

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MOTIF FOODWORKS, INC.,
Petitioner,

v.

IMPOSSIBLE FOODS, INC.,
Patent Owner.

IPR2023-00206
Patent 9,943,096 B2

Before DONNA M. PRAISS, CHRISTOPHER M. KAISER, and
JEFFREY W. ABRAHAM, *Administrative Patent Judges*.

PRAISS, *Administrative Patent Judge*.

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

I. INTRODUCTION

Motif FoodWorks (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1–12 and 14–24 of U.S. Patent No. 9,943,096 B2 (Ex. 1001, “the ’096 patent”). Impossible Foods, Inc. (“Patent Owner”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”). The Board granted Patent Owner’s Motion for Leave to Seek a Certificate of Correction after briefing by the parties. Papers 9, 11, 15 (“Order”); Ex. 2015 (Patent Owner’s Petition to Accept Unintentionally Delayed Benefit Claims Under 37 C.F.R. §§ 1.78(c) and 1.78(e)). Because Petitioner could not have known Patent Owner would seek to change the priority claim for the ’096 patent, the Board authorized briefing by the parties on the earliest effective filing date of the challenged claims and whether the challenged claims are entitled to claim the benefit of earlier applications. Order 7; Papers 17, 19, 20, 22.

To institute *inter partes* review, we must determine that the information presented in the Petition shows “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). For the reasons discussed below, after considering the parties’ submissions and the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to at least one claim of the ’096 patent, and we institute *inter partes* review of all claims and all grounds asserted in the Petition.¹

¹ *Guidance on the Impact of SAS on AIA Trial Proceedings* (Apr. 26, 2018), <https://www.uspto.gov/patents-application-process/patent-trial-and-appeal->

A. Related Proceedings

The parties identify the following district court litigation as a related matter: *Impossible Foods, Inc. v. Motif Food Works, Inc.*, No. 22-cv-00311 (“the parallel District Court litigation”). Pet. 1; Paper 5, 1 (Patent Owner’s Mandatory Notices). Patent Owner identifies the following co-pending *inter partes* review proceedings as related matters: IPR2023-00207 (US 11,224,241), IPR2023-00208 (US 11,013,250), and IPR2023-00209 (US 10,039,306). Paper 5, 1. Patent Owner additionally identifies as related matters IPR2022-00887 (US 10,863,761) and the opposition proceeding in EP2943072. *Id.*

B. Real Parties-in-Interest

Each party identifies itself as the real party-in-interest. Pet. 1; Paper 5, 1.

C. The ’096 Patent

The ’096 patent, titled “Methods and Compositions for Affecting the Flavor and Aroma Profile of Consumables,” seeks to provide “improved plant-based meat substitutes which better replicate the aromas and flavors of meat, particularly during and/or after cooking.” Ex. 1001, code (54), 1:60–62. According to the ’096 patent, existing meat substitute compositions are “extruded soy/grain mixtures which largely fail to replicate the experience of cooking and eating meat.” Ex. 1001, 1:46–48. The ’096 patent describes the common product limitations as “texture and mouthfeel that are more homogenous than that of equivalent meat products.” *Id.* at 1:49–51. Further, the ’096 patent explains that, because these products are “largely . . . sold

board/trials/guidance-impact-sas-aia-trial; *see also SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018).

pre-cooked, with artificial flavors and aromas pre-incorporated, they fail to replicate the aromas, flavors, and other key features . . . associated with cooking or cooked meat.” *Id.* at 1:52–55.

The ’096 patent describes combining one or more iron complexes such as a heme-containing protein, with one or more flavor precursor molecules or compositions to “generate or provide a range of savory and meaty aromas and tastes . . . in a cooked consumable food product.” *Id.* at 2:43–50. According to the ’096 patent, the flavor precursor molecules or compositions can be added to uncooked food “in purified form and/or can be derived from ingredients in the uncooked consumable food product that contain and/or are enriched with one or more of the particular flavor precursors.” *Id.* at 2:50–54. The ’096 patent describes adding one or more flavor precursor molecules along with an iron complex to “an uncooked food product, before and/or during the cooking process.” *Id.* at 2:66–3:3. According to the ’096 patent, “[c]onsumable food products . . . can be flavor additive compositions, e.g. for addition to another consumable food product before, during, or after its cooking process.” *Id.* at 3:32–35. The ’096 patent further describes the food flavor additive composition as not being limited in its form and that it “can be used to modulate the flavor and/or aroma profile for a variety of consumable food products.” *Id.* at 3:49–54.

D. Illustrative Claims

Independent claims 1 and 10 are reproduced below.

1[pre] 1. A food flavor additive composition comprising:

1[a] a) an isolated heme-containing protein; and

1[b] b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose,

maltodextrin, and galactose, and mixtures of two or more thereof; and

1[c] c) a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof;

1[d] wherein the flavor additive composition contains no animal products; and,

1[e] wherein cooking the food flavor additive composition results in the production of at least two volatile compounds which have a meat-associated aroma.

Ex. 1001, 73:46–58 (paragraph numbering added as used in the Petition).

10[pre] 10. A food flavor additive composition prepared by a process of:

10[a] a) combining an isolated heme-containing protein;

10[b] a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose and galactose, and mixtures of two or more thereof; and

10[c] a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof, to form a heme flavor reaction mixture, and

10[d] b) heating the heme flavor reaction mixture to at least 150° C. for at least 1 minute to result in the food flavor additive composition;

10[e] wherein the food flavoring additive composition contains no animal products; and

10[f] wherein the heme flavor reaction mixture has a meaty flavor and/or meaty aroma during the heating of step b) and the food flavoring additive composition has a meaty flavor and/or meaty aroma after the heating of step b).

Id. at 75:8–25 (paragraph numbering added as used in the Petition).

E. Priority

The '096 patent claims the benefit of the following applications as provided on the Application Data Sheet filed January 4, 2017 (Ex. 1002, 25)

and on the face of the '096 patent under “Related U.S. Application Data” (Ex. 1001, codes (63), (60)):

Application No.	Continuity Type	Filing Date	Exhibit No.
US 61/751,816	Claims benefit of provisional	Jan. 11, 2013	1025
US 13/941,211	Continuation of	July 12, 2013	1161
US 61/908,634	Claims benefit of provisional	Nov. 25, 2013	1145
PCT/US/2014/011347	Continuation of	Jan. 13, 2014	1160
US 14/797,006	Continuation of	July 10, 2015	

Petitioner asserts that the challenged claims are not entitled to claim priority to US 61/751,816 (the “’816 Provisional”), the earliest listed date on the '096 patent, because it fails to adequately describe the full scope of the issued claims. Pet. 5–6.² Petitioner identifies two of the sugar compounds (glucose-6-phosphate and maltodextrin) and three of the sulfur compounds (cystine, thiamine, and methionine) recited in the claims that are not disclosed in the '816 Provisional. *Id.* at 7 (citing Ex. 1025 ¶¶ 124, 217, 254–55). Petitioner provides the Declaration of Dr. Robert McGorin (Ex. 1005, the “McGorin Declaration”) to show that the claimed-but-not-disclosed sugar and sulfur compounds have unique chemical structures that are sufficiently different from the disclosed compounds to significantly affect the chemical reactivity in a Maillard reaction. *Id.* at 7–8 (citing Ex. 1005 ¶¶ 94–97). As a consequence of this difference, Petitioner asserts that the

² Petitioner also asserts that the disclosure of US 13/941,211 (the “’211 application”) fails to provide written description support for the '096 patent claims. Pet. 6 n.4; Paper 17, 1. Petitioner, however, notes that even if the '211 application provides adequate written description support, Brown would still be prior art under 35 U.S.C. § 102(a)(1). Pet. 6 n.4. Therefore, we need not address whether the '211 application provides adequate written description support for the '096 patent claims for purposes of this Decision.

