

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MOTIF FOOD WORKS, INC.,
Petitioner,

v.

IMPOSSIBLE FOODS, INC.,
Patent Owner.

IPR2023-00207
Patent 11,224,241 B2

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

KAISER, *Administrative Patent Judge*.

DECISION

Denying Institution of *Inter Partes* Review
35 U.S.C. § 314, 37 C.F.R. § 42.4

I. INTRODUCTION

A. *Background and Summary*

Motif FoodWorks, Inc. (“Petitioner”) filed a corrected petition for an *inter partes* review (Paper 6 (“Pet.”)) challenging claims 1–23 of U.S. Patent No. 11,224,241 B2 (Ex. 1001 (“the ’241 patent”)). Impossible Foods, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). At the Board’s request, the parties also filed briefs regarding Patent Owner’s request to file a petition for a certificate of correction for the ’241 patent. Paper 8, 10.

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2022). The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted “unless the Director determines . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.”

For the reasons set forth below, we determine the information presented in the Petition does not establish a reasonable likelihood that Petitioner would prevail with respect to at least one of the challenged claims. Accordingly, we do not institute an *inter partes* review.

B. *Real Parties-in-Interest*

Each party identifies itself as the real party-in-interest. Pet. 80; Paper 4, 1.

C. *Related Matters*

The parties identify *Impossible Foods, Inc. v. Motif Foodworks, Inc.*, Case No. 22-cv-00311-WCB (D. Del) (“the Litigation”), as well as IPR2023-00206, involving U.S. Patent No. 9,943,096 B2; IPR2023-00208,

involving U.S. Patent No. 11,013,250 B2; and IPR2023-00209, involving U.S. Patent No. 10,039,306, as related matters. Pet. 80; Paper 4, 1. Patent Owner also identifies IPR2022-00887, involving U.S. Patent No. 10,863,761 B2, and opposition proceedings in EP2943072 as related matters. Paper 4, 1; Paper 13, 1.

D. The '241 Patent (Ex. 1001)

The '241 patent, titled “Methods and Compositions for Affecting the Flavor and Aroma Profile of Consumables,” issued on January 18, 2022. Ex. 1001, codes (45), (54). According to the '241 patent, existing meat substitute compositions are “extruded soy/grain mixtures which largely fail to replicate the experience of cooking and eating meat.” Ex. 1001, 1:51–53. The '241 patent describes the common product limitations as “texture and mouthfeel that are more homogenous than that of equivalent meat products.” *Id.* at 1:54–56. Further, the '241 patent explains that, because these products are “largely . . . sold 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 1:56–60.

The '241 patent describes “methods and compositions for modulating the flavor and/or aroma profile of consumable products.” *Id.* at 2:3–7. This can “give the cooked consumable food product a particular meaty taste and smell.” *Id.* at 3:4–19.

E. Illustrative Claims

Of the challenged claims, claims 1 and 22 are independent claims. Claim 1 is illustrative and reproduced below.

1. A meat-like-food product produced by a method comprising:
providing one or more plant proteins; and

combining, with the one or more plant proteins:

a composition comprising a heme-containing protein, wherein the composition comprises at least 60% of the heme-containing protein on a dry weight basis;

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

a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof in a concentration of at least 1.5 mM;

wherein the meat-like food product is free of animal heme-containing protein;

wherein cooking the meat-like-food-product results in the production of at least two volatile compounds which have a meat-associated aroma; and

wherein the meat-like food product is in a form selected from the group consisting of a hotdog, a burger, ground meat, a sausage, a steak, a filet, a roast, a meatball, a meatloaf, or bacon.

Ex. 1001, 77:53–78:58.

F. Asserted Unpatentability Challenges

Petitioner asserts that claims 1, 3–11, 13, 14, 16–24, 26, 27, and 29–33 are unpatentable based on the following challenges:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–9, 12–23	103	Brown, ¹ Giacino ²
2, 3	103	Brown, Giacino, Ronai ³
10, 11	103	Brown, Giacino, Rolan ⁴
1, 4–6, 8, 10, 13–23	103	Rovaart, ⁵ Conrad, ⁶ Crane ⁷
2, 3	103	Rovaart, Conrad, Crane, Ronai
8, 9, 14	103	Rovaart, Conrad, Crane, Giacino
11, 12	103	Rovaart, Conrad, Crane, Rolan
1, 4–8, 10, 13–23	103	Rovaart, Conrad, Proulx ⁸
2, 3	103	Rovaart, Conrad, Proulx, Ronai
8, 9, 14	103	Rovaart, Conrad, Proulx, Giacino
11, 12	103	Rovaart, Conrad, Proulx, Rolan

Petitioner relies on the declaration of Rodrigo Tarté, Ph.D. (Ex. 1003, the “Tarté Declaration”), the declaration of Robert McGorin, Ph.D (Ex. 1005, the “McGorin Declaration”), and the declaration of Carl Batt, Ph.D (Ex. 1007, the “Batt Declaration”).

