

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NEENAH, INC. AND AVERY PRODUCTS CORPORATION,
Petitioner,

v.

JODI A. SCHWENDIMANN, f/k/a JODI A. DALVEY,
and NUCOAT, INC.,
Patent Owner.

IPR2020-00629
Patent 7,754,042 B2

Before JEFFREY W. ABRAHAM, MICHELLE N. ANKENBRAND, and
AVELYN M. ROSS, *Administrative Patent Judges*.

ABRAHAM, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)
Denying in Part, Dismissing in Part Patent Owner's Motion to Strike
37 C.F.R. § 42.20

I. INTRODUCTION

Neenah, Inc. and Avery Products Corporation (collectively, “Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–22 of U.S. Patent No. 7,754,042 B2 (Ex. 1004, “the ’042 patent”). Pet. 12. Jodi A. Schwendimann, formerly known as Jodi A. Dalvey, and NuCoat, Inc., (collectively “Patent Owner”) filed a Preliminary Response (Paper 8).

On September 15, 2020, we instituted *inter partes* review of all of the challenged claims based on all of the grounds identified in the Petition. Paper 10 (“Inst. Dec.”). Subsequently, Patent Owner filed a Response (Paper 15, “PO Resp.”), Petitioner filed a Reply (Paper 20, “Reply”), and Patent Owner filed a Sur-reply (Paper 27, “Sur-reply”).

Patent Owner also filed a Motion to Strike (Paper 29), and Petitioner filed a Response to Patent Owner’s Motion to Strike (Paper 30).

We held a consolidated oral hearing for this proceeding and related proceedings IPR2020-00628, IPR2020-00634, and IPR2020-00915 on July 12, 2021, and have entered a transcript of the hearing into the record. Paper 38 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–22 of the ’042 patent are unpatentable. We also deny in part and dismiss in part Patent Owner’s Motion to Strike.

II. BACKGROUND

A. *Related Proceedings*

The parties identify the following lawsuits involving the ’042 patent: *Jodi A. Schwendimann v. Neenah, Inc.*, Case No. 1:19-cv-00361-LPS (D.

Del.) (“Delaware Lawsuit”); *Jodi A. Schwendimann v. Arkwright Advanced Coating, Inc.*, Case No. 0:11-cv-00820-JRT-HB (D. Minn.) (“Arkwright Lawsuit”); *Jodi A. Schwendimann v. Stahls’, Inc.*, Case No. 2:19-cv-10525-LVP-MKM (E.D. Mich.) (“Michigan Lawsuit”); and *Jodi A. Schwendimann v. Siser North America, Inc.*, Case No. 1:19-cv-00362-LPS (D. Del.). Pet. 12–13; Paper 9, 2.

Petitioner identifies the following related patents: U.S. Patent No. RE 41,623 (“the RE ’623 patent”), U.S. Patent No. 7,749,581 (“the ’581 patent”), U.S. Patent No. 7,771,554 (“the ’554 patent”), and U.S. Patent No. 7,766,475 (“the ’475 patent”). Pet. 12–13.

Patent Owner notes that the ’042 patent is at issue in IPR2020-00635, and the related patents are at issue in the following co-pending proceedings: IPR2020-00628 (RE ’623 patent), IPR2020-00633 (RE ’623 patent), IPR2020-00634 (’581 patent), IPR2020-00641 (RE ’623 patent), IPR2020-00644 (’581 patent), IPR2020-00915 (’475 patent), IPR2020-01121 (’554 patent), and IPR2020-01122 (’475 patent). Paper 9, 2.

B. The ’042 Patent (Ex. 1004)

The ’042 patent, titled “Method of Image Transfer on a Colored Base,” issued on July 13, 2010. Ex. 1004, codes (45), (54). The ’042 patent is directed to “transferring an image onto a colored base and to an article comprising a dark base and an image with a light background on the base.” Ex. 1004, 1:18–20.

The ’042 patent explains that conventional image transfer processes involving the transfer of an image to a dark base such as a black t-shirt used two-steps: applying a white or light background polymeric material to the colored base with heat and then using another sheet to impart an image to the substantially white polymeric material. Ex. 1004, 3:39–52. According

to the '042 patent, the conventional two-step process required careful alignment of an image with the white background, was “exceedingly time-consuming,” and produced significant waste of base and image transfer materials. Ex. 1004, 3:53–59.

The '042 patent purports to provide a significant improvement over the conventional two-step image transfer process by transferring an image and background to a colored base in a single step. Ex. 1004, 3:21–23. An exemplary image transfer process of the '042 patent is depicted below in Figure 1.

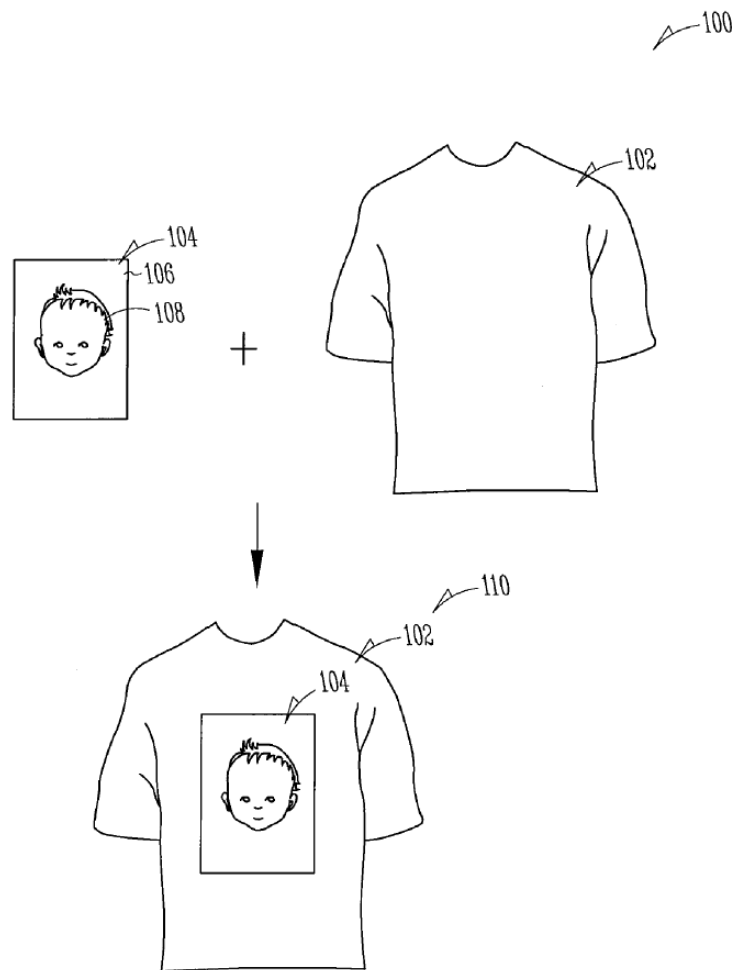


Fig. 1

Figure 1 “illustrates a schematic view of one process of image transfer onto a colored product.” Ex. 1004, 2:33–34. Figure 1 depicts colored base material 102 (e.g., a colored textile) and image 104 including substantially white background 106 and indicia 108 disposed on substantially white background 106. Ex. 1004, 3:12–23. The ’042 patent states that image 104 is applied to colored base material 102 with heat to make article 110 in a single step. Ex. 1004, 3:12–23.

An embodiment of an image transfer device is depicted below in Figure 5.

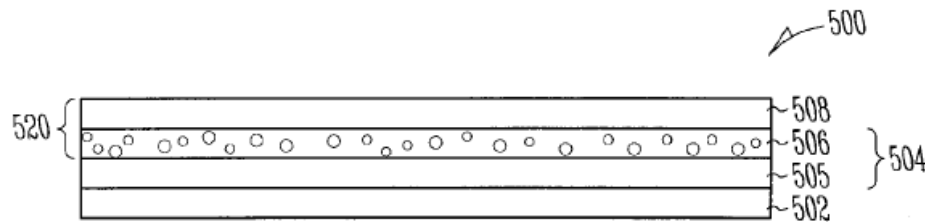


Fig. 5

Figure 5 illustrates “a cross-sectional view of one other embodiment of the image transfer device of the present invention.” Ex. 1004, 2:43–44. The ’042 patent explains that image transfer sheet 500 is comprised of substrate layer 502 and release layer 504 that comprises silicone coating 505 and white layer 506. Ex. 1004, 8:45–47. Figure 5 also depicts white layer 506 and receiving layer 508 as part of peel layer 520. Ex. 1004, 8:54–57, 9:1–3.

The ’042 patent describes white layer 506 as imparting “a white background on a dark substrate.” Ex. 1004, 3:37–38. In one embodiment, “the white layer 506 of the image transfer sheet 500 is impregnated with

titanium oxide or other white or luminescent pigment.” Ex. 1004, 8:51–54.¹ In another embodiment, “the white layer 506 and a receiving layer 508, contacting the white layer 506[,] are impregnated with titanium oxide or other white or luminescent pigment.” Ex. 1004, 8:54–57. According to the ’042 patent,

[f]or some embodiments, a white layer 506, 606, such as is shown in FIGS. 5-6, includes ethylene/methacrylic acid (E/MAA), with an acid content of 0-30%, and a melt index from 10 to 3500 with a melt index range of 20 to 2300 for some embodiments. A low density polyethylene with a melt index higher than 200 is also suitable for use. Other embodiments of the white layer include ethylene vinyl acetate copolymer resin, EVA, with vinyl acetate percentages up to 50%/EVA are modifiable with an additive such as DuPont Elvax, manufactured by DuPont de Nemours of Wilmington, Del. These resins have a Vicat softening point of about 40 degrees to 220 degrees C., with a range of 40 degrees to 149 degrees C. usable for some embodiments.

Ex. 1004, 6:8–20.

Referring once again to the embodiment of Figure 5, the ’042 patent describes an image transfer process in more detail. Specifically, the ’042 patent discloses “an image is imparted to the polymer component of the peel layer 520 utilizing a top coat image-imparting material such as ink or toner.” Ex. 1004, 9:1–3. The ’042 patent states that “[t]he image transfer sheet 500 is applied to the colored base material so that the polymeric component of the peel layer 520 contacts the colored base” and a source of heat is applied to the image transfer sheet 500. Ex. 1004, 9:11–19. The ’042 patent further states that “[t]he peel layer 520 transfers the image” and “[t]he application of

¹ “Titanium oxide,” “titanium dioxide,” and “TiO₂” are synonymous, and used interchangeably in the prior art, the parties’ papers, and in this Decision.

heat to the transfer sheet 500 results in ink or other image-imparting media within the polymeric component of the peel layer being changed in form to particles encapsulated by the polymeric substrate.” Ex. 1004, 9:19–25. As a result, “[t]he encapsulated ink particles or encapsulated toner particles and encapsulated titanium oxide particles are then transferred to the colored base in a mirror image to the ink image or toner image on the polymeric component of the peel layer 520.” Ex. 1004, 9:28–32. The ’042 patent explains as follows:

Because the polymeric component of the peel layer 520 generally has a high melting point, the application of heat, such as from an iron, does not result in melting of this layer or in a significant change in viscosity of the overall peel layer 520. The change in viscosity is confined to the polymeric component that actually contacts the ink or toner or is immediately adjacent to the ink or toner. As a consequence, a mixture of the polymeric component, titanium oxide or other white or luminescent pigment, and ink or toner is transferred to the colored base as an encapsulate whereby the polymeric component encapsulates the ink or toner or titanium oxide or other white pigment. It is believed that the image transfer sheet, with the white titanium oxide or other white or luminescent pigment background is uniquely capable of both cold peel and hot peel with a very good performance for both types of peels.