'816 Provisional's disclosure does not show possession of the claimed invention's recited glucose-6-phosphate, which is less reactive than the disclosed 5-carbon sugars such as ribose and may be less successful at achieving the desired aroma profile. *Id.*

In further support of its argument that the challenged claims are not entitled to the earlier priority date of the '816 Provisional, Petitioner argues that the '816 Provisional's general disclosure of "sugars" and "sulfur compounds" does not adequately inform a POSITA of the specific sugar and sulfur compounds claimed. *Id.* at 9–10 (citing *In re Ruschig*, 379 F.2d 990, 994–95 (CCPA 1967)). Petitioner also asserts the '816 Provisional does not disclose the combination of a genus of heme proteins, sugars, and sulfur compounds, without any animal products in the context of the food flavor additive because the '816 Provisional discloses adding compounds to a "poultry composition" made with real chicken and evaluating the resulting product for beef aroma. *Id.* at 10 (citing Ex. 1025 ¶¶ 44, 256, 407–408).

In the Preliminary Response, Patent Owner contends that the Petition does not dispute that written description support for the challenged claims is provided by the '211 application's disclosure. Prelim. Resp. 9–10. Patent Owner asserts that the omission of the earlier disclosures to which the '211 application itself claims priority was unintentional and that it will seek a certificate of correction from the Director. *Id.* at 10. Patent Owner's petition for a certificate of correction from the Director was filed on May 30, 2023 and made an exhibit to this proceeding. Ex. 2015. In its papers to the Director and subsequent brief in this proceeding, Patent Owner asserts it is entitled to the following corrected priority claim in the '096 patent, which adds three earlier filed applications. *Id.* at 11; Paper 19, 2.

Application No.	Continuity Type	Filing Date	Exhibit No.
US 61/572,205	Claims benefit of	July 12, 2011	1167
PCT/US2012/046560	Continuation in part	July 12, 2012	1012
US 61/671,069	Claims benefit of	July 12, 2012	2012
US 61/751,816	Claims benefit of	Jan. 11, 2013	1025
US 13/941,211	Continuation of	July 12, 2013	1161
US 61/908,634	Claims benefit of	Nov. 25, 2013	1145
PCT/US/2014/011347	Continuation of	Jan. 13, 2014	1160
US 14/797,006	Continuation of	July 10, 2015	

Patent Owner does not assert that any of the earlier filed applications added to the priority claim or even the '211 application itself, which is listed as a continuation of the application that issued as the '096 patent, explicitly disclose the claimed-but-not-disclosed sugar and sulfur compounds identified by Petitioner. Paper 19, 4–9.³ Instead, Patent Owner asserts that written description support for the claimed subject matter is provided by the disclosures because the statement “sugars and other carbohydrates found in plants as well as meat” includes the sugars maltose, glucose, and fructose that are present in plant-based ingredients and the sugars glucose, glucose-6-phosphate, ribose, and fructose that are present in meat. *Id.* at 6. Patent Owner also points out that the disclosures include “pea flour” which contains cysteine, cystine, thiamine, and methionine and “describes that its products ‘contain[] no animal products.’” *Id.* at 8. Patent Owner’s position on written description support for the '096 patent claims is essentially that if the disclosure is sufficient to be an anticipatory disclosure it is also sufficient for purposes of written description. *Id.* at 7 (“applying Petitioner’s logic”);

³ Patent Owner’s assertion of written description support for the challenged '096 patent claims based on PCT/US2012/046560 (Ex. 1012) applies equally to the disclosures in US 13/941,211 (Ex. 1161) and US 61/671,069 (Ex. 2012). Paper 19, 9.

id. at 8 (“applying Petitioner’s logic”). On that basis, Patent Owner asserts that “the challenged claims . . . are entitled to the benefit of the filing date of at least . . . July 12, 2012.” *Id.* at 9.

Although the burden of persuasion with respect to the unpatentability of the challenged claims remains with Petitioner, the burden of production for demonstrating that the challenged claims for the ’096 patent are entitled to the earlier priority date(s) lies with Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1379–80 (Fed. Cir. 2015). A patentee demonstrates possession of the invention by describing it “in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention.” *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997); *see Biogen Int’l GmbH v. Mylan Pharms. Inc.*, 18 F.4th 1333, 1342–43 (Fed. Cir. 2021) (holding that a skilled artisan could not deduce from the broad dosage ranges disclosed that the claimed dosage would be therapeutically effective for the claimed treatment).

When the subject matter is disclosed in terms of a broad genus, as Patent Owner indicates is the case here with the disclosure of “sugars and other carbohydrates found in plants as well as meat,” the Federal Circuit requires that the disclosure “provide sufficient ‘blaze marks’ to guide a reader through the forest of disclosed possibilities” toward the claimed invention. *Novozymes A/S v. DuPont Nutrition Biosciences APS*, 723 F.3d 1336, 1346 (Fed. Cir. 2013) (quoting *In re Ruschig*, 379 F.2d 990, 994–95 (C.C.P.A. 1967)). “[O]ne cannot disclose a forest in the original application, and then later pick a tree out of the forest and say here is my invention.” *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1326 (Fed. Cir. 2000)

(Examples from which data could be pieced together to generate the claimed ratio limitation did not provide written description support because the disclosure did not emphasize the ratio as an aspect of the invention). Rather, the Specification must provide some guides or “blaze marks” that disclose the claimed invention “specifically, as something appellants actually invented.” *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1348 (Fed. Cir. 2010).

Instead of setting forth the “blaze marks” that might narrow generic disclosures into the claimed invention in the disclosures Patent Owner relies on to show an effective filing date of July 12, 2012, or earlier, Patent Owner directs us to extrinsic materials for, *inter alia*, lists of sugars present in meat. Paper 19, 6 (citing Ex. 1026, 499 (Table 3 listing over 50 “Potential Flavor Precursors Isolated from Meat Extracts”), 503, 517). Even if Patent Owner’s extrinsic materials were informative as to the claimed *Markush* groups, the “blaze marks” must be present in the originally filed disclosure. *Purdue Pharma*, 1326–27.

In addition, Patent Owner provides no support for its position that an anticipatory disclosure must necessarily provide written description support for the same patent claims. A single embodiment of more broadly claimed subject matter constitutes a description of the invention for anticipation purposes, but alone may not provide an adequate disclosure for purposes of written description. *Chester v. Miller*, 906 F.2d 1574, 1577 (Fed. Cir. 1990); *In re Lukach*, 442 F.2d 967, 970 (CCPA 1971); *In re Ruscetta*, 255 F.2d 687, 689 (CCPA 1958) (“[I]t is axiomatic that the disclosure of a species in a reference is sufficient to prevent a later applicant from obtaining generic claims, unless the reference can be overcome.”).

