* Ex. 1003, 66, 76–77. In addition, Patent Owner fails to point to any evidence that Kokonaski-166 includes an embodiment that employs an electronics module made of insulating material and that it argued that such a structure cannot meet both claim limitations at issue here, or any other evidence referencing the particular claim construction dispute at issue here. *See* PO Resp. 35–36. Accordingly, we determine that the statements made during prosecution did not amount to a clear disavowal of claim scope that forecloses Petitioner’s arguments here.

We also find that Petitioner proved that a POSITA would have been motivated to use plastic for Howell-596’s module housing 1700 because, as Petitioner correctly points out, plastic was a well-known insulator and commonly used in eyeglasses. Pet. 47–48 (citing Ex. 1002 ¶¶ 143–144; Ex. 1004 ¶¶ 184, 194, Fig. 17A; Ex. 1006 ¶ 51; Ex. 1011, 57, 64).

Petitioner’s expert testimony and the printed circuit board design standard fully support these positions. *See* Ex. 1002 ¶¶ 143–144; Ex. 1011, 57, 64.

Patent Owner argues, for the first time in its Sur-reply, that Petitioner hinges its argument on the use of metal eyeglass frames, but Petitioner never mentions metal frames in its analysis. *See* PO Sur-reply 19–20; Pet. 47–49. Petitioner refers to the obvious option of employing insulated “metal-cased components,” as taught by the printed circuit board design standard, but metal-cased “components” are not metal eyeglass frames, which the standard never mentions. *See* Ex. 1011, 57 (“Metal-cased components shall be mounted so that they are insulated from adjacent electrically conductive elements.”); Pet. 48. Nevertheless, even if Petitioner’s argument hinged on the use of metal frames, we would find the argument persuasive given the prevalence of metal eyeglass frames and the limited number of frame materials available, as discussed in the context of the first challenge to claim 1 above. *See* Pet. 22–24; Ex. 1002 ¶ 68. To the extent that Patent Owner views Petitioner’s arguments with respect to the use of metal frames in the first challenge applicable here, we would find Petitioner’s arguments persuasive, and Patent Owner’s arguments unpersuasive, for the same reasons discussed above. In addition, Patent Owner’s argument appears to assume, without support, that insulating electronic components only makes sense in the presence of metal frames. Based on the foregoing, we find that Patent Owner forfeited this argument because it was raised for the first time in its Sur-reply, as well as being unpersuasive.¹⁴

¹⁴ Patent Owner raises a related new argument in its Sur-reply that the use of plastic insulative material in Howell-596 cannot be an “insulating layer” in the absence of conductive material. *See* PO Sur-reply 19 (citing Ex. 2014 ¶ 74). Patent Owner also forfeited this argument by failing to raise it in the Patent Owner Response. The argument also lacks support, as a material may satisfy the structural “insulating layer” limitation in apparatus claim 1

Based on the foregoing, Petitioner proves by a preponderance that a POSITA would have been motivated to use an insulating layer for Howell-596's module housing and that Howell-596 teaches or suggests every limitation in claim 1. *See* Pet. 47–49 (citing Ex. 1002 ¶¶ 143–144; Ex. 1004 ¶¶ 184, 194, Fig. 17A; Ex. 1006 ¶ 51; Ex. 1011, 57, 64). Accordingly, we determine that Petitioner proves by a preponderance of the evidence that claim 1 would have been obvious based on Howell-596.

Petitioner argues that claims 2–11 and 13–19 would have been obvious based on Howell-596, and Patent Owner does not raise separate arguments as to these claims other than those already addressed above. *See* Pet. 49–52; *See* PO Resp. 37; Pet. Reply 19–20; PO Sur-reply 20. We have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that the limitations in claims 2–11 and 13–19 are disclosed or rendered obvious by Howell-596 for the reasons set forth in the Petition, which we adopt as our own. *See* Pet. 49–52. Accordingly, we find that Petitioner has established, by a preponderance of the evidence, that claims 2–11 and 13–19 would have been obvious based on Howell-596.