¹ WO 2013/010042 A1, published Jan. 17, 2013 (Ex. 1012).

² US 3,519,437, issued July 7, 1970 (Ex. 1015).

³ US 4,153,738, issued May 8, 1979 (Ex. 1132).

⁴ US 2008/0268112 A1, published Oct. 30, 2008 (Ex. 1021).

⁵ US 3,930,044, issued Dec. 30, 1975 (Ex. 1125).

⁶ US 4,818,557, issued Apr. 4, 1989 (Ex. 1013).

⁷ US 2011/0287467 A1, published Nov. 24, 2011 (Ex. 1014).

⁸ 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., 2006, 54, 1518–1522, 2006 (Ex. 1019).

II. 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). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

A claim is unpatentable under 35 U.S.C. § 103 if “the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. § 103. 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) when present, objective evidence of nonobviousness. *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). “Rather, obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.* (citing *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007)). “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 418–19. 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.” *Id.* at 418; *accord In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007). Nevertheless, “A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning.” *KSR*, 550 U.S. at 421.

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art would have had “(i) a B.S. degree in food sciences, biology, chemistry, microbiology, or a related discipline, and (ii) a Master’s degree or Ph.D. in food science or at least three years of experience working as a food scientist.” Pet. 12. Petitioner also asserts that a person of ordinary skill in the could be “part of a team of food scientists, including flavor chemists.” *Id.* at 12–13 (citing Ex. 1003 ¶ 37; Ex. 1005 ¶¶ 82–83; Ex. 1007 ¶¶ 24–25). Patent Owner does not challenge Petitioner’s definition or offer its own. Prelim. Resp. 1–52.

In light of the record before us, and for purposes of this Decision, we adopt Petitioner’s proposal regarding the level of ordinary skill in the art. Based on our review of the ’241 patent and the prior art of record, we determine that the definition offered by Petitioner comports with the qualifications a person would have needed to understand and implement the teachings of the ’241 patent and the prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (explaining that specific findings regarding ordinary skill level are not required “where the prior art itself reflects an

appropriate level and a need for testimony is not shown”) (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)).

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). Under *Phillips*, claim terms are afforded “their ordinary and customary meaning.” *Phillips*, 415 F.3d at 1312. “[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Id.* at 1313. “Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.*

Petitioner argues that the term “free of animal heme-containing protein” does not need to be construed but notes that “in parallel litigation, [Patent Owner] asserts that ‘free of animal heme-containing protein’ covers bovine myoglobin, which is native to an animal (*Bos taurus* (cow)), even when produced in yeast (a non-animal *source*).” Pet. 17 (citing Ex. 1009 ¶¶ 32, 140). Petitioner also argues that the language in the challenged claims requiring that the claimed “meat-like-food product” be produced by a particular process does not “impart ‘structural and functional differences’ to the claimed meat-like-food product.” *Id.* at 18–21. Finally, Petitioner argues that the term “a compound” does not need to be construed but notes that Patent Owner “has implicitly taken the position in the Litigation that this term is not limited to *free* compounds of the claimed sugars and sulfur-containing precursors (*i.e.*, compounds not chemically bound to the structure

of another compound).” *Id.* at 21–22 (citing Ex. 1003 ¶¶ 133–136; Ex. 1116 ¶¶ 36, 51).

Patent Owner disagrees with Petitioner’s arguments with respect to the process limitations imparting structural and functional differences and with respect to the construction of the term “a compound.” Prelim. Resp. 4–12.

After considering the arguments and information presented in the Petition and Preliminary Response, we determine that we do not need to expressly construe any terms for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”)).

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

Petitioner contends claims 1–9 and 12–23 are unpatentable as obvious in view of Brown and Giacino; claims 2 and 3 are unpatentable as obvious in view of Brown, Giacino, and Ronai; and claims 10 and 11 are unpatentable as obvious in view of Brown, Giacino, and Rolan. Pet. 22, 27–46.