In subsequent briefing of the priority issue, Patent Owner characterizes the issue of written description support as an issue of proper claim interpretation. Paper 22, 4 (“[U]nder the correct interpretation of the claimed subject matter, Brown does not anticipate the challenged claims and thus does not provide written description support for the challenged claims.”). Specifically, Patent Owner asserts that Brown’s “muscle replica” cannot be equated to the claimed “food flavor additive composition.” *Id.*; Paper 19, 4 (“[U]nder the correct interpretation of the claimed subject matter, Brown, as a continuation-in-part and as a non-anticipatory reference, does not disclose the elements of the challenged claims.”). Because the present record does not show sufficiently how “muscle replica” relates to the written description support for the full scope of the ’096 patent claims, namely, the specific sugar and sulfur compounds claimed that are missing from the ’861 Provisional’s disclosure, we find Patent Owner’s argument that written description support depends on claim interpretation to be unavailing.

For purposes of this Decision on Institution, we determine that Petitioner presents sufficient evidence indicating the ’816 Provisional’s disclosure lacks written description support for the full scope of the challenged claims of the ’096 patent. As Petitioner points out, the current record lacks a basis for us to find that “all of the claimed sugars and sulfur compounds are inherently in Brown’s ingredients.” Paper 20, 3.

In its subsequent briefing, Petitioner asserts that the ’096 patent does not properly claim priority to the ’211 application because PCT/US/2014/011347 cannot be a continuation of the ’211 application. . Paper 17 at 5. Patent Owner’s priority claim that PCT/US2014/011347 is a

continuation of the '211 application, however, is an issue for the Director to decide. Order 6–7; Ex. 2015 (Patent Owner’s Petition to Accept Unintentionally Delayed Benefit Claims). Petitioner does not argue that the '211 application fails to provide written description support for the '096 patent claims. Accordingly, for purposes of this Decision, the earliest effective filing date that the '096 patent claims are entitled to claim is the filing date of the '211 application—namely, July 12, 2013.

F. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability.

Claims Challenged	Reference(s)	Basis⁴ §
1–5, 7–9, 23, 24	Brown ⁵	102
1–12, 14–17, 20–24	Giacino, ⁶ Brown	103
18–19	Giacino, Brown, MacLeod ⁷	103
1, 2, 4–7, 9–12, 14, 15, 20–24	Giacino, Conrad, ⁸ Crane ⁹	103

⁴ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103. Without the benefit of provisional application No. 61/751,816, which Petitioner disputes (Pet. 5–6), the '096 patent has an effective filing date after March 16, 2013. Ex. 1001, code (60). Accordingly, patentability is governed by the versions of 35 U.S.C. §§ 102 and 103 after amendment by the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011).

⁵ WO 2013/010042 A1 (PCT/US/2012/046560), published Jan. 17, 2013 (Ex. 1012).

⁶ US 3,519,437, issued July 7, 1970 (Ex. 1015).

⁷ Glesni MacLeod and M. Seyyedain-Ardebili, *Natural and Simulated Meat Flavors (with Particular Reference to Beef)*, CRC Critical Reviews in Food Science and Nutrition, Thomas E. Furia, Ed., 14:4, 309–437, 1981 (Ex. 1024).

⁸ US 4,818,557, issued Apr. 4, 1989 (Ex. 1013).

⁹ US 2011/0287467 A1, published Nov. 24, 2011 (Ex. 1014).

Claims Challenged	Reference(s)	Basis ⁴ §
3, 16	Giacino, Conrad, Crane, Proulx ¹⁰	103
8, 17	Giacino, Conrad, Crane, Perret ¹¹	103
18, 19	Giacino, Conrad, Crane, MacLeod	103
1–7, 9–12, 14–16, 20–24	Giacino, Proulx, Conrad	103
8, 17	Giacino, Proulx, Conrad, Perret	103
18, 19	Giacino, Proulx, Conrad, MacLeod	103

In support of its unpatentability arguments, Petitioner relies on the declarations of Rodrigo Tarté, Ph.D. (Ex. 1003, the “Tarté Declaration”), Robert McGorin, Ph.D. (Ex. 1005), Carl Batt, Ph.D. (Ex. 1007), and Sylvia Hall-Ellis, Ph.D. (Ex. 1009).

II. ANALYSIS

A. Claim Construction

We apply the claim construction standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). 37 C.F.R. § 42.100(b) (2022). Under *Phillips*, claim terms are afforded “their ordinary and customary meaning.” *Phillips*, 415 F.3d at 1312. The “ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Id.* at 1313. Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent

¹⁰ Amy K. Proulx and Manju B. Reddy, *Iron Bioavailability of Hemoglobin from Soy Root Nodules Using a Caco-2 Cell Culture Model*, J. Agric. Food Chem., 54, 1518–1522, 2006 (Ex. 1019).

¹¹ US 3,365,306, issued Jan. 23, 1968 (Ex. 1020).

necessary to resolve the controversy.” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

Petitioner asserts that the claim terms “contains no animal products,” “food flavor additive composition,” and “a compound” do not require construction for purposes of this proceeding. Pet. 10–12. According to Petitioner, even if “no animal products” covers bovine myoglobin, which is native to an animal even when produced in engineered yeast, the grounds presented in the Petition are unaffected because the term is alternatively mapped to a heme-containing protein native to plants. *Id.* at 11. Petitioner asserts the remaining terms each have a “plain meaning.” *Id.* at 11, 12.

Patent Owner states “[t]he terms of the challenged claims do not require express construction in order to reach a decision denying institution.” Prelim. Resp. 4. Nevertheless, Patent Owner asserts that Petitioner relies on an erroneous construction of “food flavor additive composition” to mean “each and every food item of every kind simply because it will have some flavor” and “any component of a food product . . . [that] has flavor and is added to the food product.” *Id.* at 4–5, 6. Patent Owner asserts “a food flavor additive composition is an additive that varies or adjusts the flavor and/or aroma profile present in a consumable food product.” *Id.* at 7. Patent Owner contends “the ’096 patent describes food flavor additives that are added to replica products to change the product’s flavor and aroma profile ‘before, during, or after cooking of the consumable food product.’” *Id.* (quoting Ex. 1001, 3:54–56). On the present record, it is not clear to us what distinction Patent Owner seeks to make between an “additive that varies or adjusts the flavor . . . in a consumable food product” and a “component of a food product . . . [that] has flavor and is added to the food product.”

We determine we need not explicitly construe any claim term at this stage of the proceeding. *See Realtime Data*, 912 F.3d at 1375. We invite the parties to address the construction of “food flavor additive composition,” as necessary, during the course of this proceeding.

B. Level of Ordinary Skill in the Art

Petitioner asserts that one of ordinary skill in the art “would have (i) a Bachelor of Science degree in food science, biology, chemistry, microbiology, or a related discipline, and (ii) a Master of Science degree or Ph.D. in food science or at least three years of experience working as a food scientist” and “could also be part of a team of food scientists, including flavor chemists.” Pet. 5 (citing Ex. 1003 ¶¶ 42–47). Patent Owner does not offer an alternative definition of a person of ordinary skill in the art. Accordingly, for the purposes of this Decision, we adopt Petitioner’s proposal regarding the level of one of ordinary skill in the art.