G. Obviousness Based on Howell-596 and Hattori-913

Petitioner argues that claims 16 and 17 would have been obvious based on Howell-596 and Hattori-913 and incorporates its analysis for Ground 2 based on Howell-596, Howell-158, and Hattori-913. *See* Pet. 45–46, 52. Patent Owner argues that Petitioner's challenge of dependent

regardless of whether adjacent structure suggests that the layer is actively insulating due to nearby electrically conductive structures.

claims 16 and 17 fails for the reasons Patent Owner provides in the context of claim 1, which we found unpersuasive for the reasons provided above. *See* PO Resp. 38.

We have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that the limitations in claims 16 and 17 are disclosed by the combination of Howell-596 and Hattori-913 and that a POSITA would have been motivated to combine the references, for the reasons set forth in the Petition, which we adopt as our own. *See* Pet. 45–46, 52. Accordingly, we find that Petitioner has established, by a preponderance of the evidence, that claims 16 and 17 would have been obvious over the combination of Howell-596 and Hattori-913.

H. Obviousness Based on Kokonaski-166 and Howell-158

Petitioner argues that the combination of Kokonaski-166 and Howell-158 renders claims 1–9, 11, and 13–19 obvious. Pet. 53–66. Patent Owner raises specific arguments against the challenge to claim 1 and argues that the challenge to claims 2–9, 11, and 13–18 fails for the same reasons. PO Resp. 38–43. Patent Owner does not argue that Petitioner fails to show that claim 19 would have been obvious based on Kokonaski-166 and Howell-158. *See id.*; Pet. Reply 24; PO Sur-reply 21–26. Accordingly, we focus on the parties’ arguments as to claim 1.

Petitioner argues that Kokonaski-166, titled “Electronic Eyeglass Frame,” discloses all of the limitations of claim 1 with the exception of the “insulating layer.” *See* Pet. 53–56; Ex. 1008, code (54). For the insulating layer, Petitioner argues that Kokonaski-166 discloses a silicone seal to prevent water from contacting components, “which is insulative.” Pet.

56–57 (citing Ex. 1002 ¶¶ 161–162; Ex. 1008 ¶¶ 76, 87). Petitioner then asserts that it would have been obvious to a POSITA to apply that “insulation” to Okonaski-166’s electronic module 101 because “the seal for the electronic module is directed to the same goal ‘to prevent water from contacting the electronic’ components while within a universal frame component.” *Id.* at 57 (citing Ex. 1002 ¶ 161; Ex. 1008 ¶¶ 76, 87). According to Petitioner, once Okonaski-166’s sealed “electronic module is disposed within the housing module, the insulating layer of silicone would be disposed between the electronic module and the housing module and, thus, between the electronic components within the electronics module and the frame.” *Id.* (citing Ex. 1002 ¶ 162). In the alternative, Petitioner relies on Howell-158 as disclosing the insulating layer of claim 1, as it did in the first challenge. *See id.* (citing Ex. 1006 ¶ 53). Petitioner asserts that “Kokonaski-166 discloses that its ‘frame can be made of zyle, metal, or any combination thereof’” and that, for the same reasons as discussed above in the first ground, “a POSITA would have been motivated to dispose an insulating layer between the electronics module and housing module in the metal frame of Kokonaski-166 and would have had a reasonable expectation of success in applying Howell-158’s teachings.” *Id.* (citing Ex. 1002 ¶ 163; Ex. 1008 ¶ 84; incorporating previous motivation arguments from ground 1).