Ex. 1004, 9:33–48.

C. Illustrative Claims

Petitioner challenges claims 1–22 of the ’042 patent. Of the challenged claims, claims 1, 10, and 16 are independent. Claims 1 and 16 are illustrative and are reproduced below.

1. A method of making an image transfer article, the method comprising:

obtaining a removable substrate;

- coating the removable substrate with at least one of silicone, clay, resin, fluorocarbon, urethane, or an acrylic base polymer;
- overlaying the coated removable substrate with one or more polymer layers; and
- combining at least one of the one or more polymer layers with a pigment, the pigment having a concentration or configuration sufficient to provide an opaque background for received indicia, when transferred to a base.

Ex. 1004, 11:35–46.

16. A method of transferring an image to a dark-colored or black base, the method comprising:

- obtaining an image transfer article, comprising

- an image-imparting member, including at least one surface configured to receive and carry indicia to be transferred and including at least one portion comprising a pigment concentration or configuration sufficient to provide an opaque, non-transparent background for received indicia, when transferred to the dark-colored or black base; and

- a removable substrate disposed adjacent the image-imparting member;

- peeling the removable substrate away from the image-imparting member;

- contacting the image-imparting member, after being separated from the removable substrate, to the dark-colored or black base such that the opaque background is closer to the dark-colored or black base than the received indicia; and

- applying heat to at least the image-imparting member so that received indicia and the opaque background having the degree of non-transparency are transferred to the dark-colored or black base at substantially the same time.

Ex. 1004, 12:52–13:8.

D. Reviewed Unpatentability Challenges

We instituted an *inter partes* review to determine whether claims 1–22 of the '042 patent are unpatentable based on the following challenges:

Claim(s) Challenged	35 USC ²	References/Basis
1–3, 5–8, 10–22	§ 103	Oez-US, ³ Meyer ⁴
4	§ 103	Oez-US, Meyer, Hare ⁵
9	§ 103	Oez-US, Meyer, DeVries ⁶
1–3, 5–8, 10–22	§ 103	Oez-PCT, ⁷ Oez-US
4	§ 103	Oez-PCT, Oez-US, Hare
9	§ 103	Oez-PCT, Oez-US, DeVries
1–3, 5–8, 10–22	§ 103	Kronzer, ⁸ Oez-US
4	§ 103	Kronzer, Oez-US, Hare
9	§ 103	Kronzer, Oez-US, DeVries
1–3, 5–8, 10–16, 19–22	§ 103	Kronzer, Meyer
4	§ 103	Kronzer, Meyer, Hare

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the application from which the '042 patent issued was filed before this date, the pre-AIA version of § 103 applies.

³ US 5,665,476, issued Sep. 9, 1997 (Ex. 1013).

⁴ US 3,359,127, issued May 9, 1966 (Ex. 1019).

⁵ US 4,284,456, issued Aug. 18, 1981 (Ex. 1037).

⁶ US 4,021,591, issued May 3, 1977 (Ex. 1036).

⁷ WO 97/41489, published Nov. 6, 1997 (Ex. 1014). References to Oez-PCT will be to Exhibit 1016, which is an English-language translation of Oez-PCT with line numbers. Pet. 15.

⁸ US 5,798,179, issued Aug. 25, 1998 (Ex. 1018).

Claim(s) Challenged	35 USC ²	References/Basis
9	§ 103	Kronzer, Meyer, DeVries
17, 18	§ 103	Kronzer, Meyer, Hare-PCT ⁹

E. Testimonial Evidence

Petitioner filed a Declaration of Robert A. Wanat, Ph.D. (Ex. 1020, “Wanat Declaration”) with its Petition. Petitioner also filed a Declaration of Robert A. Wanat, Ph.D. in Support of Petitioner’s Reply (Ex. 1062, “Wanat Reply Declaration”).

Patent Owner filed a Declaration of Christopher Ellison, Ph.D. (Ex. 2011) with its Patent Owner Response. Petitioner deposed Dr. Ellison, and filed the transcript of the deposition as Exhibit 1063 in this proceeding.

III. ANALYSIS

A. Legal Standards

“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 the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A claim is unpatentable under 35 U.S.C. § 103(a) if “the differences between the subject matter sought to be patented and the prior art are such

⁹ WO 97/33763, published Sep. 18, 1998 (Ex. 1038).

that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness.¹⁰ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

To show obviousness, it is not enough to merely show that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). “This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.” *KSR*, 550 U.S. at 418–419.

On the other hand, an obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418; *accord In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007). However, a petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). Instead, a petitioner must articulate a reason why a person of ordinary skill in the art would have combined or modified

¹⁰ The parties have not asserted or otherwise directed our attention to any objective evidence of nonobviousness.

the prior art references. *In re NuVasive, Inc.*, 842 F.3d 1376, 1382 (Fed. Cir. 2016); *see also Metalcraft of Mayville, Inc. v. The Toro Co.*, 848 F.3d 1358, 1366 (Fed. Cir. 2017) (“In determining whether there would have been a motivation to combine prior art references to arrive at the claimed invention, it is insufficient to simply conclude the combination would have been obvious without identifying any reason why a person of skill in the art would have made the combination.”); *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.”) (citing *InTouch Techs., Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014)).

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

B. Level of Ordinary Skill in the Art

We review the grounds of unpatentability in view of the understanding of a person of ordinary skill in the art at the time of invention. *Graham*, 383 U.S. at 17.

In the Institution Decision, we determined that a person of ordinary skill in the art at the time of the invention of the ’042 patent

would have at least a Bachelor’s degree in Chemistry, Chemical Engineering, Imaging Technology or Material Science with at least one year of experience in coating technologies and imaging technologies, or at least five years of work experience in the field of coating technologies and imaging technologies.

Inst. Dec. 12–13 (adopting Patent Owner’s proposed definition).

For purposes of this Final Written Decision, we maintain our determination from the Institution Decision because neither party disputes

that determination and that level of ordinary skill is consistent with the record. *See* PO Resp. 15; *see generally* Reply.

C. Claim Construction

In an *inter partes* review, we construe claim terms according to the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–17 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b) (2019). Under that standard, we construe claims “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b). Furthermore, we expressly construe the claims only to the extent necessary to resolve the unpatentability issues before us. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

In the Institution Decision, we determined that each of the claims in the ’042 patent requires a “white layer” that melts and mixes with another layer or layers during application. Inst. Dec. 14. Our construction was based the parties’ agreement that the claims of the ’042 patent require a white layer that melts and mixes with another layer, and on the claim construction of “white layer” that the district court in the Arkwright Lawsuit adopted. Ex. 1022, 17 (Arkwright Lawsuit Markman Order). In the Institution Decision, we rejected Patent Owner’s attempt to modify the interpretation adopted in the Arkwright Lawsuit to include “a polymer that softens or melts and mixes to some degree with another layer.” Inst. Dec. 14 (Patent Owner’s modifications indicated with underlining).

In its Response, Patent Owner again requests that we adopt a construction of “white layer” that differs from the construction adopted in the Arkwright Lawsuit and in our Institution Decision. Specifically, Patent Owner’s proposed construction includes “a layer comprising a concentration or configuration of pigment providing a white background for received indicia and which further comprises a polymer that softens or melts, such that it mixes with another layer or layers during application, without the resulting composition needing to be substantially uniform.” PO Resp. 15–16 (Patent Owner’s modifications indicated with underlining).

Petitioner contends that we should again reject Patent Owner’s attempt to rewrite the construction of “white layer” because it is “completely at odds” with the construction in both the Arkwright Lawsuit and the Delaware Lawsuit, which requires actual melting, not just softening, and construes “mix” to have its plain and ordinary meaning. Reply 2 (citing Ex. 1066, 6).

We agree, and decline to adopt Patent Owner’s construction that departs from the construction in the Arkwright Lawsuit and the Delaware Lawsuit. Ex. 1022, 17; Ex. 1066, 6. Accordingly, for purposes of this Final Written Decision, we maintain our construction of the term “white layer” from the Institution Decision. We note, however, that Patent Owner states that “the parties’ disputes with respect to the construction of the ‘white layer’ make no difference to the Board’s resolution of this matter.” PO Resp. 17; Tr. 13:21–14:3; 53:19–21.

We do not need to construe any other terms for purposes of this Decision. *Nidec*, 868 F.3d at 1017.

D. Alleged Obviousness over Kronzer and Oez-US (claims 1–3, 5–8, and 10–22)

Petitioner contends claims 1–3, 5–8, and 10–22 are unpatentable as obvious over Kronzer and Oez-US. Pet. 66. Petitioner directs us to portions of Kronzer and Oez-US that purportedly disclose all the limitations in the challenged claims. Pet. 66–79. Petitioner also relies on the declaration testimony of Dr. Wanat to support its arguments. *See* Pet. 66–79; Reply 2–12; Ex. 1020; Ex. 1062.

1. Kronzer (Ex. 1018)

Kronzer relates to a printable heat transfer paper having cold release properties to permit the removal of the carrier or base sheet after the transfer sheet has cooled. Ex. 1018, Abstract, 2:25–30. According to Kronzer, the heat transfer paper includes a flexible first layer, or base sheet, that “ha[s] sufficient strength for handling, coating, sheeting, and other operations associated with its manufacture, and for removal after transferring an image.” Ex. 1018, 4:15–25. The heat transfer paper includes a second layer, or “release layer,” disposed on the base sheet and composed of a thermoplastic polymer having essentially no tack at transfer temperatures. Ex. 1018, 5:23–25. A third layer, overlaying the second layer, includes a thermoplastic polymer, which melts in a range from about 65° C to about 180° C. Ex. 1018, 5:46–48. According to Kronzer, “[t]he third layer functions as a transfer coating to improve the adhesion of subsequent layers in order to prevent premature delamination of the heat transfer material.” Ex. 1018, 5:48–51. A fourth layer overlays the third layer to provide a layer on which an image is placed by an ink jet printer. Ex. 1018, 7:3–6. The printable heat transfer material of Kronzer may further include a fifth layer, including a film-forming binder and located between the second and third

layers, to improve adhesion and prevent delamination. Ex. 1018, 8:31–46. Additionally, “any of the foregoing film layers may contain other materials, such as processing aids, release agents, pigments, deglossing agents, antifoam agents, and the like,” because “use of these and similar materials is well known to those having ordinary skill in the art.” Ex. 1018, 8:47–51.