C. Discretion under 35 U.S.C. § 325(d)

Patent Owner argues the Board should exercise its discretion under 35 U.S.C. § 325(d) and deny institution “because Petitioner relies on substantially the same prior art or arguments previously considered by the Office, and Petitioner fails to show that the Office materially erred.” Prelim. Resp. 40–41. More particularly, Patent Owner argues that the Examiner identified Proulx in the reason for allowance as disclosing a non-animal heme-containing protein “is a good source of bioavailable iron and can be used as a food fortificant” but found no motivation to include such a fortificant in combination with the claimed sugars and amino acids to produce meat associated flavors. *Id.* at 42 (quoting Ex. 1002, 1180). Patent Owner also argues that Petitioner’s grounds use the same rationale as in the

prosecution for combining a sugar and/or sulfur compound with an isolated heme-containing protein to arrive at the claimed additive composition. *Id.*

In assessing whether to exercise the Board’s authority to deny institution under § 325(d), the Board considers a two-part analysis. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8–9 (Feb. 13, 2020) (precedential). First, the Board considers whether “the same or substantially the same” art or arguments were previously presented to the Office. *Id.* at 8. If either is met, the Board then considers whether the petition demonstrates that the Office “erred in a manner material to the patentability of the challenged claims.” *Id.* In applying the two-part framework, the Board considers several nonexclusive factors set forth in *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph).¹²

Petitioner contends “the art asserted here is materially different from that examined in prosecution. Indeed, none of the present art was the basis for a rejection during prosecution.” Pet. 70. In support of this position, Petitioner contends that the references asserted during prosecution “all relied

¹² *Becton, Dickinson* identifies the following non-exclusive factors: (a) the similarities and material differences between the asserted art and the prior art involved during examination; (b) the cumulative nature of the asserted art and the prior art evaluated during examination; (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; (d) the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art; (e) whether petitioner has pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art; and (f) the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments.

on animal products (e.g., beef, beef blood)” and that the references used in Petitioner’s challenges “are based on simulated meat flavoring compositions that do not include animal products.” *Id.* at 70–71. Petitioner states that while Brown and Proulx were cited during prosecution and the Notice of Allowance briefly discusses Proulx, neither were used as the basis of a rejection. *Id.* at 70.

We have considered Patent Owner’s arguments in light of this analysis, and we decline to exercise our discretion to deny the Petition. We agree with Petitioner that the asserted prior art references, as a whole, are materially different from the prosecution record in that they do not include animal products. Regarding the discussion of Proulx, which does not include animal products, the Examiner noted in the reason for allowance that the record lacked a reason for combining such a heme fortificant product with the claimed sugars and amino acids. Ex. 1002, 1180. The Petition, on the other hand, provides a rationale for combining Proulx’s heme fortificant with other prior art references not of record in the prosecution history, namely, Giacino, which discloses not merely sugars and amino acids, but “artificial meaty flavoring compositions” and further discloses other materials may be added to build upon the flavoring composition. Pet. 27–28, 46, 58; Ex. 1015 (Giacino) 1:19–25, 2:38–41, 7:15–26. Accordingly, we find these facts fail to demonstrate that “the same or substantially the same” art or arguments were previously presented to the Office, and, therefore, weigh against exercising our discretion under 35 U.S.C. § 325(d) to deny institution.

D. 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”)); *see also* 37 C.F.R. § 42.104(b) (requiring a petition for *inter partes* review to identify how the challenged claim is to be construed and where each element of the claim is found in the prior art patents or printed publications relied upon).

“To anticipate, the reference must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements arranged as in the claim.” *Sanofi-Synthelabo v. Apotex, Inc.*, 550 F.3d 1075, 1083 (Fed. Cir. 2008) (internal quotation marks omitted). In other words, it is not enough to be able to find all of the pieces of the claimed invention somewhere in a prior art reference; rather, those elements must be set out in the prior art reference in the same way they are in the claimed invention. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) (“Because the hallmark of anticipation is prior invention, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements ‘arranged as in the claim.’”) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved based on underlying factual determinations including: (1) the scope and content of the prior art; (2) differences between the prior art and the claims at issue; (3) the level of ordinary skill in the pertinent art; and (4) when presented, objective evidence of nonobviousness, i.e., secondary considerations.¹³ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements,” but “must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). A reason to combine or modify the prior art may be found explicitly or implicitly in market forces; design incentives; the “interrelated teachings of multiple patents”; “any need or problem known in the field of endeavor at the time of invention and addressed by the patent”; and the background knowledge, creativity, and common sense of the person of ordinary skill. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1329 (Fed. Cir. 2009) (quoting *KSR*, 550 U.S. at 418–21).

E. Anticipation by Brown

Petitioner argues that Brown anticipates claims 1–5, 7–9, 23, and 24. Pet. 20–26. Patent Owner disagrees. Prelim. Resp. 9–12.

¹³ At this stage, Patent Owner does not present any objective evidence of nonobviousness (i.e., secondary considerations) as to any of the challenged claims.

1. Brown (Ex. 1012)

Brown discloses a plant-based “meat substitute composition” that “accurately mimics the taste, texture, or color of a meat product derived from animal sources.” Ex. 1012 ¶ 6. In Brown’s compositions, “the characteristic flavor and fragrance components are mostly produced during the cooking process by chemical reactions involving one or more amino acids, fats, peptides, nucleotides, organic acids, sulfur compounds, sugars and other carbohydrates.” *Id.* ¶ 362. Other “characteristic flavor and fragrance components are produced during the cooking process by chemical reactions catalyzed by the heme iron in a heme protein.” *Id.* ¶ 363. The compositions of Brown “may be visually similar to or indistinguishable from ground beef or a particular cut of beef.” *Id.* ¶ 272. In addition, the “[c]haracteristic flavor and fragrance components” of Brown are such that, “[i]n some embodiments” of Brown, “the olfactory map of the consumable during or after cooking is similar to or indistinguishable from that of cooked or cooking meat.” *Id.* ¶ 295. This “similarity [may be] sufficient to be beyond the detection threshold of human perception.” *Id.*

Brown’s “meat substitute product” comprises “a muscle replica; a fat tissue replica; and a connective tissue replica” that are “assembled in a manner that approximates the physical organization of meat.” *Id.* ¶ 189. The muscle replica component of Brown’s meat replica composition is described as follows: “[a] muscle replica comprising pea flour, sunflower oil, and glucose was heated for 10 minutes at 140C in the presence of either reduced leghemoglobin (LHb) or a mixture of iron (Fe³⁺)” and volatile “compounds found exclusively or more abundantly in the LHb samples are: 2-octanone,

2-methyl furan, which are often associated with the aroma of cooked meat.”
Id. ¶ 364.

2. *Analysis*

Petitioner asserts that every element of claims 1–5, 7–9, 23, and 24 is disclosed by Brown’s muscle replica composition, which does not contain any animal products and is added to meat substitute to impart a cooked meat aroma. Pet. 20–26.

Regarding the recited “isolated heme-containing protein,” Petitioner shows that Brown’s composition includes leghemoglobin, which would be understood as isolated because it is disclosed as being extracted. *Id.* at 22. Regarding the recited sugars, Petitioner shows that Brown’s composition includes glucose. *Id.* Regarding the recited sulfur compounds, Petitioner relies on the Tarté Declaration (Ex. 1003) regarding the contents of pea flour in Brown’s muscle replica. *Id.* at 22–23. The Tarté Declaration states “[a] POSITA would have understood that pea flour includes cystine, methionine, and thiamine.” Ex. 1003 ¶ 121–125. Regarding the limitation that the composition “contains no animal products,” Petitioner states “[a] POSITA would understand that like sunflower oil, soy leghemoglobin, and pea flour, glucose is also conventionally derived from plant starches.” Pet. 23. Regarding the recited “meat-associated aroma” resulting from cooking the composition, Petitioner asserts that Brown’s composition produces at least two volatile components (2-octanone and 2-methyl furan) which have a meat-associated aroma. *Id.* The record supports Petitioner’s assertions. Ex. 1012 (Brown) ¶¶ 189, 364, 376, 377, 380, 381; Ex. 1003 (Tarté Declaration) ¶¶ 103, 113, 116–117, 119, 121–125, 127–131, 133; Ex. 1001, 3:32–35, 3:38–48, 3:49–51.