Patent Owner argues that Kokonaski-166 fails to disclose an insulating layer, as found during prosecution, and “Petitioner provides no evidence that silicone constitutes an insulating layer other than the bare allegation that it is often ‘insulative.’” PO Resp. 39 (citing Ex. 2014 ¶¶ 80–81). Patent Owner also contends that “Petitioner provides no evidence that the silicone described in Kokonaski-166 is actually a layer

disposed between one or more electrical components in the electronics module and the frame, as opposed to just one of many components within the electronic device of claim 1.” *Id.* at 39–40 (citing Ex. 2014 ¶ 81). As to Petitioner’s argument based on a combination of Kokonaski-166 and Howell-158, Patent Owner argues that a POSITA would not have been motivated to add the insulating layer because “a POSITA would have understood that to avoid the risk of short circuits, one would merely have to choose a non-metal frame or a frame not made entirely of metal.” *Id.* at 41 (citing Ex. 2014 ¶ 82). Patent Owner also asserts that Petitioner fails to provide the details of how Howell-158’s double-sided tape would be applied to Kokonaski-166’s structures without defeating Kokonaski-166’s goals of easily replacing its module 101 and allowing access to certain components. *See id.* at 41–42 (citing Ex. 2014 ¶¶ 82–84; Ex. 1008 ¶¶ 74, 98).

In its Reply, Petitioner argues that Patent Owner’s arguments against the combination of Kokonaski-166 and Howell-158 fail for the same reasons as Patent Owner’s similar arguments made in the context of the challenge based on Howell-596 and Howell-158. *See* Pet. Reply 21–22. Petitioner also asserts that Patent Owner fails to support its assertion that adding an insulating layer would detract from aesthetics and admits that Kokonaski-166 discloses metal frames. *Id.* at 22. As to Patent Owner’s argument that adding Howell-158’s insulating layer would undermine Kokonaski-166’s goal of easy ability to access and remove electronic components, Petitioner contends that claim 1 does not require this ability, the argument improperly seeks to limit Howell-158 to its double-sided sticky tape embodiment, Howell-158 itself shows replaceable components held in place by adhesives, and Kokonaski-166’s robust screw-based mechanisms for accessing and

replacing components undermines Patent Owner’s argument that sticky tape would interfere with these actions. *Id.* at 23 (citing Ex. 1006 ¶¶ 53, 171).

In its Sur-reply, Patent Owner contends that “adding unnecessary elements such as metal and insulation detract from” aesthetics and points to the use of a “bulky” silicone seal based on Kokonaski-166. PO Sur-reply 24 (citing Ex. 2014 ¶¶ 83–84). Patent Owner also argues that Petitioner’s argument that double-sided tape would not impede removability comes too late and lacks support. *See id.* (citing Ex. 1006 ¶ 171).

We focus our analysis on Petitioner’s proposed combination of Okonaski-166 and Howell-158. Because we find Petitioner’s argument persuasive, we need not reach Petitioner’s alternative argument based on modifying Okonaski-166’s silicone seal. As to the disputed insulating layer limitation, the parties incorporate and rely on many of the same arguments as to the combination of Kokonaski-166 and Howell-158 as they raised in the context of the first challenge to claim 1 based on Howell-596 and Howell-158. *See* Pet. 57; PO Resp. 41–43; Pet Reply 21–22. To the extent that those same arguments apply here, we find Petitioner’s arguments persuasive, and Patent Owner’s unpersuasive, for the same reasons discussed above in the context of the challenge based on Howell-596 and Howell-158. For example, we find Petitioner’s argument that adding Howell-158’s insulating layer to Kokonaski-166 for ergonomic and aesthetic reasons persuasive because those same reasons apply with equal force here. *See* Pet. 22–24.

As noted in our previous analysis, Howell-158 expressly notes advantages when adding an insulating layer to eyeglasses using metal frames—to prevent short circuits and current leakage. Ex. 1006 ¶ 53. Those

same advantages apply here, and Kokonaski-166 makes them even more readily apparent in the proposed combination than Howell-596 because Kokonaski-166 expressly discloses the possibility of using metal frames. *See* Ex. 1008 ¶ 84. Patent Owner argues that a POSITA would simply avoid the use of metal frames entirely to avoid potential issues with their use, including short circuits. *See* PO Resp. 41 (“[A] POSITA would have understood that to avoid the risk of short circuits, one would merely have to choose a non-metal frame or a frame not made entirely of metal.”). We give this argument little weight because the references directly refute the position by at least implicitly recommending the use of metal frames by describing it as part of their preferred embodiments, without teaching away from the use of metal frames. Ex. 1006 ¶¶ 52–53; Ex. 1008 ¶ 84. Dr. Feland also notes the advantages of metal frames. *See* Ex. 1002 ¶ 68. Simply arguing “do not do what the prior art tells you to do,” as Patent Owner does here, without compelling support, does not persuade us that a POSITA would not have been motivated to make the proposed modification.