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 the compositions of Brown, “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.*

2. *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.

3. *Analysis*

a) *Independent Claims 1 and 22*

Independent claim 1 of the ’241 patent recites “[a] meat-like-food product produced by a method comprising . . . combining, with . . . one or more plant proteins . . . a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof in a

concentration of at least 1.5 mM.” Ex. 1001, 77:53–65. Similarly, independent claim 22 recites “[a] meat-like-food product produced by a method comprising . . . combining, with . . . one or more plant proteins . . . one or more of cysteine, cystine, thiamine, and methionine.” *Id.* at 83:9–18.

For its challenges based on Brown and Giacino, Petitioner contends that these limitations are satisfied both by Brown and separately by Giacino. Pet. 29–33, 41. Specifically, Petitioner argues first that “Brown’s muscle replica includes pea flour,” which “contains cystine, thiamine, and methionine,” and Petitioner also argues that a person of ordinary skill in the art “would be motivated [by Giacino] to include well-known flavor precursors such as cysteine and thiamine at the specified process concentrations.” *Id.* at 29. We consider each of these arguments separately.

For the arguments based solely on Brown, we note first that Petitioner relies on Brown’s “pea flour” for both the limitation reciting “providing one or more plant proteins” and the limitation reciting “combining, with the one or more plant proteins [the amino acid or amino acid mixture].” *Id.* at 28, 29; *see* Ex. 1001, 77:53–65, 83:9–18. In other words, according to Petitioner, Brown’s pea flour not only would have satisfied the requirement of the claims to provide plant proteins, it also would have satisfied the separate requirement of the claims to combine particular amino acids with that plant protein, because those amino acids would have been present in the plant protein itself. But the independent claims of the ’241 patent require more than just the presence of particular amino acids in the finished product. They require a product that is “produced by a method” that includes both “providing one or more plant proteins” and then adding to those plant

proteins the specified amino acid or mixture of amino acids. Ex. 1001, 77:53–65, 83:9–18.

Petitioner argues that the language of claims 1 and 22 that recites providing plant proteins and combining those proteins with additional ingredients constitutes non-limiting process limitations in a product-by-process claim. Pet. 18–21. On the present record, we disagree. The particular process by which a product is made is often unimportant to the unpatentability analysis of a product-by-process claim, but it becomes important when “the process by which a product is made imparts ‘structural and functional differences,’” as Petitioner acknowledges. *Id.* at 18 (quoting *Kamstrup A/S v. Axioma Metering UAB*, 43 F.4th 1374, 1381 (Fed. Cir. 2022) (quoting *Greenliant Sys., Inc. v. Xicor LLC*, 692 F.3d 1261, 1268 (Fed. Cir. 2012))). Here, the process recited in claims 1 and 22 results in a composition that contains more of at least one of the recited amino acids than the plant protein alone would contain, because those amino acids are added to the plant protein. Ex. 1001, 77:53–65, 83:9–18. This higher concentration of amino acids is not merely a difference in manufacturing method; it results in a different product than would be obtained using the plant protein alone. Accordingly, it is a structural difference in the resulting product, and it has patentable weight. Thus, Petitioner cannot demonstrate a reasonable likelihood of prevailing in showing the obviousness of claims 1 and 22 by relying solely on the amino acids present in the plant protein in Brown’s pea flour.

Next, Petitioner argues that a person of ordinary skill in the art “would [have] underst[ood] that Brown’s composition could be modified” and “would [have] be[en] motivated to include well-known flavor precursors such as cysteine and thiamine at the specified process concentrations to

impart a beef flavor/aroma using ordinary skill in the art with a reasonable expectation of success.” Pet. 29–33. Specifically, Petitioner argues that Giacino teaches adding cysteine and thiamine to enhance the meaty flavor of food products and that it would have been obvious, given those teachings, to have “combine[d] Giacino’s composition with Brown’s muscle replica.” *Id.* at 29–31. This argument does not suffer from the same flaw as Petitioner’s Brown-alone argument, discussed above, because it does not rely on amino acids naturally present in a plant protein to satisfy claim limitations that require the presence of additional amino acid above and beyond that naturally present in the plant protein. Instead, this argument relies on the combination of Giacino and Brown to teach a composition that contains a plant protein as well as additional amino acid.