Patent Owner argues that “Brown is not prior art to the ’096 patent.” Prelim. Resp. 9. Patent Owner argues that Petitioner “does not establish that the ’211 application fails to provide written description support for the challenged claims” and “[t]he ’211 application itself claims priority to U.S. Provisional Application 61/671,069 (the “’069 provisional”), filed on July 12, 2012, which contains substantially the same content as the ’211 application, and also claims priority to Brown and its provisional application, U.S. Provisional Application 61/572,205 (the “’205 provisional”). The ’069 provisional also contains substantially the same content as Brown.” *Id.* at 9–10. Patent Owner asserts that its petition to correct the ’096 patent’s priority claim will remove Brown as prior art. *Id.* at 10.

As discussed above, on this record, the ’096 patent claims are entitled to an earliest effective filing date of July 12, 2013. Therefore, Brown is prior art under 35 U.S.C. § 102(a)(1) because it was published on January 17, 2013, which is before July 12, 2013. Pet. 15; Ex. 1012, code (43). Moreover, as discussed above, the record lacks sufficient explanation as to how Brown, the ’069 provisional, or the ’205 provisional provide the necessary written description support for the ’096 patent claims should Patent Owner’s priority correction be made. To the extent the record on this question is developed more fully at trial, we will determine the prior-art status of Brown at the time we issue our final written decision.

Next, Patent Owner argues that the Petition fails to explain how Brown’s “muscle replica” component meets the “food flavor additive composition” limitation of the ’096 patent claims. Prelim. Resp. 11. Patent Owner argues that the Petition lacks the necessary showing that Brown’s

“muscle replica” would have been understood by a POSITA to be a “food flavor additive” consistent with the ’096 patent. *Id.* at 12. Patent Owner also asserts that interpreting “food flavor additive composition” to encompass Brown’s “muscle replica” effectively reads out any meaning of the term “food flavor additive.” *Id.*

We agree with Patent Owner that the recitation “food flavor additive” is a claim limitation because it appears in the body of claim 1 as well as in the claim’s preamble. Prelim. Resp. 11 n.2. The Petition, however, provides a sufficient analysis, for the purpose of institution, of why the term as applied to Brown’s “muscle replica” is consistent with the use of the term in the ’096 patent. Specifically, Petitioner shows “[t]he term ‘food flavor additive composition’ in view of the ’096 patent specification does not require any specific form and is, per its plain and ordinary meaning, a composition that, when added to a food product, modulates the food product’s flavor and/or aroma.” Pet. 21. Petitioner directs us to the ’096 patent’s explicit disclosures which support this understanding: that “[c]onsumable food products for use in the present disclosure can be flavor additive compositions, e.g., for addition to another consumable food product before, during, or after its cooking process” (*id.* (quoting Ex. 1001, 3:32–35)); the additive composition “can be used to modulate the flavor and/or aroma profile of a consumable food product” (*id.* (quoting Ex. 1001, 3:38–48)); and “[a] flavor additive composition can be in the form, of but not limited to, soup or stew bases, bouillon, e.g., powder or cubes, flavor packets, or seasoning packets or shakers” (*id.* (quoting Ex. 1001, 3:49–51)).

Petitioner also directs us to dependent claims 4 and 24, which specify the form of the food flavor additive composition (e.g., powder, liquid, soup,

stew base, etc.), as further support for a POSITA's understanding that claim 1 does not require any specific form for the food flavor additive. *Id.* Petitioner's position is also supported by the Tarté Declaration. Ex. 1003 ¶¶ 102–103, 111–113 (stating that “Brown's muscle replica is a ‘food flavor additive composition’ because it is added to a food product (e.g., ‘a meat substitute product’)”). On this record, Petitioner provides sufficient evidence, including declarant testimony, to support its argument that Brown's “muscle replica” is a “food flavor additive composition.”

Patent Owner does not propose a claim construction for the recited “food flavor additive composition” that would exclude a “muscle replica,” that is itself a composition, added to “a meat substitute product.”

After considering Patent Owner's arguments, we are persuaded that Petitioner has made an adequate showing for purposes of institution as to not only the disputed limitations, but all the other limitations of independent claim 1 as anticipated by Brown. We have also reviewed Petitioner's arguments regarding dependent claims 2–5, 7–9, 23, and 24, which incorporate the limitations of claim 1, and reach the same conclusion. In summary, Petitioner provides a reasonable likelihood of prevailing on its contention that claims 1–5, 7–9, 23, and 24 are unpatentable as anticipated by Brown.

F. Challenges Based on the Combined Teachings of Giacino and Brown

Petitioner contends claims 1–12, 14–17, and 20–24 are unpatentable as obvious in view of the combined teachings of Giacino and Brown and that claims 18 and 19 are unpatentable as obvious in view of the further

combination of Giacino and Brown with MacLeod. Pet. 26–44. Patent Owner disagrees. Prelim. Resp. 12–22.

1. Giacino (Ex. 1015)

Giacino discloses “artificial meaty flavoring compositions and . . . processes for preparing them.” Ex. 1015, 1:19–20. Specifically, Giacino teaches heating a mixture of taurine and thiamine “at an elevated temperature” and thereby creating “a reaction mixture having a decided, marked meat flavor.” *Id.* at 1:60–64. Giacino’s product eliminates the previous need “to include cysteine in food flavor compositions,” although it permits the use of “small amounts of cysteine” to produce “beef flavors” rather than “pork or poultry” flavors. *Id.* at 4:47–53, 5:17–18. Giacino’s composition “can be used per se in a wide range of food stuffs, either as the dominant flavoring agent or as an aid in improving and enhancing existing flavor.” *Id.* at 1:65–67.

2. Analysis

Petitioner asserts that every element of independent claims 1 and 10 is disclosed by Giacino except for “an isolated heme-containing protein,” for which Petitioner relies on Brown. Pet. 26. Our analysis focuses on the disputed claim limitations contained in independent claims 1 and 10.

At the outset, we note that, on the present record, Patent Owner’s argument that Brown is not prior art to the ’096 patent claims is unavailing for the reasons discussed above in connection with the issue of priority. Prelim. Resp. 13.

Regarding the modification of Giacino by adding Brown’s soy leghemoglobin to meet limitations 1[a] and 10[a] requiring “isolated heme-containing protein,” Petitioner contends “Giacino was ripe for modifications

that would enhance the meaty flavors and aromas of its flavoring compositions” because “[v]arious other materials and ingredients can be incorporated into the compositions to provide a variety of flavor characteristics” that build upon the “basic flavor” of its flavoring compositions. Pet. 28 (citing Ex. 1015, 2:38–41; Ex. 1003 ¶¶ 172, 191).