At best, Patent Owner identifies potential negative aspects of using metal frames, but “[t]he fact that the motivating benefit comes at the expense of another benefit . . . should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another.” *Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000). For the same reasons, we find Patent Owner’s argument that aesthetic reasons would dissuade a POSITA from using metal frames and insulation in Kokonaski-166 unpersuasive. Even if there were potential aesthetic drawbacks, that does not necessarily negate the advantages of metal frames in some

situations or Petitioner’s reasoning in support of the combination. *See id.*; *Allied Erecting & Dismantling*, 825 F.3d at 1381.

We also find Patent Owner’s argument that Howell-158’s double-sided sticky tape would interfere with the replaceability of components in Kokonaski-166 unpersuasive for several reasons. *See* PO Resp. 41–42; PO Sur-reply 25. First, Howell-158 generally discloses the advantages of using an “insulating layer” and only uses the double-sided sticky tape as one “example” of an insulating layer. *See* Ex. 1006 ¶ 53. Howell-158 never suggests that this particular embodiment must be used to insulate the electronics when using metal frames. Second, Petitioner does not rely on the double-sided tape embodiment as the linchpin in its motivation to combine analysis as Patent Owner suggests, and instead refers generally to the advantages of using an insulating layer. *See* Pet. 22–24, 56–57; Pet. Reply 22–23. Petitioner refers to the double-sided tape embodiment when describing all of Howell-158’s teachings as to its insulation layer when asserting that Howell-158 discloses the “insulating layer” limitation of claim 1. *See* Pet. 22–24. Third, even if Petitioner’s argument relied exclusively on the use of double-sided tape and Patent Owner improperly implies, the fact that it may make one unclaimed operation of Kokonaski-166 (replacing electronic components) more difficult, standing alone, would not necessarily fatally undermine Petitioner’s position. The advantages of avoiding short circuits and current leakage would still apply, and, again, a POSITA may still find the use of an insulation layer obvious even if drawbacks exist. *See Winner*, 202 F.3d at 1349 n.8; *Allied Erecting & Dismantling*, 825 F.3d at 1381.

Finally, we find Patent Owner's argument that Petitioner provides too few details about the proposed combination unpersuasive. *See* PO Resp. 41–42. As noted above in our analysis of the challenge based on Howell-596 and Howell-158, claim 1 merely requires an insulating layer between one electronic component and the frame, and Patent Owner does not dispute that Howell-158 already discloses this arrangement. *See* Ex. 1006 ¶ 53. We agree with Petitioner that a POSITA could apply this same teaching to Kokonaski-166 and meet the claim limitation without unduly interfering with the operation of Kokonaski-166. *See* Pet. 57 (incorporating Pet. 22–24); Pet. Reply 22–23; Ex. 1002 ¶ 163.

Based on the foregoing, we find that Petitioner proves by a preponderance of the evidence that a POSITA would have been motivated to combine Kokonaski-166 and Howell-158. Patent Owner does not dispute that once combined, the combination of Kokonaski-166 and Howell-158 discloses all of the limitations of claim 1, as well as claims 2–9, 11, and 13–19. Based on our review of the record and Petitioner's arguments and evidence, we find that the combination of Kokoaski-166 and Howell-158 discloses all of the limitations of claims 1–9, 11, and 13–19 for the reasons provided by Petitioner. Accordingly, we determine that Petitioner proves by a preponderance of the evidence that Kokonaski-166 and Howell-158 render claims 1–9, 11, and 13–19 obvious.

I. Obviousness Based on Kokonaski-999 and Howell-158

Petitioner argues that the combination of Kokonaski-999 and Howell-158 renders claims 1–9, 11, and 13–19 obvious. Pet. 67–78. Patent Owner raises specific arguments against the challenge to claim 1 and argues that the challenge to claims 2–9, 11, and 13–18 fails for the same reasons. PO Resp.