2. *Oez-US (Ex. 1013)*

Oez-US “relates to a transfer paper and to a process for transferring photocopies to textiles, such as, in particular, T-shirts.” Ex. 1013, 1:6–8. Oez-US describes “a transfer paper which has, as the coating of plastic, at least: a polyurethane which can be cross-linked under the action of heat by a melamine-formaldehyde resin esterified with methanol, mixed with an acrylic acid ester/acrylic acid copolymer, the latter being a thickener.” Ex. 1013, 1:37–42. Oez-US states that it is of “essential importance that a white pigment (TiO_2) can be incorporated into the mixture so that the prior white coating of dark (black) textiles hitherto necessary can now be dispensed with and the print can be transferred immediately with a single film.” Ex. 1013, 1:51–55.

Oez-US discloses that the coating “can be peeled off from the paper as a film and can be laid as a positive on the textile substrate to be ironed on and to bond with the textile fibers.” Ex. 1013, 1:47–49. Oez-US describes ironing the film onto a textile “at elevated temperatures.” Ex. 1013, 3:56–58.

3. *Claim 1*

Petitioner contends that the combination of Kronzer and Oez-US suggests the method of making the image transfer article of claim 1. Pet. 67–72. Petitioner argues that Kronzer describes “‘a heat transfer paper’ (*i.e.*, image transfer sheet) ‘for transferring designs, messages, and

illustrations’ (*i.e.*, images) ‘on articles of clothing, such as T-shirts.’”

Pet. 67–68 (quoting Ex. 1018, 1:5–11, 9:1–18:6). Petitioner also argues Kronzer teaches how to make its image transfer articles. Pet. 68 (citing Ex. 1018, 4:27–8:46).

Claim 1 requires obtaining a removable substrate and coating the substrate with at least one of silicone, clay, resin, fluorocarbon, urethane, or an acrylic base polymer. Ex. 1004, 11:37–40. Petitioner explains that “Kronzer teaches that its image transfer article ‘includes a flexible first layer having first and second surfaces,’ which ‘serves as a base sheet or backing’ and ‘typically will be a film or a cellulosic nonwoven web.’” Pet. 68 (quoting Ex. 1018, 4:15–20, 4:27–31). According to Petitioner, Kronzer also explains that the backing sheet, which can be easily removed after the image has been transferred to the fabric, may include an acrylic base polymer or clay. Pet. 68–69 (citing Ex. 1018, 4:6–14, 5:23–45, 9:49–50, 12:12–43, Tables VI–XIV).

Claim 1 next requires “overlaying the coated removable substrate with one or more polymer layers.” Ex. 1004, 11:41–42. Petitioner alleges that Kronzer discloses a third layer that overlays the second layer and includes a thermoplastic polymer, and that “a fourth layer may overlay the third layer in order to provide an ink jet printable heat transfer material,” which “typically includes a film-forming binder and a powdered thermoplastic polymer.” Pet. 69 (quoting Ex. 1018, 2:45–48, 2:65–67, 7:3–9).

Lastly, claim 1 requires “combining at least one of the one or more polymer layers with a pigment, the pigment having a concentration or configuration sufficient to provide an opaque background for received indicia, when transferred to a base.” Ex. 1004, 11:43–46. Petitioner argues that “[a]lthough Kronzer does not expressly disclose that its third layer . . .

includes a ‘white’ pigment that provides an opaque/non-transparent background, this feature is taught by Oez-US.” Pet. 70. In particular, Petitioner explains that “Oez-US teaches combining its polymer layer with a white pigment to provide a white background for an image that is transferred to a base (e.g., fabric).” Pet. 37–38 (citing Ex. 1013, 1:26–31, 1:47–55, 3:22–58; Ex. 1020 ¶¶ 114–116). Petitioner contends that a person of skill in the art would have had reason to combine the teachings of Kronzer and Oez-US because “both Kronzer and Oez-US teach printable multi-layered transfer structures having a removable substrate, release coating, and image-imparting layer, and share the common goal of improving image transfer characteristics.” Pet. 67. Petitioner also argues that Kronzer teaches that any of its layers may contain materials such as pigments, and Oez-US teaches that its white-layered sheets “can be used particularly advantageously on dark (black) fabrics.” Pet. 70 (quoting Ex. 1013, 1:27–31, 2:50–51; citing Ex. 1018, 8:47–49).

Petitioner additionally asserts that “Kronzer and Oez-US further teach the ‘melt and mix’ requirement.” Pet. 71. Petitioner contends that Kronzer’s third and fourth layers can comprise thermoplastic polymers that melt between 65 °C and 180 °C. Pet. 71 (citing Ex. 1018, 2:45–67). According to Petitioner, a person skilled in the art would have understood that the Kronzer/Oez-US transfer sheet would have been heated above 180 °C during application and, therefore, that the white layer (third layer) and image-imparting layer (fourth layer) would melt and mix. Pet. 71–72 (citing Ex. 1020 ¶¶ 38–60, 211–213).

Patent Owner does not dispute that Kronzer and Oez-US together teach or suggest all of the limitations recited in claim 1. *See generally* PO

Resp. 20–42;¹¹ Reply 1. After considering the full record developed during trial, we agree with Petitioner’s undisputed arguments and evidence that Kronzer and Oez-US teach or suggest all of the limitations recited in claim 1.

Patent Owner, however, does contend that Petitioner has not demonstrated a reason to combine just the white pigment from Oez-US (and not the entire cross-linking white layer) with Kronzer’s structure or that such a combination would yield a reasonable expectation of success. PO Resp. 27–28. Additionally, Patent Owner affirmatively asserts that a person of ordinary skill in the art would *not* have had a reason to combine the teachings of Kronzer and Oez-US to achieve the invention claimed in the ’042 patent. PO Resp. 28. We address Patent Owner’s arguments below.

¹¹ In its Sur-reply, Patent Owner states that “Petitioner’s main obviousness challenge presents a combination of two references (Kronzer-Oez . . .), **neither of which discloses this key feature:** a white layer that melts and mixes with another layer.” Sur-reply 1. Patent Owner also states, “[n]o prior art of record teaches the key feature of the ‘042 Patent: a white layer that melts and mixes with another layer.” Sur-reply 2. We understand Patent Owner’s assertions here to mean that neither reference, individually, discloses a white layer that melts and mixes, not that the combined teachings of the references fail to disclose a white layer that melts and mixes. Our understanding is based on Patent Owner’s arguments that Kronzer has no need for a white layer at all, and that Oez-US discloses a white layer that does not melt and mix. Sur-Reply 1. Patent Owner’s statements in the Sur-reply do not address Petitioner’s actual argument, namely that Kronzer discloses a layer that melts and mixes, and Oez-US discloses the use of a white pigment, such that the references collectively teach or suggest a white layer that melts and mixes. *See In re Merck*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.”).

*a) Whether Petitioner has established a reason to combine
Kronzer and Oez-US*

Patent Owner acknowledges that Petitioner offers three reasons why a person of ordinary skill in the art would have combined the teachings of Kronzer and Oez-US, and challenges each reason. PO Resp. 28–31.

Patent Owner contends that Petitioner’s first reason—that both Kronzer and Oez-US teach “printable multi-layered transfer structures having a removable substrate, release coating, and image-imparting layer”—is incorrect. PO Resp. 28. Patent Owner asserts that “every example and every claim in Oez teaches a single coating of plastic, not a multi-layered transfer with a distinct ‘image-imparting layer.’” PO Resp. 28 (citing Ex. 1013 generally). Patent Owner additionally argues that mere identity of subject matter between two references is insufficient to establish that the ordinarily skilled artisan would have had a reason to combine the teachings of those references. PO Resp. 28.

Petitioner asserts that Patent Owner’s allegation regarding Oez-US being limited to a single layer of plastic is “demonstrably false.” Reply 4. Petitioner explains that “Oez[-US] discloses and claims a multi-layered transfer sheet” and that “[Patent Owner’s] expert admitted as much during his deposition.” Reply 4 (citing Ex. 1013, 2:36–44; Ex. 1063, 295:8–296:18).

We agree with Petitioner that Oez-US is not limited to a single-layer coating and instead encompasses multi-layered designs. Petitioner directs us to specific portions of Oez-US that, like Kronzer, describe multi-layered transfer structures. *See* Ex. 1013, 2:36–44 (describing a polymer layer *between* the paper and the polyurethane layer), claim 12 (same). Testimony from Dr. Ellison likewise indicates Oez-US discloses a multi-layered

structure. Ex. 1063, 295:8–296:18 (Dr. Ellison’s testimony describing Oez-US as having a second, optional layer).

Furthermore, although we agree with Patent Owner that identity of subject matter alone is insufficient to demonstrate that the ordinarily skilled artisan would have had reason to combine the teachings of Kronzer and Oez-US, Petitioner does not rely on identity of subject matter alone, as discussed in more detail below. Nevertheless, we consider Petitioner’s discussion of the identity of subject matter to be relevant for purposes of demonstrating the references are analogous art, which is part of the obviousness analysis. *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1238 (Fed. Cir. 2010); *see also In re Kahn*, 441 F.3d 977, 987–88 (Fed. Cir. 2006) (noting that the inquiry as to whether a person of ordinary skill in the art would have sought to combine the references “picks up where the analogous art test leaves off”).

Patent Owner next challenges Petitioner’s argument that Kronzer and Oez-US “share the common goal of improving image transfer characteristics” because “Kronzer and Oez-US actually solve fundamentally different problems using fundamentally different technologies.” PO Resp. 29. Patent Owner explains that Kronzer “solves the problem of creating an image transfer that has ‘cold release properties’” where, in contrast, Oez-US “solves the problem of printing in ‘positive,’ incorporating white pigment into ‘a coating of plastic,’ and the use of ‘black textiles.’” PO Resp. 29. According to Patent Owner, Kronzer’s solution involved experimenting with transparent transfer materials (i.e., lacking pigment) that can be printed in mirror image and applied image-side down, whereas Oez-US’s solution involves incorporating white pigment into its coating and using an image-side up, peel first method. PO Resp. 29–30. Therefore, Patent Owner reasons that “the divergent goals and solutions of the two inventions

demonstrate why a [person of ordinary skill in the art] would **not** be motivated to combine the references.” PO Resp. 30.