Petitioner asserts Brown teaches that adding leghemoglobin to a meat flavoring composition “contributes favorably to [the] aroma of” the composition and produces “the aroma of cooked meat.” Pet. 29 (citing Ex. 1012 ¶ 364; Ex. 1003 ¶¶ 173, 192) (alteration in original). Petitioner points to the production of volatile compounds that “are often associated with the aroma of cooked meat” Pet. 29 (citing Ex. 1012; Ex. 1003 ¶¶ 174, 193). Petitioner states the leghemoglobin is isolated because “it is extracted from soy root nodules or obtained using recombinant expression systems.” Pet. 29–30 (citing Ex. 1012 ¶¶ 376–377, 380–381; Ex. 1003 ¶ 194). Petitioner further asserts that it would have been obvious to add Brown’s leghemoglobin to Giacino’s composition “to provide a cooked meat and aroma flavor” and “to capitalize on the express benefits touted by Brown that adding leghemoglobin has on the resulting volatile profile, especially since Giacino expressly invites incorporating additional ingredients to its compositions to modulate their flavor. This modification would further Giacino’s goal of providing a “‘true[r] flavor’ of meat.” Pet. 30 (citing Ex. 1003 ¶¶ 175, 195) (alteration in original).

Petitioner contends there would have been “a reasonable expectation of success in combining Giacino’s and Brown’s teachings” because both Giacino’s and Brown’s compositions “also include reducing sugars and sulfur compounds.” Pet. 30–31. Therefore, “a POSITA would reasonably

expect the same catalyzation described in Brown to take place when adding leghemoglobin to Giacino's compositions to produce volatiles associated with cooked meat." *Id.* at 31. Petitioner argues "nothing more than ordinary skill would have been required to obtain Brown's soy leghemoglobin and mix it into Giacino's composition prior to heating." *Id.* (citing Ex. 1003 (Tarté Declaration) ¶¶ 184, 196). Petitioner argues a POSITA would have known how to combine and heat flavor precursors as taught by Giacino and Brown to produce meat-associated volatiles because the "Maillard reaction using flavor precursors was long known to produce desirable meaty flavors/aromas." *Id.* (citing Ex. 1003 (Tarté Declaration) ¶ 185; Ex. 1005 (McGorrin Declaration) Sections V.B, V.D.).

Patent Owner asserts that the proposed prior art combination is based on hindsight because Giacino states that its basic flavor "is perfectly well suited, without the inclusion of additional ingredients to be used as a meat flavor imparting agent" and that by referencing the possibility of additional ingredients, Giacino does not provide "an open invitation" to use other ingredients. Prelim. Resp. 22 (quoting Ex. 1015, 1:58–63; citing Ex. 1015, 4:67–5:10). Rather, according to Patent Owner, Giacino lists the other ingredients it contemplates for use with its composition. *Id.* Patent Owner points to Giacino's disclosure that its "marked meat flavor" is based on "the discovery that taurine has the ability to impart these [meaty] characteristics when employed as a reactive component." *Id.* (quoting Ex. 1015, 2:8–13, 2:47–51) (alteration in original). Patent Owner argues that Giacino, thus, does not suggest adding leghemoglobin, which Patent Owner asserts would be added "as part of a structural component of a meat replica, in combination with its flavor additive components." *Id.*

Petitioner's reason for modifying Giacino's artificial meaty flavoring composition with Brown's leghemoglobin is sufficient for purposes of institution because the benefits of including leghemoglobin in a meat flavoring composition are supported by Brown itself. Ex. 1012 (Brown) ¶ 364 (identifying leghemoglobin as a factor in producing volatile compounds associated with cooked meat). Moreover, the Petition proposes to modify Giacino with the addition of Brown's leghemoglobin as a flavoring agent, not as a structural component of Brown's meat replica. Pet. 30 ("Based on Brown's teachings, a POSITA would have been motivated to add leghemoglobin to a flavoring composition, such as Giacino[] . . . to provide a cooked meat aroma and flavor.").

Patent Owner also contends that the combination of Giacino with Brown is insufficient because Giacino does not expressly disclose that its flavoring compositions do not contain animal products, as required by the claims. Prelim. Resp. 13. Patent Owner asserts that Giacino's components identified by Petitioner are not from an example, but, rather, "a composition that Petitioner selectively stitches together." *Id.* at 14. Patent Owner acknowledges that Giacino discloses a preference for non-animal, vegetable hydrolysates, but asserts that Giacino also teaches that animal and fish hydrolysates are suitable and that yeast and other natural products can be used as a source of thiamine. *Id.* (citing Ex. 1015, 3:21–25, 5:68–70). Patent Owner asserts that the Petition is based on a "faulty premise that Giacino's flavor compositions could be made from non-animal sources" rather than

any suggestion or motivation from Giacino, which does not discuss using non-animal sourced cysteine, taurine, and ribose. *Id.* at 15–16.

Regarding limitations 1[d] and 10[e] requiring “the food flavoring additive composition contains no animal products,” Petitioner contends Giacino discloses “a meaty flavoring composition that includes thiamine, taurine, vegetable protein hydrolysate, cysteine, and a monosaccharide, such as ribose” Pet. 32 (citing Ex. 1015, 2:5–8, 2:53–60, 3:23–25, 3:43–46, 5:1–10, 6:1–4).¹⁴ Petitioner notes that Giacino’s thiamine is sourced from yeast. Pet. 32 (citing Ex. 1015, 3:23–25). Relying on the Tarté Declaration, Petitioner asserts “a POSITA would understand that Giacino allows for—and indeed motivates—the use of cysteine, ribose, and taurine from non-animal sources.” Pet. 32 (citing Ex. 1003 ¶ 199). Petitioner further asserts “it was well-known that cysteine could be obtained from non-animal sources, including synthetic cysteine made in recombinant microorganisms” (citing Exs. 1085, 1078, 1079) and “it was well-known that taurine is derived synthetically from, for example, ethylene oxide or monoethanolamine” (citing Ex. 1081 1:5–29) and “[r]ibose is also derived synthetically from xylose.” (citing Ex. 1080 1:46–49; Ex. 1003 ¶ 204). Pet. 32–33.

The Petition underscores Giacino’s preference for non-animal products in the composition: “[t]here is considerable demand for meat-flavored products in which the actual meat such as beef, pork, chicken, turkey, duck and the like is not needed or is actually undesirable” (citing

¹⁴ The Petition provides support from Giacino itself for including a monosaccharide in the flavoring composition. Pet. 31. The record supports the inclusion of a monosaccharide for “more intense flavor characteristics.” Ex. 1015 (Giacino), 6:1–7.

Ex. 1015, 1:26–31) and “prior art meat flavor compositions lack the ‘true flavor’ of meat.” Pet. 28 (citing Ex. 1015, 1:51–59). Petitioner’s assertion that a motivation to use non-animal sourced cysteine, taurine, and ribose, is “to keep the meaty flavoring composition (and thus the food product to which it is ultimately added) free of animal products for those individuals that refrain from consuming animal products for health, environmental, ethical, or religious reasons,” therefore, is at least suggested by Giacino’s disclosure that there is a “considerable demand for meat-flavored products” that do not include “actual meat.” Pet. 33; Ex. 1015 (Giacino), 1:27–30. Giacino identifies a number of reasons for avoiding “actual meat” including “cost factors, convenience . . . , consumer acceptance,” “deteriorat[ion] in storage and spoil[age] of the food,” “sterilizing or otherwise preserving the natural product is extremely deleterious to the flavor.” Ex. 1015 (Giacino), 1:36–47. Petitioner asserts using non-animal compounds is consistent with Giacino’s teachings that actual meat can be undesirable in the meaty flavoring composition. Pet. 33 (citing Ex. 1015, 1:27–30; Ex. 1003 ¶ 205). Petitioner notes the leghemoglobin added from Brown maintains “the composition’s ‘no animal products’-status because it is derived from plants.” Pet. 33 (citing Ex. 1003 ¶ 206). Therefore, for purposes of institution, the Petition sufficiently shows that the combination of Giacino and Brown discloses or at least suggests no animal products in its meat flavoring compositions.