Petitioner argues that a person of ordinary skill in the art would have been motivated to combine the teachings of Giacino with those of Brown for two reasons. First, Petitioner argues that “Brown invites a [person of ordinary skill in the art] to modify its composition to add ‘amino acids’ which result in ‘[c]haracteristic flavor and fragrance components . . . similar[] to meat.’” *Id.* at 30 (quoting Ex. 1012 ¶¶ 295, 262, 363). Second, Petitioner argues that Giacino teaches a “[c]onsiderable demand for meat-flavored products’ without meat,” as well as “‘novel flavor compositions’” that “provide ‘meat flavor’” and that can “aid in improving and enhancing existing flavor” by including some of the amino acids recited in the claims of the ’241 patent, of which “[c]ysteine, especially, is ‘highly desirable.’” *Id.* (quoting Ex. 1015, 1:26–31, 2:47–48, 1:65–67, 4:47–49, 5:17–18, 10:3–8).

On the present record, we are not persuaded that Petitioner has shown sufficiently that a person of ordinary skill in the art would have been

motivated to modify Brown by adding to it Giacino's composition. To begin with, Petitioner's argument that "Brown invites a [person of ordinary skill in the art] to modify its composition to add 'amino acids' which result in '[c]haracteristic flavor and fragrance components . . . similar[] to meat'" is incorrect. *Id.* at 30. Brown does teach that "[c]haracteristic flavor and fragrance components are mostly produced during the cooking process by chemical reactions [between] molecules including amino acids." Ex. 1012 ¶ 295. But Brown does not teach adding amino acids to its composition. Instead, it teaches that amino acids and other molecules are present in its composition, allowing its composition to produce "flavor and fragrance components . . . during the cooking process" in a way that is "similar[] to meat." *Id.*; *see id.* ¶ 362 ("in some embodiments, the characteristic flavor and fragrance components are produced during the cooking process by chemical reactions involving amino acids").

Petitioner is also incorrect that Giacino teaches that "[c]ysteine, especially, is 'highly desirable'" among all the amino acids that Giacino teaches using. Pet. 30 (quoting Ex. 1015, 4:47–49, 5:17–18). Instead, Giacino teaches limiting the use of cysteine. Ex. 1015, 4:47–51 ("Under some circumstances, it has been regarded as being highly desirable if not essential, to include cysteine in food flavor compositions. The present invention, however, is effective essentially completely to eliminate this requirement . . ."). Giacino does, however, teach that "small amounts of cysteine" can be used, particularly when attempting to achieve a beef, rather than a pork or poultry, flavor. *Id.* at 4:51–53, 5:17–18. In addition, Giacino

teaches the desirability of using thiamine, another of the amino acids recited in the challenged claims. *Id.* at 1:60–65.

Petitioner is correct that Giacino teaches that its composition can be used both to create a meaty flavor and to enhance a meaty flavor already present. Ex. 1015, 1:60–67 (a mix of taurine and thiamine has “a decided, marked meat flavor” and “can be used . . . either as the dominant flavoring agent or as an aid in improving and enhancing existing flavor”), 3:58–63 (“the taurine-thiamine reaction mixture is perfectly well suited, without the inclusion of additional ingredients to be used as a meat flavor imparting agent in its own right or as a flavor enhancer when added to foods already having meat flavor”). But Petitioner does not explain why a person of ordinary skill in the art would have seen such enhancement of Brown’s meaty flavor or aroma as necessary or beneficial. Instead, Petitioner alleges precisely the opposite. First, Petitioner argues that “Brown discloses a plant-based ‘meat substitute composition’ that ‘accurately mimics the taste, texture, or color of a meat product derived from animal sources.’” Pet. 24 (quoting Ex. 1003 ¶¶ 85–90; Ex. 1012 ¶¶ 6, 273, 296). Petitioner repeats this assertion. *Id.* at 27 (quoting Ex. 1012 ¶¶ 6, 273, 296). According to Petitioner, “Brown . . . teaches that heme can be used to generate meaty flavor/aroma.” *Id.* Finally, Petitioner argues that “Brown discloses that its muscle replica, when cooked, results in the production of at least ‘2-octanone, 2-methyl furan, which are often associated with the aroma of cooked meat’” and that “Brown’s composition ‘may be visually similar to or indistinguishable from ground beef or a particular cut of beef.’” *Id.* at 33–34 (quoting Ex. 1003 ¶¶ 191–194; Ex. 1012 ¶¶ 272, 364).