43–47. Patent Owner does not argue that Petitioner fails to show that claim 19 would have been obvious based on Kokonaski-166 and Howell-158. *See id.*; Pet. Reply 26; PO Sur-reply 26–28. Accordingly, we focus on the parties’ arguments as to claim 1.

Petitioner argues that Kokonaski-999, titled “Electro-active Spectacles and Associated Electronics,” discloses all of the limitations of claim 1 with the exception of the “insulating layer.” *See* Pet. 67–69; Ex. 1009, code (54). For the insulating layer, Petitioner argues that Kokonaski-999 discloses a frame having “one or more conductive portions” as well as “conductive links embedded within any portion of the frame.” Pet. 69 (citing Ex. 1009 ¶¶ 24, 32). Petitioner relies on Howell-158 for the “insulating layer” limitation and incorporates its analysis of its first ground based on Howell-596 and Howell-158. *Id.* (citing Ex. 1006 ¶ 53). Petitioner asserts that, “[l]ike Kokonaski-999, Howell-158 discloses ‘approaches to embed an electrical component into a pair of glasses.’” *Id.* (citing Ex. 1006 ¶ 51). Petitioner further argues that, “[f]or the reasons described above for Ground 1, a POSITA would have been motivated to dispose an insulating layer between the electronics module and housing module in the metal frame of Kokonaski-999 to prevent circuits from being shorted and reduce leakage current with a reasonable expectation of success in applying Howell-158’s teachings.” *Id.* (citing Ex. 1002 ¶ 191 and incorporating previous arguments).

Patent Owner argues that “Kokonaski-999 teaches an alternative to combining the eyeglasses disclosed therein with Howell-158’s insulating layer, because Kokonaski-999 specifically uses the conductive portions of the frame to create conductive pathways that facilitate communication between electronic components.” PO Resp. 43–44 (citing Ex. 1009 ¶¶ 35–

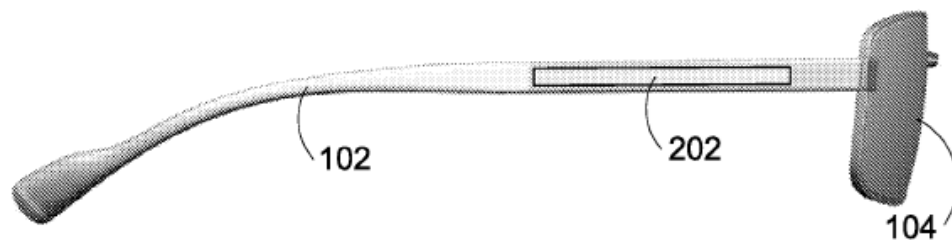
36, 79, 81; Ex. 2014 ¶¶ 87–88). According to Patent Owner, “[o]ther parts of the frames described by Kokonaski-999 can be non-conductive as desired, thereby rendering an ‘insulating layer’ unnecessary.” *Id.* at 44. Patent Owner also argues that “communication between electrical components as described by Kokonaski-999 would be impeded (if not destroyed) by placing an insulating layer between those components and the frame” because Kokonaski-999’s components rely on the conductivity to function and Petitioner’s proposal “would cleave that connection between the electrical components.” *Id.* (citing Ex. 1009 ¶¶ 35–36, 79, 81; Ex. 2014 ¶¶ 87–88). Patent Owner contends that even if short circuiting remains a concern, a POSITA would use non-conductive portions of the frame to address the issue rather than “the potentially cumbersome insulating layer.” *Id.* at 44–45. Patent Owner also argues that Kokonaski-999’s modules can communicate using conductive wires or conductive portions of the frame, and Petitioner’s proposed insulating layer would eliminate the ability to use these conductive links. *Id.* at 45–46 (citing Ex. 1009 ¶ 32; Ex. 2014 ¶ 89).