Petitioner maintains that “Kronzer and Oez-US are both directed to improving the image transfer quality of multi-layer transfer sheets.” Reply 4 (citing Pet. 66–67; Ex. 1020 ¶¶ 97, 199–200; Ex. 1062 ¶¶ 11–12). Citing our Institution Decision, Petitioner explains that “Kronzer’s teachings are applicable to image transfers on any color fabric” and argues that a person of ordinary skill in the art “would have understood from Oez-US’s teachings that a ‘positive’ image would be printed on top of Kronzer’s layer in conjunction with adding white pigment.” Reply 4 (citing Inst. Dec. 21–22; Ex. 1020 ¶¶ 97, 200, 208–210, 223; Ex. 1062 ¶¶ 7–14).

We find Petitioner’s arguments persuasive. Contrary to Patent Owner’s argument that the references have divergent goals, the evidence of record supports Petitioner’s assertion that both Kronzer and Oez-US share the common goal of improving the quality of image transfers. *E.g.*, Ex. 1013, 1:25–31 (referring to a transfer paper that “ensures a greater brilliance of the image”); Ex. 1018, 2:17–48 (referring to “an improved heat transfer paper”); Ex. 1062 ¶¶ 199–200. Additionally, we credit Dr. Wanat’s testimony that Kronzer and Oez-US are “complementary and compatible” with one another “because Kronzer’s image transfer sheet can be used on any color fabric.” Ex. 1062 ¶ 11. As noted in our Institution Decision, we do not discern any specific discussion in Kronzer that its teachings are limited to any color fabric. Inst. Dec. 21. Nor has Patent Owner directed us to any. Instead, Patent Owner acknowledges that Kronzer does not discuss problems with transferring an image to a dark fabric, or the use of dark or black fabric/T-shirts. PO Resp. 22. In view of Kronzer’s silence about the

color of its T-shirt base, a person of ordinary skill in the art would have understood that Kronzer's teachings are applicable to any color fabric.

Moreover, even if we were to agree with Patent Owner's argument regarding Kronzer and Oez-US solving fundamentally different problems, it would be error to "assum[e] that a person of ordinary skill in the art attempting to solve a problem will be led only to those prior art elements designed to solve the same problem." *KSR*, 550 U.S. at 402. Further, "[c]ommon sense teaches . . . that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420.

Patent Owner also challenges Petitioner's argument that a person of ordinary skill in the art would have combined the teachings in Kronzer and Oez-US because Kronzer discloses its film layer may contain pigments and "Oez-US teaches that its transfer sheets 'can be used particularly advantageously on dark (black) fabrics.'" PO Resp. 30 (quoting Pet. 67, 70; citing Pet. 68–69). According to Patent Owner,

nothing in this argument indicates **why** a [person of ordinary skill in the art] would be motivated to combine Oez-US **with Kronzer**. In other words if a [person of ordinary skill in the art] had before it Kronzer and Oez and was looking to solve the problem of transferring to dark fabrics, Petitioners do not explain what would motivate a [person of ordinary skill in the art] to look to Kronzer **at all**.

PO Resp. 30. Patent Owner faults Petitioner for failing to argue, for example, "that Kronzer's structure provides something beneficial that is lacking in Oez-US" or "that the combination of the two references as Petitioners propose would result in some new desirable feature." PO Resp. 30; Sur-reply 11. As a result, Patent Owner argues that Petitioner's

combination of Kronzer and only the pigment from Oez-US uses the claims as a roadmap. PO Resp. 30–31.

We disagree. Petitioner’s arguments are based on Oez-US supplying something beneficial that is missing from Kronzer, and therefore improving the system of Kronzer.¹² Thus, contrary to Patent Owner’s assertions otherwise, Petitioner has indicated why a person of ordinary skill in the art would have been motivated to combine Oez-US and Kronzer. Furthermore, Petitioner’s reliance on express teachings from Oez-US and Kronzer in support of its arguments undermines Patent Owner’s assertion that Petitioner improperly relies on hindsight.

In weighing the evidence and arguments before us, we find Petitioner advances sufficient reasoning with rational underpinnings to explain why one of ordinary skill in the art would have had reason to combine Kronzer and Oez-US. Petitioner relies on Kronzer’s express teaching that any of its layers may contain pigments and Oez-US’s express teaching that its layered sheet including a white pigment “can be used particularly advantageously on dark (black) fabrics.” Pet. 70 (citing Ex. 1018, 8:47–49; Ex. 1013, 1:27–31 (stating the use of white pigment “ensures a greater brilliance of the image . . . especially for printing black textiles”), 2:50–51). Accordingly, Petitioner reasons that a person of ordinary skill in the art would have included the white pigment of Oez-US in the polymer layer of Kronzer to

¹² In view of this, we agree with Petitioner that Patent Owner’s assertion regarding Petitioner’s failure to argue Kronzer provides something beneficial that is lacking in Oez-US is a red herring, as Petitioner does not propose to modify or improve anything in Oez-US based on Kronzer. Reply 5.

achieve the shared goal in Kronzer and Oez-US of improving image transfer.
Pet. 66–67; Reply 5; Ex. 1062 ¶¶ 11–12.

- b) *Patent Owner’s affirmative arguments that a person of ordinary skill in the art would not have combined Kronzer and Oez-US to yield the invention described in the ’042 patent claims*

In addition to arguing Petitioner fails to establish that a person skilled in the art would have been motivated to combine Kronzer and Oez-US, Patent Owner affirmatively argues the evidence of record shows a person of ordinary skill in the art would not have been motivated to combine Kronzer and Oez-US. PO Resp. 31. Specifically Patent Owner contends that

[t]his evidence includes: (1) Kronzer’s trials all involve transparent, non-pigmented sheets that would pose issues if transferred to dark t-shirts; (2) Kronzer and Oez rely upon different chemical reactions; (3) Kronzer and Oez employ different structures; (4) Kronzer and Oez solve different problems and use different technologies to solve those problems; and (5) Kronzer and Oez use opposite methods of applications.

PO Resp. 31. Patent Owner additionally alleges adding the white pigment from Oez-US to Kronzer would not yield predictable results and a person of ordinary skill in the art would not “expect the combination to succeed” because Petitioner “incorrectly borrows a single function of the white pigment in Oez (allowing transfer to dark fabrics) while ignoring the impact of the other functions of the white pigment.” PO Resp. 31–32. We address each of Patent Owner’s arguments below.

- (1) *whether a person of ordinary skill in the art would not have had reason to combine Kronzer and Oez-US because Kronzer’s sheets are transparent and Kronzer does not*

*acknowledge problems associated with transferring an
image to dark fabrics*

Patent Owner argues that “a [person of ordinary skill in the art] would not be motivated to combine Kronzer with Oez-US to create the inventions of the ‘042 Patent . . . because Kronzer does not solve – or even acknowledge – the problem of transferring an image onto dark fabric.” PO Resp. 32. For example, Patent Owner contends that Kronzer does not acknowledge that conventional, transparent transfers result in an image that has insufficient brilliance on dark fabric, and that none of Kronzer’s examples utilize a pigment at all, let alone one used to form an opaque background for dark fabrics. PO Resp. 33 (citing Ex. 2011 ¶¶ 41, 137).

Petitioner “asserts that Oez-US—not Kronzer—discloses the solution to the problems with transferring images onto dark fabrics; *i.e.*, including a white/opaque pigment to provide a white/opaque background onto which a positive image can be printed,” the same issue the ’042 patent purports to solve. Reply 6. Petitioner further explains that Kronzer is not limited to any fabric color and a person skilled in the art “would have been motivated to improve Kronzer by including a white pigment as taught by Oez-US.” Reply 6.

We are persuaded by Petitioner’s arguments. Contrary to Patent Owner’s assertions, Kronzer need not solve, much less acknowledge, the specific problem of dark image transfer. The test for obviousness is not whether any one or all of the references expressly suggests the claimed invention, but whether the claimed subject matter would have been obvious to those of ordinary skill in the art in light of the combined teachings of those references. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Moreover, one of ordinary skill can use his or her ordinary skill, creativity,

and common sense to make the necessary adjustments and further modifications to result in a properly functioning method. *See KSR*, 550 U.S. at 418 (holding “a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ”). And, where “a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *See id.* at 417.

Here, Kronzer discloses an image transfer sheet, and does not expressly limit its teachings to any color fabric. Oez-US teaches an improvement—the use of a white, opaque pigment that “ensures a greater brilliance of the image . . . especially for printing on black textiles.” Ex. 1013, 1:28–31. The evidence of record discussed above, including the fact that Kronzer teaches including a pigment in any one of its polymer layers (Ex. 1018, 8:46–51), the shared goal of improving image transfer sheets (Ex. 1013, 1:25–31; Ex. 1018, 2:17–48), and the “complementary and compatible” nature of the transfer sheets in Kronzer and Oez-US (Ex. 1062 ¶ 11), supports a finding that a person of ordinary skill in the art would have recognized that the Oez-US technique would improve the similar transfer sheet disclosed in Kronzer, and would have had a reason to combine the teachings of Kronzer and Oez-US. *See KSR*, 550 U.S. at 417.

(2) *whether a person of ordinary skill in the art would not have had reason to combine Kronzer with Oez-US’s white pigment alone and whether a reasonable expectation of success exists*

Patent Owner argues that a person of ordinary skill in the art would not have had reason to use only the white pigment from Oez-US because Oez-US teaches away from a white layer that does not crosslink, i.e., that

melts and mixes. PO Resp. 34; Sur-reply 11–12. According to Patent Owner, “[t]he cross-linking reaction in Oez is **required** for the white layer in Oez to function,” but Petitioner simply ignores it. PO Resp. 34. Patent Owner also argues that “transferring a pigment from a reactive system (Oez) to a non-reactive system (Kronzer) raises significant technical challenges from a chemistry and materials science perspective,” such that a person of ordinary skill in the art would not have had a reasonable expectation of success in taking only the pigment from Oez-US, and not the entire cross-linking white layer. PO Resp. 35 (citing Ex. 2011 ¶ 141).

Patent Owner contends the “numerous failures in the numerous trials in Kronzer” support its argument and further “demonstrate why one cannot simply add a completely different composition (i.e., white pigment) without making other adjustments or accommodating for all of the various effects caused by the pigments.” PO Resp. 35 (citing Ex. 2011 ¶ 140). Patent Owner argues that “it is ‘extremely rare’ to find a ‘drop in’ replacement for an existing ingredient that will result in the identical finished . . . color.” PO Resp. 35–36 (citing Ex. 2011 ¶ 140; Ex. 2012, 3). Additionally, Patent Owner states “that, in the reactive system of Oez[-US], the titanium dioxide performs multiple functions beyond providing whiteness,” and can also chemically react with the components of a polymer layer. PO Resp. 36 (citing Ex. 2011 ¶ 144). Patent Owner further argues that titanium dioxide is a particulate, which “would completely change the characteristics” of Kronzer’s third layer, including the viscosity and flow properties of the third layer at transfer temperatures and solid state characteristics of the third layer, such as modulus, elasticity, and flexibility. PO Resp. 36–37. As a result, according to Patent Owner, transferring the pigment from Oez-US to Kronzer is not a “like-for-like transfer,” the results of the transfer would be

unpredictable, and a person would not have had a reasonable expectation that adding pigment to the third layer of Kronzer would be successful. PO Resp. 37.