Petitioner’s arguments are supported by Brown, which teaches that its “meat substitute composition accurately mimics the taste, texture, or color of

a meat product derived from animal sources.” Ex. 1012 ¶ 6. Brown’s “consumable[s] may be visually similar to or indistinguishable from ground beef or a particular cut of beef.” *Id.* ¶ 272. “In some embodiments” of Brown’s invention, “the olfactory map of the consumable during or after cooking is similar to or indistinguishable from that of cooked or cooking meat.” *Id.* ¶ 295. As noted above, Petitioner argues that a person of ordinary skill in the art would have modified Brown to achieve similarity to the flavor and fragrance of meat, Pet. 30, but Petitioner also acknowledges that Brown already achieves such similarity on its own. Thus, it is unclear why any modification to Brown would have been seen as necessary or desirable. To the extent that varying levels of verisimilitude in replicating the flavor and aroma of meat were possible, Brown teaches that its composition includes leghemoglobin and teaches that this inclusion “contributes favorably to [the] aroma of meat replicas,” resulting in an aroma even closer to that of animal-sourced meat than that obtained from “the characteristic flavor and fragrance components [that] are produced during the cooking process by chemical reactions involving amino acids, fats and sugars.” Ex. 1012 ¶¶ 362–364. The result is a product whose aroma “similarity [to animal-sourced meat] is sufficient to be beyond the detection threshold of human perception.” *Id.* ¶ 295. Given that Brown teaches achieving such similarity to animal-sourced meat on its own, it is unclear why, and Petitioner does not explain sufficiently why, a person of ordinary skill in the art would have been motivated to modify Brown to achieve an even more faithful meat replica. Accordingly, Petitioner does not show a reasonable likelihood of prevailing on its argument that claims 1 and 22 of

the '241 patent would have been obvious in view of the teachings of Brown and Giacino.

b) Dependent Claims 2–21 and 23

Claims 2–21 depend, directly or indirectly, from independent claim 1, and claim 23 depends from independent claim 22. For its challenges of these claims, Petitioner relies on the arguments discussed above for independent claims 1 and 22. Pet. 34–46. Nothing in Petitioner's analysis of the additional references relied upon for its challenges of the dependent claims cures the deficiencies discussed above regarding the proposed combination of Brown and Giacino. *Id.* Therefore, for the same reasons discussed above for independent claims 1 and 22, we determine Petitioner has failed to establish a reasonable likelihood of prevailing on its challenge that claims 2–21 and 23 are unpatentable as obvious in view of Brown and Giacino, or further in view of Ronai or Rolan.

E. Challenges Based on the Combined Teachings of Rovaart and Conrad

Petitioner contends claims 1, 4–6, 8, 10, and 13–23 are unpatentable as obvious in view of Rovaart, Conrad, and Crane; claims 2 and 3 are unpatentable as obvious in view of Rovaart, Conrad, Crane, and Ronai; claims 8, 9, and 14 are unpatentable in view of Rovaart, Conrad, Crane, and Giacino; claims 11 and 12 are unpatentable as obvious in view of Rovaart, Conrad, Crane, and Rolan; claims 1, 4–8, 10, and 13–23 are unpatentable as obvious in view of Rovaart, Conrad, and Proulx; claims 2 and 3 are unpatentable as obvious in view of Rovaart, Conrad, Proulx, and Ronai; claims 8, 9, and 14 are unpatentable in view of Rovaart, Conrad, Proulx, and Giacino; and claims 11 and 12 are unpatentable as obvious in view of Rovaart, Conrad, Proulx, and Rolan. Pet. 22, 46–75.

1. *Rovaart (Ex. 1125)*

Rovaart discloses a “process for preparing an expanded porous food product having a meat-like flavor” that comprises “heating under pressure a mixture comprising (a) a finely divided food material, (b) a sulphur compound such as a sulphur-containing amino-acid, (c) a pentose or hexose, and (d) water, and rapidly releasing the pressure.” Ex. 1125, code (57).

Rovaart explains that prior art processes for forming products with a porous expanded structure and meat like taste involved first forcing a moistened raw material through an extrusion die to form the desired expanded porous structure, followed by a subsequent “flavouring treatment” involving “incorporating into the expanded porous products suitable flavouring agents, which may be natural or synthetic.” Ex. 1125, 1:8–29. In contrast to prior art processes, Rovaart explains that in its process, which it characterizes as being “particularly simple,” the desired texture and taste are obtained in a single operation. Ex. 1125, 1:38–42.