With respect to limitation 1[e]’s required production of “at least two volatile compounds which have a meat-associated aroma,” Patent Owner asserts Petitioner’s contentions rely on inherency that has not been established as necessarily resulting from the combination. Prelim. Resp. 18,

20. According to Patent Owner, Giacino does not expressly disclose this limitation upon heating of its composition and Brown cannot be relied upon for this limitation because Brown's volatile compounds are with respect to Brown's muscle replica. *Id.* at 18–19. Patent Owner also contends that the Petition equates Giacino's "flavors" with the claimed "aroma" without explanation. *Id.* at 19–20.

As to limitation 1[e], Petitioner states Giacino discloses heating the pre-mix composition at an elevated temperature "causes a 'reaction' that produces the meaty aroma and flavor." Pet. 33 (citing Ex. 1015, 6:15–17, 6:20–23, 2:5–8; Ex. 1003 ¶¶ 208–209). Petitioner further asserts heating a composition including cystine, thiamine, and ribose "induces a Maillard reaction that produces a myriad of volatiles (at least two) known to have a meat-associated aroma" and "the same is true when heating thiamine" Pet. 34 (citing Ex. 1003 ¶¶ 210–211; Ex. 1005, Sections V.B., V.D.). Petitioner contends that addition of Brown's leghemoglobin "would only further contribute to the meaty aroma volatiles because Brown's process reacts leghemoglobin with amino acids and sugars to achieve a 'cooked meat' aroma" Pet. 34 (citing Ex. 1003 ¶ 212). Thus, the Petition does not rely on Brown's aroma for this patentability challenge, but, rather, the volatiles that the Tarté Declaration, supported by the McGorin Declaration, describes being produced by Giacino's heating step to induce a Maillard reaction with a known meat-associated aroma. Ex. 1003 ¶¶ 209, 210 (citing Ex. 1005 (McGorin Decl.) ¶ 27, Sections V.B, V.D.).

Based on the current record, the Petition sufficiently supports for purposes of institution that Giacino's heating produces volatiles that produce the claimed "aroma." It is not clear to us, based on Patent Owner's

arguments in the Preliminary Response, how the volatiles produced by Giacino’s heating, which Giacino discloses produces the desired meaty “flavor,” would not also produce the required “aroma” given that volatiles by definition are readily vaporizable and “flavor” is a physiological response to “aroma” and taste. *See* Ex. 1015, 6:15–17 (“The meat flavor of the compositions of the present invention is developed by heating the pre-mix compositions at an elevated temperature for a period of time.”); Ex. 1003 (Tarté Decl.) ¶ 209 (“‘[F]lavor’ involves the body’s physiological response to **aroma** and taste.”); Ex. 1005 (McGorrin Decl.) ¶ 27 (“Because aroma volatiles are predominant contributors to the flavor of food, flavor and aroma are highly linked.”).

After considering Patent Owner’s arguments, we are persuaded that Petitioner has made an adequate showing for purposes of institution as to not only the disputed limitations, but all the other limitations of independent claims 1 and 10, that claims 1 and 10 would have been obvious over the combination of Giacino and Brown. We have also reviewed Petitioner’s arguments regarding dependent claims 2–9, 11, 12, 14–17, and 20–24, which incorporate the limitations of claim 1 or claim 10, and reach the same determination. In summary, Petitioner has established a reasonable likelihood of prevailing on its contention that claims 1–12, 14–17, and 20–24 would have been obvious over the combination of Giacino and Brown alone or in further combination with MacLeod.

G. Challenges Based on the Combined Teachings of Giacino, Conrad, and Crane

Petitioner contends claims 1, 2, 4–7, 9–12, 14, 15, and 20–24 are unpatentable as obvious in view of Giacino, Conrad, and Crane; claims 3 and 16 are unpatentable as obvious in view of Giacino, Conrad, Crane, and Proulx; claims 8 and 17 are unpatentable as obvious in view of Giacino, Conrad, Crane, and Perret; and claims 18 and 19 are unpatentable as obvious in view of Giacino, Conrad, Crane, and MacLeod. Pet. 44–57. Patent Owner disagrees. Prelim. Resp. 23–39.

1. Conrad (Ex. 1013)

Conrad is directed to a “meat replacement product to be used in mixed minced meat products, . . . whereby the meat replacement product comprises the gluten protein and the bran fractions of whole cereal grain, preferably wheat.” Ex. 1013, code (57). Conrad explains that animal meat can be “somewhat expensive,” and that “[p]eople of today have too little fibre in their food.” Ex. 1013, 1:25–28. Therefore, according to Conrad, “[i]t would be desirable from a nutritional point of view and from a cost benefit point of view to be able to replace some of the meat in minced meat products . . . with a vegetable preferably cereal product, where the amino acid composition of the final product can be varied.” Ex. 1013, 1:32–40.

Conrad states that its “grain meat” is preferably “wheat meat,” and is formed by crushing the wheat grain to a suitable size, and separating the grain meat from a suspended aqueous phase comprising “starch granules containing most of the water-soluble components of the grain such as soluble proteins, salts, and sugars.” Ex. 1013, 2:1–8. In one example, Conrad states that the wheat meat had a brown-yellow color, and that “the color can

advantageously be transferred into meat color by adding . . . blood, preferably the hemoglobin part separated off from blood.” Ex. 1013, 4:5–10. According to Conrad, “[t]he addition of blood/hemoglobin further gives a desired taste improvement as it improves the meat flavor of the final product,” which, in Conrad, includes a mixed minced meat product wherein up to 50% of the “meat part” is replaced by the wheat meat. Ex. 1013, 4:14–16, 4:45–49.

2. *Crane (Ex. 1014)*

Crane is directed to “methods of producing recombinant functional heme-binding proteins with complete heme incorporation and purified preparation of the same.” Ex. 1014, code (57). Crane states that heme-binding proteins “have diverse biological functions including, oxygen transport, catalysis, active membrane transport, electron transport, and sensory.” *Id.* ¶ 21. Crane includes leghemoglobin among the “classes of heme-binding proteins” encompassed by the disclosure. *Id.* ¶ 21.

3. *Analysis*

We have reviewed the parties’ arguments and evidence. On this record, we have concerns whether Petitioner can establish that a POSITA would have had reason to modify Giacino’s meaty flavoring compositions by adding hemoglobin in view of Conrad, and further modify the combined teachings of Giacino and Conrad by replacing Conrad’s “hemoglobin . . . of whole blood from slaughtered animals” with Crane’s recombinant bovine hemoglobin in order to provide the “isolated heme-containing protein” required by claim limitations 1[a] and 10[a]. Pet. 46–50, 53. We preliminarily agree with Patent Owner that the Petition does not adequately explain how Crane may be considered analogous art in view of its biological

focus for producing recombinant heme-binding proteins. Prelim. Resp. 23; Ex. 1014, code (57), ¶ 21. Patent Owner’s arguments in this regard highlight the Petition’s insufficient rationale for modifying Giacino and Conrad’s food product compositions with Crane’s teachings.