Petitioner argues that Oez-US does not teach away from using only the white pigment because “Oez-US does **not** make **any** statement that criticizes, discredits or would discourage a [person of ordinary skill in the art] from the use of a white pigment such as TiO_2 in non-crosslinking polymers.” Reply 7. Petitioner also argues that “Oez-US does **not** suggest that using TiO_2 with thermopolymers, such as those disclosed in Kronzer, would not achieve the same improvement to an image transfer sheet.” Reply 7 (citing Ex. 1062 ¶¶ 13–20). Instead, Petitioner explains that it is undisputed that Oez-US describes the use of TiO_2 to improve image quality on dark substrates and asserts that “Kronzer also **encourages** using of pigments in its polymer layers.” Reply 7 (citing Ex. 1013, 1:46–55; Ex. 1018, 8:46–51; Ex. 1062 ¶¶ 16–20; Ex. 2011 ¶¶ 87–91). Petitioner further asserts that a person of ordinary skill in the art would have understood “that TiO_2 would function as a white pigment—and provide a white/opaque background—**regardless of whether it was present in a cross-linked polymer or a non-cross-linked polymer**,” and points to testimony from Patent Owner’s declarant, Dr. Ellison, in support. Reply 7–8 (citing Ex. 1063 ¶¶ 17–20; Ex. 1063, 304:8–22). And Petitioner states that neither Patent Owner nor Dr. Ellison cite to record evidence “to support [their assertion] that TiO_2 somehow participates in the cross-linking reaction in Oez-US.” Reply 8 (citing PO Resp. 34–36; Ex. 2011 ¶¶ 141–148; Ex. 1063, 302:4–303:21).

We do not agree with Patent Owner’s arguments that Oez-US teaches away from using white pigment alone or that Oez-US requires a crosslinking

polymer for the white pigment to function. *See* PO Resp. 34–37. To teach away, a reference must discourage one of ordinary skill in the art from following the path set out in the reference, or lead that person in a direction divergent from the path taken by the applicant. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) (“[A] reference will teach away if it suggests that the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant.”). “A reference does not teach away . . . if it merely expresses a general preference for an alternative invention but does not ‘criticize, discredit, or otherwise discourage’ investigation into the invention claimed.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (quoting *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)). Patent Owner does not identify any teaching in Oez-US that either requires use of a crosslinking polymer with its white pigment or discourages use of a white pigment without a crosslinking polymer. Our independent review of Oez-US does not reveal any such teaching. The fact that Oez-US uses a white pigment in addition to a crosslinked polymer does not mean that crosslinking is required nor does it teach away from pursuing the path taken in the ’042 patent.

Patent Owner’s arguments that transferring a white pigment from a reactive to a non-reactive system would have been unpredictable because the titanium dioxide performs functions beyond providing whiteness and the properties and characteristics of the layer would be altered are similarly unavailing. *See* PO Resp. 34–37; Sur-reply 5–6. Neither Patent Owner nor its declarant, Dr. Ellison, identifies anything in Oez-US that suggests the titanium dioxide performs any function other than providing a contrasting background. *See generally* PO Resp. 34–37; *see generally* Ex. 2011. Rather, Oez-US consistently refers to the white pigment or titanium dioxide

as the material responsible for providing contrast for images transferred to dark-colored textiles. Ex. 1013, 1:25–30, 1:50–54, 2:50–51. In fact, Oez-US states that “[i]f white textiles are to be printed on, the titanium oxide pigment can also be omitted.” Ex. 1013, 2:31–32. Further, Dr. Ellison’s testimony that “white pigments like titanium dioxide *often* have a surface chemistry [that] . . . *can* interact with components of reactive systems [and] . . . *can* itself chemically react with the components of the single polymer layer of Oez[-US] and become part of the crosslinked network,” is inconclusive and, at best, describes *possible* interactions in a *reactive* system—not a non-reactive system as Petitioner proposes. Ex. 2011 ¶ 144 (emphasis added).

Furthermore, record evidence supports Petitioner’s position that a person of ordinary skill in the art would have understood that incorporating titanium dioxide within a polymer layer provides a white background whether the polymer is crosslinked or not. Ex. 1062 ¶¶ 17–18 (citing Ex. 1055 ¶¶ 120–121); Ex. 1063, 304:8–22 (Dr. Ellison’s testimony that the reactions described in Oez-US would not be required for titanium dioxide to provide whiteness). Regarding the purported changes titanium dioxide would have on certain properties or characteristics of the polymer layers, Patent Owner’s argument is based solely on the conclusory declaration testimony of Dr. Ellison, which is entitled to little or no weight. *See* Ex. 2011 ¶¶ 145–148; 37 C.F.R. § 42.65(a).

Similarly, Patent Owner’s argument that “it is ‘extremely rare’ to find a ‘drop in’ replacement” for titanium dioxide (PO Resp. 35–36) appears to be based on an incomplete understanding of the referenced articles and is otherwise conclusory. For example, Patent Owner relies on the testimony of Dr. Ellison and Exhibits 2012 and 2013. But Dr. Ellison admits the book

excerpted in Exhibit 2013 is not relevant to inorganic pigments such as TiO₂, and that he had not “studied” the details of the paper in Exhibit 2012, which identifies the problem with TiO₂ only as a possible color shift or variance in lightness of up to 10%. Reply 8–9; Ex. 1063, 343:11–347:7, 350:5–355:2.

On the other hand, Petitioner identifies evidence that suggests titanium dioxide is well-studied, well-understood, and the most widely-used white pigment in response to Patent Owner’s unpredictability arguments and arguments that a person of ordinary skill in the art would not have had a reasonable expectation of success. Reply 8–10; Ex. 1062 ¶¶ 19–39 (citing Exs. 1054–1058); *see also* Ex. 2012, 1 (“Titanium dioxide is the most widely used white pigment because of its unique ability to provide exceptional opacity and lend whiteness and brightness.”); Ex. 1055 (“Half of all TiO₂ pigment produced is consumed by the coatings industry and a quarter by the paper industry.”).

We also disagree with Patent Owner’s assertion that the alleged “numerous failures” in Kronzer demonstrate why adding a new component to the third layer would be unpredictable. PO Resp. 35; Sur-reply 5. Even if we were to accept Patent Owner’s characterization of Kronzer as including some failures as true, Patent Owner itself acknowledges that none of those trials included a pigment. PO Resp. 31 (“Kronzer’s trials all involve transparent, non-pigmented sheets . . .”), 33 (“In each of the 68 trials in Kronzer, there is no pigment in any of the layers that are transferred . . .”); *see also* Reply 9 (“Kronzer does not disclose any ‘failure’ regarding the use of TiO₂ or any pigment.”) Thus, we fail to see the particular significance of those specific trials to the question of unpredictability based on the addition of a pigment to Kronzer. Moreover, a reference should be considered in its entirety for what it fairly teaches one skilled in the art, which here would

include the multiple successful trials in Kronzer. Ex. 1018, Tables VI–XIV (showing transfer sheet trials with characteristics, including image transfer, that are “good” and/or “excellent”); *see In re Wesslau*, 353 F.2d 238, 241 (CCPA 1965).

(3) *whether a person of ordinary skill in the art would not have had reason to combine Kronzer and Oez-US because Kronzer and Oez-US allegedly involve different structures and manufacturing processes*

Patent Owner contends there are “fundamental differences in [the] structures and manufacturing” of Kronzer versus Oez-US such that the ordinarily skilled artisan would not have combined their teachings. PO Resp. 38. In particular, Patent Owner asserts that “Kronzer is a multi-layered structure, in which each layer is laid down separately during manufacturing and in which each layer serves a different function,” whereas “every example and every claim in Oez teaches a single homogenized coating, which is pre-mixed during manufacture.” PO Resp. 38.

Petitioner argues that Oez-US is not a “single homogenized coating” as Patent Owner suggests. Reply 10. Petitioner asserts that both Oez-US itself and Patent Owner’s own declarant describe Oez-US as having a multi-layered structure. Reply 10.

For the same reasons discussed above in Section III.D.3.a, we do not agree with Patent Owner’s arguments in this regard. As we explained above, Oez-US and Kronzer each describe a multi-layered image transfer structure. *See* Ex. 1013, 2:36–44 (describing a polymer layer *between* the paper and the polyurethane layer), claim 12 (same); *see also* Ex. 1063, 295:8–296:18 (testimony by Dr. Ellison describing Oez-US as having a second, optional layer); Ex. 1018, 2:33–3:6 (describing a heat transfer sheet having up to five layers).

(4) whether a person of ordinary skill in the art would not have had reason to combine Kronzer and Oez-US because the problems being solved, and technology employed to solve them are different

Patent Owner also argues that “a [person of ordinary skill in the art] would not be motivated to combine Kronzer and Oez . . . because of the fundamental differences in the problems each reference seeks to address and the fundamental differences in the technology each reference uses to solve those problems.” PO Resp. 39.

Petitioner argues that “Kronzer and Oez-US are both directed to improving the image transfer quality of multi-layer transfer sheets.” Reply 4; Pet. 66–67 (referring to the “common goal” of improving image transfer sheets). Dr. Wanat testifies that the teachings of Kronzer and Oez-US are “clearly complementary and compatible with one another” because “Kronzer’s image transfer sheet can be used on any color fabric,” “Kronzer teaches that ‘pigments’ can be used in any of its layers,” and “[t]here is no structural or chemical characteristic of Kronzer’s image transfer sheet that would prevent it from being applied to dark or black fabric, or prevent it from being used with a white pigment as taught by Oez-US.” Ex. 1062 ¶¶ 11–12.

For the same reasons discussed above in Section III.D.3.a, Patent Owner’s arguments in this regard are unavailing. As we explained above, we consider Kronzer and Oez-US to be aligned with a common goal of improving the quality of transferred images. Additionally, Dr. Wanat’s testimony regarding Oez-US and Kronzer being complementary and compatible, which Kronzer supports because it teaches the use of pigments and is not limited to fabric color, undermines Patent Owner’s arguments that the technology in the two references is so different that a person of ordinary

skill in the art would not have had any reason to combine the teachings of the references.