2. *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. On 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.

3. *Analysis*

a) Independent Claims 1 and 22

Each of the independent claims of the ’241 patent recites “[a] meat-like-food product produced by a method comprising . . . combining . . . a heme-containing protein.” Ex. 1001, 77:53–57, 83:9–13. For its challenges based on Rovaart and Conrad, Petitioner contends Rovaart “teaches ‘porous expanded food products having a meat-like taste’” and that, “because ‘it is desired to impart to [these products] the taste of meat,’ the products ‘are subsequently given a flavouring treatment.’” Pet. 46–47 (quoting Ex. 1125, 1:24–26) (alteration in original). Petitioner asserts that “Rovaart teaches including ‘suitable flavouring agents’ in its products, ‘which may be natural,’” and teaches adding sugars/sulfur compounds for this purpose. *Id.* at 47, 49 (quoting Ex. 1125, 1:24–29). Based on these disclosures, Petitioner argues that “Rovaart generally motivates a [person of ordinary

skill in the art] to provide meaty flavor in products.” *Id.* at 49. Petitioner also argues that a person of ordinary skill in the art would have been taught by Rovaart “the desirability of *enhancing* the meaty flavor of Rovaart’s products” and would have “recognize[d] that one way [to do so would have been] to include other ‘natural’ ‘suitable flavouring agents’ in the products.” *Id.* (citing Ex. 1003 ¶¶ 309–311).

According to Petitioner, a person of ordinary skill in the art “would have modified Rovaart’s flavoring compositions to include a heme-containing protein based on Conrad’s and Crane’s teachings.” *Id.* at 47. Specifically, Petitioner argues that “Conrad teaches adding the ‘hemoglobin part’ of slaughtered-animal blood to [its] grain-based ‘meat’ confers multiple properties characteristic of meat,” including both color and flavor. *Id.* at 50 (citing Ex. 1003 ¶¶ 312–313; Ex. 1013, 4:3–17).

Patent Owner asserts that Petitioner’s proposed combination is illogical and based on hindsight. Prelim. Resp. 27–32. Specifically, Patent Owner argues Petitioner fails to account for the differences between Conrad’s “wheat-based product designed to replace some portion of meat itself,” and Rovaart’s soybean flour “products that already have a meat-like flavor.” Prelim. Resp. 29–30. According to Patent Owner,

Petitioner fails to explain why a [person of ordinary skill in the art] would have been motivated to modify Rovaart to “enhance” its meat flavor or color, when the reference itself already achieves a “more pronounced and fuller” meat flavor (EX101125, 2:58-61) and is unconcerned with color, in view of a reference that seeks to add blood to a meat-based product to recoup flavor and color lost by its extension with a non-meat-based product.

Prelim. Resp. 30.

After considering the parties' arguments and information in the present record, we are not persuaded by Petitioner's contention that a person of ordinary skill in the art would have had reason to combine the teachings of Conrad and Rovaart.

It is undisputed that Rovaart teaches methods for producing a porous, soy-based food product having a meat-like flavor. Pet. 49; Prelim Resp. 30; Ex. 1125, 1:38–43. These methods include using the same sugar/sulfur compound combination recited in the '241 patent. Ex. 1125, 1:38–46, 1:66–2:1. Thus, to the extent Rovaart “generally motivates” a person of ordinary skill in the art to provide meaty flavor in its products, as Petitioner asserts (Pet. 49), the evidence of record establishes that a skilled artisan would have understood how to accomplish that based on Rovaart alone. Accordingly, Petitioner does not demonstrate persuasively that a person of ordinary skill would have had a reason to look beyond Rovaart itself, i.e., to Conrad, to provide meaty flavor in its products.

We reach a similar result with regard to Petitioner's argument that Conrad's teaching that “adding a composition that comprises a heme-containing protein would contribute to meaty flavor” would motivate a person of ordinary skill in the art to add Conrad's composition to Rovaart's products to enhance their meaty flavor. Pet. 50. This argument is based on Petitioner's characterization of Rovaart as teaching methods of *enhancing* meaty flavor of its food product—not just *producing* products having a meaty flavor. Pet. 49. But what Petitioner directs us to as evidence of Rovaart's methods of enhancing flavor are simply the steps Rovaart discloses for “preparing an expanded porous food product having a meat-like flavour.” Ex. 1125, 1:38–40.