In its Reply, Petitioner characterizes Patent Owner’s argument as misunderstanding Kokonaski-999 because adding an insulating layer would not interfere with the operation of Kokonaski-999’s eyeglasses, including embodiments incorporating conductive wires. *See* Pet. Reply 25 (citing Ex. 1009 ¶¶ 32, 79). Petitioner also argues that “Kokonaski-999 does not ‘rely on the conductivity of the frame for functionality’” and instead merely ‘teaches an alternative.’” *Id.*

In its Sur-reply, Patent Owner argues that Petitioner tries to shift its argument away from Kokonaski-999’s conductive portions of the frame by relying on new options within Kokonaski-999, but that Petitioner waived

those arguments. *See* PO Sur-reply 26. Patent Owner also argues that Petitioner abandoned the only argument in the Petition “based on Kokonaski-999’s inclusion of conductive frame portions” and “Petitioner does not articulate why an insulating layer would have otherwise been necessary.” *Id.* at 26–27 (citing Ex. 1009 ¶ 32; Ex. 2014 ¶ 89). Patent Owner clarifies that it does not rely on a “teaching away” argument, but contends that it shows a lack of motivation to modify Kokonaski-999 because the modification would have “defeated the stated purpose of the references” and “overlooks superior alternatives to Petitioner’s proposed combinations.” *Id.* at 27.

Based on our review of the parties’ arguments and evidence, we find Petitioner’s position more persuasive. Our analysis here tracks that for Petitioner’s first ground based on Howell-596 and Howell-158, which Petitioner incorporates by reference for its motivation to combine arguments. *See* Pet. 69. Here, Petitioner relies on a cavity within Kokonaski-999’s frame 102 to meet the “housing module” limitation and electronic module 202 to meet the “electronics module” limitation, with the electronic module disposed within the cavity/housing module. *See id.* at 67–69. We reproduce Kokonaski-999’s Figure 2 below.



Kokonaski-999’s Figure 2 shows frame 102 that includes electronics module 202, as well as first electro-active lens 104. *See* Ex. 1009 ¶¶ 32–33.

For the insulating layer limitation, as noted above, Petitioner relies on Howell-158 as disclosing the limitation and argues that the same reasons provided for its first ground support the combination because “a POSITA would have been motivated to dispose an insulating layer between the electronics module and housing module in the metal frame of Kokonaski-999 to prevent circuits from being shorted and reduce leakage current with a reasonable expectation of success in applying Howell-158’s teachings.” *See id.* at 69 (citing Ex. 1002 ¶ 191). We agree, for the same reasons discussed above in the context of the first ground based on Howell-596 and Howell-158. In short, Howell-158 expressly discloses a metal frame and the advantages of using an insulating layer with metal frames, and those reasons alone support Petitioner’s proposal to dispose an insulating layer between Kokonaski-999’s electronics module 202 and the cavity formed within frame 102. *See id.*

Patent Owner focuses its arguments on Petitioner’s argument that “Kokonaski-999 discloses frame 102 having ‘one or more conductive Portions’ and ‘conductive links embedded within any portion of the frame.’” Pet. 69 (citing Ex. 1009 ¶¶ 24, 32); PO Resp. 43–46; PO Sur-reply 26–28. We find Patent Owner’s arguments unpersuasive for several reasons. First, Petitioner appears to rely on this portion of Kokonaski-999 in an effort to show similarities between Kokonaski-999’s device and Howell-158’s device, including metal in the frames and “approaches to embed an electrical component into a pair of glasses.” *See* Pet. 69. While these arguments are generally persuasive to show that the references address similar issues with electronic eyeglasses and support their combination, they are not necessary to Petitioner’s motivation to combine arguments given that Howell-158

already discloses the use of metal frames, a POSITA would have been motivated to use metal frames in at least some situations, and Howell-158 expressly notes advantages of using an insulating layer between the electrical components and the frames when using metal frames. *See* Ex. 1006 ¶¶ 52–53; Ex. 1002 ¶ 68. Accordingly, even if Kokonaski-999 never mentioned the use of metal or any conducting material in its frames, Petitioner adequately supports the motivation to modify Kokonaski-999 based on Howell-158, as was the case in the first ground where Howell-596 did not mention any metal in the frame at all.