(5) whether a person of ordinary skill in the art would not have had reason to combine Kronzer and Oez-US where the printing and applying method of Kronzer and Oez-US are opposite to one another

Patent Owner contends that a person of ordinary skill in the art would not have had a reason to combine Kronzer and Oez-US because the “two references use opposite methods of application” and a person of ordinary skill in the art would not have had a reasonable expectation of successfully adding white pigment to Kronzer’s third layer using Kronzer’s method of application. PO Resp. 39–40. Patent Owner contends that, with the exception of claim 16, Petitioner does not address how one would have combined the peel later method of Kronzer (where the backing is peeled away from the image transfer sheet after heating) with the peel first method of Oez-US (where the backing is peeled away from the image transfer sheet before heating), or which method an ordinarily skilled artisan would have used. PO Resp. 39. According to Patent Owner, a person of ordinary skill in the art using Kronzer’s peel later method would not have had a reasonable expectation of successfully adding a white pigment to the third layer of Kronzer because, in Kronzer, the third layer is between the viewer and the graphic, and, therefore, adding white pigment would “obscure the decorative graphic” and be counterintuitive. PO Resp. 39–40.

Petitioner asserts that “far from being ‘counterintuitive’ (PO[Resp.] 40), a [person of ordinary skill in the art] (or anyone else possessing a modicum of common sense) would have understood that the inclusion of an white/opaque pigment in Kronzer’s layer would necessitate the image to be

positioned positively on top of (not underneath) the opaque/white layer, as expressly taught by Oez-US.” Reply 10–11 (citing Ex. 1062 ¶¶ 42–43).

We are persuaded by Petitioner’s arguments. Oez-US teaches that the printed image should be oriented on top of the white/opaque background. Ex. 1013, 1:25-31, 1:46-55, 3:1-4. Thus, we agree with Petitioner that a person of ordinary skill in the art would have understood from the references themselves that the image in Kronzer should be positioned such that it does not end up underneath the white/opaque layer when printed. Reply 10–11. Further, as Patent Owner acknowledges, using a white pigment without modifying Kronzer’s peel later method would result in the white layer covering the image and therefore, the image would be obscured. PO Resp. 40 (citing Ex. 2011 ¶ 150) (“[A] [person having ordinary skill in the art] would expect that white pigment in the third layer would obscure the decorative graphic.”); Pet. Reply 12; Ex. 1062 ¶¶ 42–43. We disagree, however, that this would have dissuaded a person of ordinary skill in the art from making Petitioner’s proposed modification because the “person of ordinary skill is also a person of ordinary creativity, not an automaton,” and does not abandon common sense when considering the combination of references. *KSR*, 550 U.S. at 421; *Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000) (explaining that a person of ordinary skill in the art would have considered both the advantages and disadvantages of the prior art).

For all of the foregoing reasons, we are persuaded by Petitioner’s arguments and evidence demonstrating that a person of ordinary skill in the art would have had reason to combine the teachings of Kronzer and Oez-US, and would have had a reasonable expectation of successfully doing so to arrive at the subject matter recited in claim 1. As noted above, we also agree

with Petitioner's arguments and evidence that Kronzer and Oez-US teach or suggest all of the limitations recited in claim 1. As a result, we find Petitioner has established, by a preponderance of evidence, that claim 1 is unpatentable as obvious in view of Kronzer and Oez-US.

4. *Claims 2, 3, and 5–8*

Claims 2, 3, and 5–8 depend from claim 1. Petitioner alleges that the combined teachings of Kronzer and Oez-US would have rendered obvious the subject matter of dependent claims 2, 3, and 5–8. Pet. 72–73. Petitioner directs us to portions of Kronzer and Oez-US that teach or suggest all of the limitations in claims 2, 3, and 5–8, and argues that a person of ordinary skill in the art would have had reason to combine the disclosures in Kronzer and Oez-US and would have had a reasonable expectation of successfully achieving the claimed invention. Pet. 72–73.

Patent Owner does not separately address dependent claims 2, 3, and 5–8 and, therefore, has forfeited any arguments based on these uncontested claims. *See generally* PO Resp. 20–42; *cf. NuVasive*, 842 F.3d at 1381 (explaining that a patent owner waives an argument presented in the preliminary response if it fails to renew that argument in the patent owner response during the instituted trial). Instead, Patent Owner relies on the same arguments addressed above in our discussion of claim 1, challenging Petitioner's arguments and evidence regarding whether a person of ordinary skill in the art would have had reason to combine the teachings of Kronzer and Oez-US, and whether a person of ordinary skill in the art would have had a reasonable expectation of success.

We have reviewed the information Petitioner provides, including the relevant portions of the Wanat Declaration, and agree with Petitioner's undisputed arguments and evidence that Kronzer and Oez-US teach or

suggest all of the limitations in claims 2, 3, and 5–8. Additionally, for the same reasons discussed above, we are persuaded by Petitioner’s arguments and evidence demonstrating that a person of ordinary skill in the art would have had reason to combine the disclosures set forth in Kronzer and Oez-US, and that a person of ordinary skill in the art would have had a reasonable expectation of success in achieving the claimed invention. We, therefore, find Petitioner has established, by a preponderance of the evidence, that claims 2, 3, and 5–8 are unpatentable as obvious in view of the combined teachings of Kronzer and Oez-US.

5. *Claims 10–15*

Petitioner also alleges that the combined teachings of Kronzer and Oez-US would have rendered obvious the subject matter of independent claim 10 and claims 11–15, which depend therefrom. Pet. 67–74. Independent claim 10 is similar to claim 1, and additionally requires an “image-imparting member including at least one surface configured to receive and carry indicia to be transferred.” Ex. 1004, 12:24–28. For the common limitations between claims 1 and 10, Petitioner relies on the same arguments and evidence discussed above with regard to claim 1. Pet. 67–72. Additionally, Petitioner argues that Kronzer’s fourth layer, which “is useful for a printable heat transfer material on which an image is to be placed by an ink jet printer,” corresponds to the “image-imparting member” with a surface for receiving/carrying indicia to be transferred, as recited in claim 10. Pet. 69–70.

Patent Owner does not separately address independent claim 10 or dependent claims 11–15 and, therefore, has forfeited any arguments based on these uncontested claims. *See generally* PO Resp. 20–42; *cf. NuVasive*, 842 F.3d at 1381. Instead, Patent Owner relies on the same arguments

addressed above in our discussion of claim 1, challenging Petitioner's arguments and evidence regarding whether a person of ordinary skill in the art would have had reason to combine the teachings of Kronzer and Oez-US, and whether a person of ordinary skill in the art would have had a reasonable expectation of success.

We have reviewed the information Petitioner provides, including the relevant portions of the Wanat Declaration, and agree with Petitioner's undisputed arguments and evidence that Kronzer and Oez-US teach or suggest all of the limitations in claims 10–15. Additionally, for the same reasons discussed above, we are persuaded by Petitioner's arguments and evidence demonstrating that a person of ordinary skill in the art would have had reason to combine the disclosures set forth in Kronzer and Oez-US, and that a person of ordinary skill in the art would have had a reasonable expectation of success in achieving the claimed invention. We, therefore, find Petitioner has established, by a preponderance of the evidence, that claims 10–15 are unpatentable as obvious in view of the combined teachings of Kronzer and Oez-US.

6. *Claims 16–22*

Petitioner alleges that the combined teachings of Kronzer and Oez-US would have rendered obvious the subject matter of independent claim 16 and claims 17–22, which depend therefrom. Pet. 74–79. Independent claim 16 is similar to claim 1, and additionally requires an “image-imparting member including at least one surface configured to receive and carry indicia to be transferred.” Ex. 1004, 12:24–28. Independent claim 16 also requires peeling the removable substrate away from the image-imparting member, contacting the image-imparting member, after being separated from the

substrate, to a dark-colored fabric, and heating the image-imparting member. Ex. 1004, 12:52–13:8 (collectively referred to as the “peel first” method).

For the common limitations between claims 1 and 16, Petitioner relies on the same arguments and evidence discussed above with regard to claim 1. Pet. 74–75. Additionally, Petitioner argues that Kronzer’s fourth layer, which “is useful for a printable heat transfer material on which an image is to be placed by an ink jet printer,” corresponds to the “image-imparting member” with a surface for receiving/carrying indicia to be transferred, as recited in claim 16. Pet. 69–70, 75. Petitioner also argues that Kronzer teaches the steps of “peeling” off the substrate, “contacting” the image-imparting member to the base/fabric, and “applying heat” to transfer the image and polymer layers onto the base/fabric. Pet. 76. Petitioner acknowledges that Kronzer does not disclose performing these steps in the sequential order recited in claim 16, but argues that Oez-US does, and that a person of ordinary skill in the art would have had reason to modify the order of the steps in Kronzer based on Oez-US and would have had a reasonable expectation of success. Pet 76–77.

In particular, Petitioner argues that “[i]n conjunction with modifying Kronzer’s third layer (adjacent to the ink-receiving layer) to include an opaque/white background, as taught by Oez-US,” a person of ordinary skill in the art “would have naturally also applied the image transfer steps and image orientation taught by Oez-US.” Pet. 76. According to Petitioner,

the purpose of adding the white pigment to Kronzer’s third layer is to provide an opaque/white background for the image being transferred. Oez-US, 1:27–31, 1:47–55. Thus, the first step would be to peel off the substrate so that the image printed on Kronzer’s fourth/ink-receiving layer is placed face-up (as a positive image) on top of the third/white layer before applying

heat. Wanat Decl., ¶¶223–231 (otherwise, the white layer would be on top of and blocking the image).

Pet. 76–77. Petitioner also argues that a person of ordinary skill in the art would have understood Kronzer’s substrate layer could be peeled off first without the need to apply heat because Kronzer expressly teaches that its substrate layer has “cold release” properties. Pet. 77.

In addition to the arguments and evidence presented with regard to claim 1, Patent Owner argues that Petitioner and Dr. Wanat cite no support for the position that using the method from Oez-US with Kronzer’s sheet would have been natural. PO Resp. 40. Patent Owner also argues that Petitioner’s proposed modification constitutes a “complete re-engineering of Kronzer” because it not only modifies Kronzer’s method of application, but also reverses the order of the layers in Kronzer. PO Resp. 40–41 (citing Ex. 2011 ¶ 151). Patent Owner further asserts that Petitioner’s re-engineering is based on hindsight. PO Resp. 41. Additionally, Patent Owner contends that this “complete reversal of the order of the layers would not yield predictable results . . . given the numerous failures in Kronzer,” and that Petitioner fails to explain why a person of ordinary skill in the art would have expected the modified structure would be successful. PO Resp. 41.