For example, as evidence that Rovaart teaches methods of enhancing meaty flavor, Petitioner directs us to Rovaart's statements that "heating [Rovaart's composition] at a temperature below 150°C does not produce the desired [meaty] flavour" and that changing Rovaart's process, by substituting one sugar for another, "can produce 'less pronounced' meaty flavors." Pet. 49 (quoting Ex. 1125, 2:46–51, 6:16–28). Although it is true, as Petitioner notes, that Rovaart teaches that heating the mixture at too low a temperature "does not produce the desired flavour and texture" (Ex. 1125, 2:49–51), this is just a teaching that, in order to get a meaty flavor, a certain minimum temperature is required. Ex. 1125, 1:38–48 ("This process comprises forming a mixture . . . [and] heating the mixture to a temperature of at least 150°C . . .").

Similarly, Rovaart discloses that its starting mixture includes, *inter alia*, at least one pentose or hexose, which may be xylose or glucose. Rovaart prepares one example, Example 2, using xylose, and another example, Example 4, using glucose. Ex. 1125, 1:42–44, 1:66–68, 5:10–36, 6:16–28. Although Rovaart reports that Example 4 had a "slightly less pronounced" flavor of boiled beef, both examples use components that Rovaart teaches one to use to provide a meat-like flavor, and Rovaart confirms that using these components does result in providing a beef flavor. Ex. 1125, 1:42–44, 1:66–68, 5:10–36, 6:16–28. Thus, Petitioner's attempts to distinguish between Rovaart teaching methods of *producing* a meaty flavor and *enhancing* a meaty flavor are unavailing.

Even if we were to agree with Petitioner that Rovaart teaches methods of enhancing meaty flavor, Petitioner does not explain persuasively why a person of ordinary skill in the art would look to a *different reference* (i.e., Conrad) to enhance the meaty flavor of Rovaart's products when Rovaart

already teaches how to do that. This is especially true considering, in Petitioner’s own words, “Rovaart . . . teaches that including undesirable ingredients can produce ‘less pronounced’ meaty flavors.” Pet. 49 (quoting Ex. 1125, 6:16–28). This statement implies that a person of ordinary skill in the art, seeking to enhance the meaty flavor of Rovaart’s products, would *not make changes* to Rovaart’s process, as doing so could produce a *less pronounced* meaty flavor, as opposed to enhancing the meaty flavor of the product. At the very least, Petitioner’s arguments here cast doubt on its conclusory statement that a person of ordinary skill in the art would have had a reasonable expectation of successfully achieving desirable meat-like properties by combining the teachings of Conrad and Rovaart. Pet. 51.

Furthermore, on the present record, there is insufficient evidence supporting Petitioner’s assertion that “[t]o further enhance Rovaart’s products’ meaty flavor, Conrad teaches that adding a composition that comprises a heme-containing protein would contribute to meaty flavor in addition to other benefits.” Pet. 50. First, this assertion is based on Petitioner’s arguments regarding enhancing the meaty flavor in Rovaart’s products, which we determine to be unpersuasive for the reasons discussed above. Next, Conrad’s disclosure that the “addition of blood/hemoglobin gives a desired taste improvement” is made in the context of adding blood/hemoglobin to a grain/wheat meat product that does not contain the sulfur/sugar components known to impart meaty flavor. Ex. 1013, 2:1–46, 4:14–16; Pet. 22. As Petitioner points out, however, these ingredients are included in Rovaart’s products. Pet. 49; Ex. 1125, 1:42–46. This distinction, along with the fact that Rovaart’s products already possess a full meat flavor on their own, undermines Petitioner’s assertion that a person of ordinary skill in the art would have understood that adding

blood/hemoglobin to Rovaart's products would enhance and/or contribute to the meaty flavor of Rovaart's products.

As to Rovaart's discussion of "suitable flavouring agents," Rovaart uses this specific phrase only when describing prior art processes that Rovaart distinguishes and seeks to improve upon. Ex. 1125, 1:24–29. Beyond stating they "may be natural or synthetic," Rovaart does not elaborate on what these "suitable flavouring agents" might be in the context of these prior art processes. Ex. 1125, 1:27–28. To the extent Petitioner contends Conrad's hemoglobin part of slaughtered-animal blood is a "suitable flavouring agent," Rovaart at best suggests it would have been suitable for use in the prior art processes disclosed in Rovaart.