Second, Petitioner only proposes adding “an insulating layer between the electronics module and housing module” in Kokonaski-999, i.e., between electronic module 202 and the cavity within frame 102 in Figure 2 above, which does not include adding insulation elsewhere in Kokonaski-999’s frame, such as around the conductive portions in the frame. *See* Pet. 69. Koknaski-999 discloses the use of conductive portions or links to electrically connect electronics module 202 to electro-active lenses 104, 106. Ex. 1009 ¶¶ 24, 32, 34. The electrical connections may take the form of electrical wires or “conductive metal layers or conductive cores encapsulated by non-conductive material.” *Id.* ¶ 32. Patent Owner improperly bases its arguments on the notion that Petitioner somehow proposes to add insulation where it already exists around these electrical connections, but Petitioner makes no such claim in the Petition and, as noted, only refers to the conductive portions of Kokonaski-999 as an additional basis to support the combination because, like Howell-158, Kokonaski-999 uses at least some metal within its frames. *See* Pet. 69. Accordingly, the fact that Kokoaski-999 already insulates its conductive portions within its frames does not

necessarily obviate the need for an insulating layer between electronics module 202 and frame 102 where they meet within the cavity of frame 102, and Patent Owner's arguments fail to undermine Petitioner's basis for its proposed combination. *See id.*; Ex. 1002 ¶ 191; *see also* Pet. 67–69 (citing Ex. 1002 ¶¶ 186–188; Ex. 1009 ¶¶ 23–36, 39, 47, 49–50, Figs. 1–2, 7–13) (describing how Kokonaski-999 discloses relevant claim limitations).

Third, we also find Patent Owner's arguments unpersuasive because they appear to assume that a POSITA, when adding an insulating layer, “would cleave the connection between the electrical components and the conductivity they would otherwise draw from the frame.” *See* PO Resp. 44; *see also id.* at 45 (“incorporating an insulating layer as Petitioner suggests would have eliminated such functionality” (citing Ex. 2014 ¶ 89)). Even if Petitioner's arguments hinged on adding insulating to already-insulated components within the frame (they do not), we do not agree with Patent Owner that a POSITA having two years of work experience with embedded electronic devices would be so daft as to add insulation in a manner that would interrupt necessary electrical connections. *See id.*

Based on the foregoing, we find that Petitioner proves by a preponderance of the evidence that a POSITA would have been motivated to combine Kokonaski-999 and Howell-158. Patent Owner does not dispute that once combined, the combination of Kokonaski-999 and Howell-158 discloses all of the limitations of claim 1, as well as claims 2–9, 11, and 13–19. Based on our review of the record and Petitioner's arguments and evidence, we find that the combination of Kokoaski-999 and Howell-158 discloses all of the limitations of claims 1–9, 11, and 13–19 for the reasons provided by Petitioner. Accordingly, we determine that Petitioner proves by

a preponderance of the evidence that Kokonaski-999 and Howell-158 render claims 1–9, 11, and 13–19 obvious.

CONCLUSION¹⁵

Based on the foregoing, we determine that Petitioner proves by a preponderance of the evidence that claims 1–19 of the '541 patent are unpatentable.

The following chart summarizes our patentability determinations:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–19	103	Howell-596, Howell-158	1–19	
16, 17	103	Howell-596, Howell-158, Hattori-913	16, 17	
1–11, 13–19	103	Howell-596	1–11, 13–19	
16, 17	103	Howell-596, Hattori-913	16, 17	
1–9, 11, 13–19	103	Kokonaski-166, Howell-158	1–9, 11, 13–19	
1–9, 11, 13–19	103	Kokonaski-999, Howell-158	1–9, 11, 13–19	
Overall			1–19	

¹⁵ Should Patent Owner wish to pursue amendment of the Challenged Claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding, 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
Outcome				

ORDER

Accordingly, it is:

ORDERED that Petitioner has proven by a preponderance of the evidence that claims 1–19 of the '541 patent are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties 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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