In response to Patent Owner’s re-engineering argument, Petitioner contends that Patent Owner and Dr. Ellison overlook Kronzer’s disclosure that its third and fourth layers are largely the same, and can include similar thermoplastic polymers/binders having similar characteristics. Reply 11 (citing Ex. 1018, 5:46–65, 6:1–8, 6:54–56, 7:12–41; Ex. 1062 ¶¶ 42–48). In view of this, Petitioner asserts that a person of ordinary skill in the art would have understood that reversing the order of the layers would result in the

same or similar functionality. Reply 11. Petitioner also argues that “Kronzer explicitly makes clear that any minor adjustments that might need to be made to the characteristics of the third and/or fourth layer would have been straightforward and trivial to a” person of ordinary skill in the art. Reply 11 (citing Ex. 1018, 6:57–59, 8:47–51; Ex. 1062 ¶ 47).

Patent Owner challenges Petitioner’s characterization of Kronzer’s third and fourth layers as largely the same, asserting that Kronzer expressly teaches that its third and fourth layers must have different molecular weights and masses, and that the fourth layer “cannot be modified without creating printability or washability problems.” Sur-reply 13–14 (citing Ex. 1018, 16:64–17:6). Patent Owner also contends Petitioner ignores the impact that compositional differences (e.g., Orgasol and pigment) in the layers would have on the proposed modification. Sur-reply 14. Additionally, Patent Owner contends that Petitioner’s admission that reversing the order of layers may require adjustments, coupled with its failure to identify any specific adjustments that would or could be made, further supports its arguments regarding unpredictability and the lack of a reasonable expectation of success. Sur-reply 14–15.

We find Petitioner’s arguments to be persuasive. As Petitioner and Dr. Wanat indicate, Kronzer teaches that its third and fourth layers may each comprise similar types of thermoplastic polymers having similar characteristics, including particle size and melting points. Ex. 1018, 5:46–65, 6:1–8, 6:54–56, 7:12–41; Pet. 71; Reply 11; Ex. 1062 ¶ 45 (including a chart listing similarities between Kronzer’s third and fourth layers). Patent Owner does not directly contest this evidence or testimony from Dr. Wanat regarding the similarities between the two layers. Instead, Patent Owner argues that Kronzer’s third and fourth layers cannot be “largely the same”

because Kronzer expressly states that the layers “must have different molecular weights and masses.” Sur-reply 13–14. The language Patent Owner relies upon for this assertion, however, appears in Kronzer’s discussion of Table XIII, which lists data for six trial samples in Kronzer aimed towards attempts to soften a transferred image, eliminate cracking, and retain good washability. Ex. 1018, 16:32–54 (Table XIII titled “Trial Samples with Pilot Second Layer-Coated Paper – Attempts to Soften Transferred Image”). We discern no indication in Kronzer that the statements regarding the relative molecular weights and masses of the third and fourth layers in these trial samples apply to all of Kronzer’s embodiments, especially considering Kronzer describes its third and fourth layers more generally elsewhere, including in its claims, without requiring a specific relationship between the molecular weights and masses of the third and fourth layers. *E.g.*, Ex. 1018, 5:46–6:31, 18:48–67 (claim 8); *see Wesslau*, 353 F.2d at 241.

Furthermore, we credit Dr. Wanat’s testimony that a person of ordinary skill in the art would have known that adjustments could be made to Kronzer’s layers, and that those adjustments would have been straightforward. Ex. 1062 ¶ 47. Dr. Wanat’s testimony is supported by Kronzer’s statement that “any of the foregoing film layers may contain other materials, such as processing aids, release agents, pigments, deglossing agents, antifoam agents, and the like. The use of these and similar materials is well known to those having ordinary skill in the art.” Ex. 1018, 8:47–51. In an obviousness analysis, we “must consider what the prior art as a whole would have suggested to one skilled in the art.” *Envtl. Designs v. Union Oil Co.*, 713 F.2d 693, 698 (Fed. Cir. 1983) (citing *In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971)). In this regard, Dr. Wanat’s testimony and the

language in Kronzer regarding what was well-known in the art undermine Patent Owner's arguments that compositional differences in the third and fourth layers, and the failure to identify specific adjustments that could be made, support a finding of unpredictability or a failure to show a reasonable expectation of success.

For all of the foregoing reasons, we find Petitioner has demonstrated sufficiently that Kronzer and Oez-US disclose the limitations in claim 16, and that a person of ordinary skill in the art would have had reason to combine the teachings of Kronzer and Oez-US and would have had a reasonable expectation of successfully doing so. Accordingly, we find Petitioner has established, by a preponderance of evidence, that claim 16 is unpatentable as obvious in view of Kronzer and Oez-US.

Claims 17–22 depend from claim 16. Petitioner alleges that the combined teachings of Kronzer and Oez-US would have rendered obvious the subject matter of dependent claims 17–22. Pet. 77–79. Petitioner directs us to portions of Kronzer and Oez-US that teach or suggest all of the limitations in claims 17–22, and argues that a person of ordinary skill in the art would have had reason to combine the disclosures in Kronzer and Oez-US and would have had a reasonable expectation of successfully achieving the claimed invention. Pet. 77–79.

Patent Owner does not separately address dependent claims 17–22 and, therefore, has forfeited any arguments based on these uncontested claims. *See generally* PO Resp. 20–42; *cf. NuVasive*, 842 F.3d at 1381. Instead, Patent Owner relies on the same arguments addressed above in our discussion of claims 1 and 16, challenging Petitioner's arguments and evidence regarding whether a person of ordinary skill in the art would have had reason to combine the teachings of Kronzer and Oez-US, and whether a

person of ordinary skill in the art would have had a reasonable expectation of success.

We have reviewed the information Petitioner provides, including the relevant portions of the Wanat Declaration, and agree with Petitioner's undisputed arguments and evidence that Kronzer and Oez-US teach or suggest all of the limitations in claims 17–22. Additionally, for the same reasons discussed above, we are persuaded by Petitioner's arguments and evidence demonstrating that a person of ordinary skill in the art would have had reason to combine the disclosures set forth in Kronzer and Oez-US, and that a person of ordinary skill in the art would have had a reasonable expectation of success in achieving the claimed invention. We, therefore, find Petitioner has established, by a preponderance of the evidence, that claims 17–22 are unpatentable as obvious in view of the combined teachings of Kronzer and Oez-US.

E. Alleged Obviousness over Kronzer, Oez-US, and Hare (claim 4) or DeVries (claim 9)

Petitioner contends dependent claim 4 is unpatentable as obvious in view of Kronzer, Oez-US, and Hare, and dependent claim 9 is unpatentable as obvious in view of Kronzer, Oez-US, and DeVries. Pet. 79–80.

Claim 4 depends from claim 2, which depends from claim 1, and additionally requires combining the indicia-receptive layer (recited in claim 2) with at least one of a glow-in-the-dark material or a color-changeable material. Ex. 1004, 11:53–57.

Petitioner contends Hare, like Kronzer and Oez-US, is directed to image transfer sheets for heat transferring images to fabric. Pet. 79 (citing Ex. 1037, Abstract, 2:40–43, 3:20–39). Petitioner notes Hare expressly teaches combining an image-receiving layer with “iridescent colors that will

glow in the dark,” and argues that a person of ordinary skill in the art would have modified the transfer sheets of Kronzer and Oez-US for reasons expressly stated in Hare, and that doing so would involve the combination of well-known elements. Pet. 79 (citing Ex. 1032, 5:27–32; Ex. 1020 ¶¶ 98, 215, 236–37).

Claim 9 depends from claim 1 and additionally requires the step of “combining at least one of the one or more polymer layers with the pigment” in claim 1 to include mixing the polymer layers with one or more ingredients such as kaolin or calcium carbonate. Ex. 1004, 12:13–20. Petitioner contends DeVries is directed to a sublimation transfer sheet applied under heat and pressure onto a substrate such as cotton, and teaches the use of opacifying agents such as calcium carbonate and kaolin. Pet. 79 (citing Ex. 1036, Abstract, 8:51–57). Petitioner contends a person of ordinary skill in the art would have understood that using calcium carbonate or kaolin in place of the titanium dioxide in Oez-US “merely involved a simple substitution of well-known white pigments.” Pet. 79–80 (citing Ex. 1020 ¶¶ 99, 218, 238–239).

Patent Owner does not separately address dependent claims 4 and 9 and, therefore, has forfeited any arguments based on these uncontested claims. *Cf. NuVasive*, 842 F.3d at 1381. Instead, Patent Owner relies on the same arguments addressed above in our discussion of claim 1, and argues that Hare and DeVries fail to cure the deficiencies in Petitioner’s arguments and evidence regarding whether a person of ordinary skill in the art would have had reason to combine the teachings of Kronzer and Oez-US, and whether a person of ordinary skill in the art would have had a reasonable expectation of success. PO Resp. 42

As discussed above, however, we disagree that Petitioner’s arguments and evidence regarding a reason to combine Kronzer with Oez-US and a reasonable expectation of success suffer from any deficiencies. Moreover, we have reviewed the undisputed arguments and evidence Petitioner provides for claims 4 and 9, including the relevant portions of the supporting Wanat Declaration, and agree that Kronzer, Oez-US, and Hare teach or suggest all of the limitations of claim 4, and Kronzer, Oez-US, and DeVries teach or suggest all of the limitations of claim 9. We also agree with Petitioner’s arguments and evidence that a person of ordinary skill in the art would have had reason to combine the teachings of the references, and would have had a reasonable expectation of successfully doing so.

For example, as Petitioner explains, Hare relates to image transfer sheets, and not only discloses the use of iridescent colors that glow in the dark in a sheet for transferring images to fabric, but also expressly states that the use of such colors will result in a shirt that “provid[es] a safety function for the wearer.” Ex. 1037, 5:27–32. Additionally, DeVries describes polymeric coating materials that include opacifying agents, such as titanium dioxide, calcium carbonate, and kaolin, that are “designed to decorate a colored substrate.” Ex. 1036, 8:51–57. Furthermore, we credit Dr. Wanat’s unchallenged testimony supporting Petitioner’s explanation that a person of ordinary skill in the art would have had reason to combine the teachings of Hare and DeVries with Kronzer and Oez-US, and would have had a reasonable expectation of success. Pet. 79–80; Ex. 1020 ¶¶ 98–99, 215, 218, 236–239.

In view of the foregoing, we find Petitioner has established, by a preponderance of evidence, that claim 4 is unpatentable as obvious in view

of Kronzer, Oez-US, and Hare, and claim 9 is unpatentable in view of Kronzer, Oez-US, and DeVries.

F. Remaining Unpatentability Challenges

Having determined that Petitioner establishes by a preponderance of the evidence that claims 1–3, 5–8, and 10–22 are unpatentable as obvious over the combined teachings of Kronzer and Oez-US, that claim 4 is unpatentable as obvious in view of the combined teachings of Kronzer, Oez-US, and Hare, and that claim 9 is unpatentable as obvious in view of Kronzer, Oez-US, and DeVries, we do not address Petitioner’s additional grounds challenging claims 1–22. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 2020) (nonprecedential) (“We agree that the Board need not address [alternative grounds] that are not necessary to the resolution of the proceeding.”).