The analogous-art test requires a showing that a reference is either in the field of endeavor of the challenged claims or is reasonably pertinent to the problem with which the inventor was concerned in order to rely on that reference as a basis for rejection. *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992). Patent Owner argues that Petitioner fails to establish Crane as analogous art under this legal framework. Prelim. Resp. 24.

First, Patent Owner asserts Crane is not “from the same field of endeavor” as the ’096 patent. *Id.* Based on this record, the ’096 patent is directed to food products while Crane, on the other hand, relates to “methods for producing recombinant functional heme-binding proteins.” Ex. 1001, 1:22–25; Ex. 1014, code (57). Like the ’096 patent, Giacino and Conrad also relate to food products, therefore, this difference between the asserted prior art references underscores the importance of Petitioner’s rationale for applying Crane’s teachings to food products.

Next, Patent Owner asserts the Petition fails to explain how Crane’s recombinant heme-binding protein is pertinent to the problem addressed by the ’096 patent inventors. According to Patent Owner, the problem solved by the inventors was “to provide meat-like-food products that overcome the limitations of prior-art meat substitutes.” Prelim. Resp. 25. Crane, however, is directed to producing recombinant heme-binding proteins with complete heme incorporation. Ex. 1014 ¶¶ 3–5. Neither Crane nor the Petition

addresses how this is relevant to improving meat-associated flavors or aromas in food flavor additives.

The Petition asserts that Crane's recombinant heme-binding protein, if used in place of Conrad's blood/hemoglobin which is added to improve taste, "would have produced the proteins with a high degree of purity." Pet. 47–48. The Petition asserts that the benefit of high purity is greater control over the amount added and consistency in the end product. *Id.* at 48. However, the Petition does not establish sufficiently that this is a problem for food additives, let alone for Conrad's blood/hemoglobin.

In addition, the Petition does not establish sufficiently that Crane's recombinant heme-binding protein would have been expected to provide the same improved taste as Conrad's blood/hemoglobin to justify the substitution of one for the other. Crane describes the importance of complete incorporation of heme in recombinantly produced heme-binding proteins in terms of heme proteins' functions such as "electron transfer, transport and storage of oxygen, production and sensing of nitric oxide, decomposition of reactive oxygen species, catalytic oxidation of substrates, signal transduction and control of gene expression." Ex. 1014 ¶ 4. Crane further discloses "employing recombinant human hemoglobin as an oxygen delivery pharmaceutical" as an example of a commercial application where fully incorporated heme in recombinant proteins is important. *Id.* ¶ 7. Thus, based on the present record, we agree with Patent Owner's argument that Crane does not suggest that its recombinant proteins with fully incorporated heme provides a benefit to food product applications.

For all of the foregoing reasons, based on the present record, we agree with Patent Owner's analogous art arguments and assessment that the

Petition does not adequately explain how or why Crane's recombinant proteins with fully incorporated heme would benefit a food product. Therefore, the Petition's modification of Giacino and Conrad's food product with Crane's teachings about recombinant heme proteins in order to achieve the claimed food flavor additive composition that "contains no animal products" appears to suffer from improper hindsight bias.

H. Challenges Based on the Combined Teachings of Giacino, Conrad, and Proulx

Petitioner contends claims 1–7, 9–12, 14–16, and 20–24 are unpatentable as obvious in view of Giacino, Proulx, and Conrad; claims 8 and 17 are unpatentable as obvious in view of Giacino, Proulx, Conrad, and Perret; and claims 18 and 19 are unpatentable as obvious in view of Giacino, Proulx, Conrad, and MacLeod. Pet. 57–66. Patent Owner disagrees. Prelim. Resp. 39–40.

1. Proulx (Ex. 1019)

Proulx teaches the use of plant-derived soy leghemoglobin to fortify non-animal food products. Ex. 1019 (Proulx), Abstract. Proulx demonstrates that "the bioavailability of hemoglobin from soy root nodules [is] similar to that of heme iron from animal sources" when added to a food product and can "provide a unique alternative fortificant" and "improve the iron status of the population." *Id.* at 1521.

2. Analysis

We have reviewed the parties' arguments and evidence. On this record, we have concerns whether Petitioner can show sufficiently that a POSITA would have had reason to modify Giacino's meaty flavoring

compositions with Proulx's isolated soy leghemoglobin to fortify the compositions with heme iron and replace Conrad's blood sourced hemoglobin to the required "isolated heme-containing protein" of claim limitations 1[a] and 10[a]. Pet. 58–64. According to the Petition, the primary motivation to modify Giacino's meaty flavoring compositions has nothing to do with aroma or flavor, but, rather, to "better approximate the iron content of meat." *Id.* at 59. Another reason provided for the combination is that Conrad discloses the addition of blood/hemoglobin "improves the meat flavor of the final product" thus Proulx's soy leghemoglobin would also improve meat flavor because a POSITA would have recognized it is "like bovine hemoglobin." *Id.* at 60–61.

Patent Owner challenges Petitioner's arguments regarding why a person of ordinary skill in the art would have had reason to combine the teachings of Proulx with Giacino and Conrad. Prelim. Resp. 39–40. In particular, Patent Owner argues Petitioner's discussion of Proulx's iron bioavailability is irrelevant to Giacino's focus on flavor development and to the proposed combination that already includes Conrad's heme-containing protein. *Id.* Patent Owner also challenges Petitioner's attempt to equate the meat flavor of Conrad's red blood cells with Proulx's soy leghemoglobin. *Id.* at 40. Based on the present record, these arguments are not without merit. Because we have already determined that Petitioner has established a reasonable likelihood of prevailing on other grounds, we do not need to resolve this issue now. We, however, invite the parties, to the extent appropriate and consistent with our rules, to further develop the arguments regarding this proposed combination of references during the course of the trial.

III. CONCLUSION

For the reasons set forth above, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to at least one challenged claim of the '096 patent, and we institute *inter partes* review on all challenged claims and on all grounds presented. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1351 (2018) (“When the Patent Office institutes an *inter partes* review, it must decide the patentability of all of the claims the petitioner has challenged.”)

At this preliminary stage of the proceeding, we have not made a final determination as to the patentability of any challenged claim or any factual or legal issue underlying the patentability inquiry; any final determination will be based on the record developed during trial. We place Patent Owner on express notice that any argument not asserted in a timely-filed Response to the Petition, or in another manner permitted during trial, shall be deemed waived, even if that argument was presented in the Preliminary Response.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that *inter partes* review is instituted on each of the grounds asserted in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, which shall commence on the entry date of this decision.

IPR2023-00206
Patent 9,943,096 B2

FOR PETITIONER:

Joseph M. Paunovich
James Glass
Sandra Haberny
Razmig Messerian
Quincy Lu
QUINN EMANUEL URQUHART & SULLIVAN, LLP
joepaunovich@quinnemanuel.com
jimglass@quinnemanuel.com
sandrahaberny@quinnemanuel.com
razmesserian@quinnemanuel.com
quincylu@quinnemanuel.com

FOR PATENT OWNER:

Michael Rosato
Lorelei Westin
Wendy Devine
Matthew Reed
Tasha Thomas
WILSON SONSINI GOODRICH & ROSATI
mrosato@wsgr.com
lwestin@wsgr.com
wdevine@wsgr.com
mreed@wsgr.com
tthomas@wsgr.com