Rovaart makes clear, however, that in these prior art processes the product is forced, "while hot and under pressure, through an extrusion die," and "subsequently given a flavouring treatment." Ex. 1125, 1:19–26. This prior art process is distinct from Rovaart's claimed invention that involves "a process for preparing an expanded porous food product having a meat-like flavour that is particularly simple and in which the desired texture and taste are obtained *in a single operation*." Ex. 1125, 1:38–42 (emphasis added). Rovaart's process includes forming a mixture of (a) a finely divided food material, (b) at least one pentose or hexose, (c) at least one sulphur-containing amino acid or an amino-acid and a substance containing sulfur, and (d) water. Ex. 1125, 1:42–46. Rovaart states that "flavouring and/or texturing agents such as sodium glutamate, inosine or guanosine monophosphate, lactic acid, calcium chloride, or sodium chloride, may be added to the mixture" formed as part of its claimed process. Ex. 1125, 2:18–22.

Petitioner does not address the differences between Rovaart's claimed process and the prior art process Rovaart distinguishes. Nor does Petitioner address sufficiently whether Conrad's hemoglobin part of slaughtered-animal blood could be added to Rovaart's mixture and used in Rovaart's single step process, as opposed to being used as a "suitable flavouring agent" in the subsequent flavoring treatment step according to prior art processes. Petitioner's failure is particularly problematic here, where, according to Petitioner, "Rovaart . . . teaches that including undesirable ingredients can produce 'less pronounced' meaty flavors." Pet. 49.

Finally, Petitioner contends that a person of ordinary skill in the art would have combined the teachings of Rovaart with Conrad in view of "other benefits" that Conrad's hemoglobin/blood could contribute. *Id.* at 50. The only "other benefit" Petitioner discusses in the section of the Petition labeled "Motivation to Combine with Conrad" is Conrad's teaching that "the color of the grain-based replica 'can advantageously be transferred into meat colour by adding thereto . . . blood.'" *Id.* (quoting Ex. 1013, 4:3–17) (alteration in original) (emphasis omitted). Although this may be beneficial for Conrad's product, particularly because its grain/wheat product has a brown/yellow color and is intended to replace real meat, the same is not necessarily true for Rovaart's products. Ex. 1013, 1:25–40, 4:3–10. Petitioner does not direct us to sufficient evidence suggesting that a person of ordinary skill in the art would have understood color was a concern in Rovaart such that adding blood per Conrad's teachings would have been viewed as beneficial. Furthermore, we agree with Patent Owner that Petitioner's arguments fail to account for the differences between the Conrad's wheat-based product and Rovaart's soy-based products, especially

in terms of how adding blood would affect the color of the different materials.

For all of the foregoing reasons, we agree with Patent Owner that Petitioner's arguments as to why a person of ordinary skill in the art would have had reason to combine the teachings of Rovaart and Conrad are not sufficiently supported, and appear to be driven by hindsight. As a result, we are not persuaded by Petitioner's argument that a person of ordinary skill in the art would have had reason to combine the teachings of Conrad and Rovaart to arrive at the invention recited in the challenged claims. Accordingly, we determine Petitioner has failed to establish a reasonable likelihood of prevailing on its challenge that claims 1 and 22 are unpatentable as obvious in view of Rovaart and Conrad, and further in view of Crane or Proulx.

b) Dependent Claims 2–21 and 23

Claims 2–21 depend, directly or indirectly, from independent claim 1, and claim 23 depends from independent claim 22. For its challenges of these claims, Petitioner relies on the arguments discussed above for independent claims 1 and 22. Pet. 63–75. Nothing in Petitioner's analysis of the additional references relied upon for its challenges of the dependent claims cures the deficiencies discussed above regarding the proposed combination of Rovaart and Conrad. *Id.* Therefore, for the same reasons discussed above for independent claims 1 and 22, we determine Petitioner has failed to establish a reasonable likelihood of prevailing on its challenge that claims 2–21 and 23 are unpatentable as obvious in view of Rovaart and Conrad, and further in view of Crane or Proulx, Ronai, Giacino, and Rolan.

III. CONCLUSION

Upon consideration of the Petition, the Preliminary Response, and the evidence presented, we determine that Petitioner has not shown a reasonable likelihood that it will prevail in showing that at least one of the challenged claims is unpatentable. Accordingly, we do not institute an *inter partes* review of any challenged claim based on any ground asserted in the Petition.

IV. ORDER

For the reasons given, it is:

ORDERED that, pursuant to 35 U.S.C. § 314, the Petition is denied, and no *inter partes* review is instituted.

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