IV. PATENT OWNER’S MOTION TO STRIKE

On June 1, 2021, with authorization, Patent Owner filed a Motion to Strike. Paper 29 (“Motion” or “Mot.”), 1. The Motion seeks to strike “evidence submitted by Petitioner for the first time on Reply,” including the Reply Declaration of Dr. Robert Wanat (Ex. 1062), as well as evidence relied on in that Declaration (Exhibits 1054–1060 and 1064–1065). Mot. 1, 4. Petitioner filed its Opposition to the Motion to Strike on June 15, 2021. Paper 30 (“Pet. Response”).

Patent Owner argues that the Wanat Reply Declaration includes “new argument and cite[s] new evidence that could have – and should have – been submitted with the Petition.” Mot. 1. Patent Owner also argues that we should strike newly submitted evidence (Exhibits 1054–1060 and 1064–

1065) used to support the Wanat Reply Declaration for the same reason.
Mot. 1, 4.

Under the Board’s rules, a petitioner’s reply “may only respond to arguments raised in the corresponding . . . patent owner response” or address the institution decision. 37 C.F.R. § 42.23(b); *see also Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1367 (Fed. Cir. 2015) (discussing how, in *inter partes* review proceedings, a petitioner’s reply is “limited to a true rebuttal role” (citing 37 C.F.R. §§ 42.104(b)(5), 42.23(b))). “Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a prima facie case of unpatentability. A party also may submit rebuttal evidence in support of its reply.” *See Consolidated Trial Practice Guide*, 73 (2019)¹³ (citing *Belden*, 805 F.3d at 1077–78). We address each of Patent Owner’s concerns below.

A. Alleged New Motivation to Combine

Patent Owner argues that the Wanat Reply Declaration, for the first time, “set[s] forth a new motivation to combine.” Mot. 1 (citing Ex. 1062 ¶¶ 9–12). Petitioner argues that “[t]ellingly, [Patent Owner] does not even identify any motivation that is supposedly ‘new.’” Pet. Response 2. Petitioner asserts that the testimony in the Wanat Reply Declaration responds to Patent Owner’s arguments, including those asserting “that there would be no motivation to combine Kronzer and Oez-US because they solve ‘fundamentally different problems using fundamentally different technologies.’” Pet. Response 3–4 (quoting Ex. 1062 ¶ 7).

We agree with Petitioner that Patent Owner does not identify with specificity what purported new motivation to combine Dr. Wanat introduces

¹³ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

in the Reply Declaration. Mot. 1. Accordingly, we find Patent Owner has failed to establish that it is entitled to the requested relief. 37 C.F.R.

§ 42.20(c) (“The moving party has the burden of proof to establish that it is entitled to the requested relief.”). Additionally, we are persuaded by Petitioner’s arguments that the testimony in Dr. Wanat’s Reply Declaration responds to arguments raised in the Patent Owner’s Response, as Dr. Wanat’s testimony appears to be specifically directed to arguments Patent Owner makes in its Response and toward testimony in Dr. Ellison’s supporting declaration. Pet. Response 3–4.

B. Alleged New Arguments Regarding the Use of TiO₂

Patent Owner argues that the Petition fails to cite any evidence for its allegation that using TiO₂ in Kronzer would have been predictable to the person of ordinary skill in the art, and, as a result, we should now preclude Petitioner from providing new evidentiary support. Mot. 2 (citing Ex. 1062 ¶¶ 17–40). Patent Owner contends that we should also strike Petitioner’s argument (and evidence) “that ready to use formulations exist that include titanium dioxide, which Petitioner asserts somehow supports the predictability of titanium dioxide.” Mot. 3 (citing Ex. 1062 ¶ 38; Ex. 1065). Patent Owner further contends that Petitioner’s arguments that a person of ordinary skill in the art “would also know to include other (unidentified) additives to Kronzer in order to make the composition work” are untimely. Mot. 2 (citing Ex. 1062 ¶¶ 37–38).

Petitioner asserts that “Dr. Wanat’s position that using TiO₂ in transfer sheets would have led to predictable results is entirely consistent with the arguments and evidence presented in the Petition.” Pet. Response 4–5 (citing Pet. 66–67, 70; Ex. 1020 ¶¶ 97, 198–202, 208–210). Petitioner explains that Dr. Wanat provides further positions regarding the use of

additives and ready-to-use formulations in the Wanat Reply Declaration in direct response to Patent Owner's arguments that TiO₂ could not be used predictably. Pet. Resp. at 7–8.

We are not persuaded that Petitioner's arguments are improper rebuttal arguments. In the Petition, Petitioner explains that it would have been obvious to combine the white layer from Oez-US (containing TiO₂) with Kronzer's third layer because Kronzer discloses that any pigment can be placed in any of its layers. Pet. 66–67; Ex. 1020 ¶ 209; Ex. 1018, 8:47–49. Petitioner also suggests that TiO₂, along with other white pigments, were well-known. *E.g.*, Pet. 79–80. In its Response, Patent Owner argues that including a pigment would have been unpredictable to one of ordinary skill in the art because the inclusion of pigments “can pose significant technical challenges” including changing “the viscosity and flow properties of the third layer at transfer temperatures” and changing “solid state characteristics of the third layer, such as modulus, elasticity, and flexibility.” PO Resp. 35–37. Patent Owner further argues that finding a “drop in replacement” for a pigment would have been “extremely rare.” PO Resp. 35–36. Therefore, Dr. Wanat's testimony that TiO₂ was well-known, well-studied, and well-understood, that the skilled artisan would have understood how to account for the “technical challenges” Patent Owner identified through use of additives, and that “drop-in replacements” were in fact available, properly supports Petitioner's arguments in response to those Patent Owner raises.

C. Alleged New Arguments Regarding the Similarity of Layers

Patent Owner asserts that Petitioner improperly advances an argument where the third and fourth layers of Kronzer are flipped and, because of their

similarity, there would be no “impact [on] the composition at all.” Mot. 3.

Petitioner argues that

[c]ontrary to PO’s assertion, the Petition expressly addresses the similarity of characteristics for Kronzer’s third and fourth layers. Pet., p. 71 (“Kronzer teaches that both its third and fourth layer include a thermostatic polymer which melts in a range of from about 65°C. to about 180°C.”); Wanat Decl., ¶¶211–213. Thus, paragraphs 44–48 of Dr. Wanat’s reply declaration are entirely consistent within the originally filed Petition. Wanat Reply Decl., ¶¶44–48.

Pet. Response 8–9. Further, Petitioner asserts that “Dr. Wanat’s reply declaration [is] clearly directed to [Patent Owner’s] own baseless argument that ‘flipping’ Kronzer’s layer would be a ‘complete re-engineering’ of Kronzer.” Pet. Response 9.

We are persuaded by Petitioner’s arguments. In the Petition, Petitioner argues that the combination of Kronzer and Oez-US would result in an image transfer sheet having the following structure.

Fourth Layer (ink receiving layer)
Third Layer (with white pigment as taught by Oez-US)
Second Layer (release coating)
First Layer (base sheet/backing)

Pet. 66–67 (citing Ex. 1020 ¶ 201), 70–71. Petitioner further explains that “Kronzer teaches that both its third and fourth layers include a ‘thermoplastic polymer which melts in a range of from about 65°C. to about 180°C.’” Pet. 71 (quoting Ex. 1018, 2:45–67); *see also* Ex. 1062 ¶ 212 (discussing same). Petitioner also explains that a person of ordinary skill in

the art “would have naturally applied the image transfer steps and image orientation taught by Oez-US,” i.e., with the image on top of the white layer. Pet. 76 (discussing claim 16) (citing Ex. 1020 ¶¶ 223–231).

Accordingly, because Petitioner raises arguments regarding the similarity of Kronzer’s third and fourth layers, and flipping the layers, in the Petition, we do not consider similar arguments in the Reply to be new. We also find Dr. Wanat’s reply testimony specifically responds to arguments Patent Owner makes in its Response and, therefore, is proper rebuttal evidence. *See, e.g.*, Ex. 1062 ¶ 44 (referring to Patent Owner’s argument that reorienting the layers in Kronzer requires a “complete re-engineering” of Kronzer).

D. Alleged New Arguments Relating to Cross-linking

Patent Owner argues that the Wanat Reply Declaration, for the first time, makes “new arguments regarding cross-linking, including new arguments regarding melting that pointed to new citations to Oez.” Mot. 4 (citing Ex. 1062 ¶¶ 63–66). These purportedly “new arguments” regarding melting relate to a challenge we do not address or rely on in determining claims 1–22 are unpatentable. Accordingly, we dismiss as moot Patent Owner’s Motion to Strike with respect to Dr. Wanat’s testimony and related exhibits regarding cross-linking.

For all of the foregoing reasons, we deny in part and dismiss in part Patent Owner’s Motion to Strike.

V. CONCLUSION

After reviewing the complete record developed during the course of the trial, we conclude that Petitioner has satisfied its burden of demonstrating, by a preponderance of the evidence, that claims 1–22 of the

'042 patent are unpatentable.¹⁴ We also deny in part and dismiss in part Patent Owner's Motion to Strike.

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner establishes by a preponderance of the evidence that claims 1–22 are unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Strike is denied in part and dismissed in part; 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.

In summary:

Claim(s)	35 U.S.C.	References/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–3, 5–8, 10– 22	§ 103	Oez-US, Meyer ¹⁵		
4	§ 103	Oez-US, Meyer,		

¹⁴ 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*. See 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).

¹⁵ As explained above, we do not reach this ground, or the other grounds for which the last two columns of this table are blank, in view of our determination that claims 1–22 are unpatentable as obvious over Kronzer, and Oez-US, either alone or in combination with Hare or DeVries.

Claim(s)	35 U.S.C.	References/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
		Hare		
9	§ 103	Oez-US, Meyer, DeVries		
1–3, 5–8, 10– 22	§ 103	Oez-PCT, Oez- US		
4	§ 103	Oez-PCT, Oez- US, Hare		
9	§ 103	Oez-PCT, Oez- US, DeVries		
1–3, 5–8, 10– 22	§ 103	Kronzer, Oez-US	1–3, 5–8, 10– 22	
4	§ 103	Kronzer, Oez-US, Hare	4	
9	§ 103	Kronzer, Oez-US, DeVries	9	
1–3, 5–8, 10– 16, 19–22	§ 103	Kronzer, Meyer		
4	§ 103	Kronzer, Meyer, Hare		
9	§ 103	Kronzer, Meyer, DeVries		
17, 18	§ 103	Kronzer, Meyer, Hare-PCT		
Overall Outcome			1–22	

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