

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MOTIF FOODWORKS, INC.,
Petitioner,

v.

IMPOSSIBLE FOODS, INC.,
Patent Owner.

Case IPR2023-00207
Patent No. 11,224,241

**PATENT OWNER'S PRELIMINARY RESPONSE
PURSUANT TO 37 C.F.R. § 42.107**

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I. INTRODUCTION

The Board should not institute *inter partes* review of claims 1-23 of U.S. Patent No. 11,224,241 (EX1001, “’241 patent”) because Petitioner Motif FoodWorks, Inc. fails to show that it has a reasonable likelihood of prevailing. Petitioner’s grounds engage in an impermissible mix-and-match exercise designed to reach the claimed invention through hindsight, mischaracterizations of the references’ teachings, and illogical combinations.

For its first set of grounds, Petitioner asserts obviousness based on Brown, which is not prior art to the challenged claims once the Office accounts for full priority chain. Even if Brown is considered to be prior art, Petitioner’s reliance on Brown alone is deficient for two reasons. First, Petitioner’s reliance on Brown requires interpreting the claims to read out the expressly claimed concentration of the required sulfur-containing compound ingredient and, second, the requirement that this compound is claimed as a separate element from the recited plant protein. Despite arguing that Brown’s product already satisfies all elements of the claims, including that cooking it results in production of at least two volatile compounds which have a meat-associated aroma, Petitioner proposes to pluck cysteine out of Giacino to modify Brown based primarily on improper “could have” reasoning. Petitioner’s rationale for this alternative fallback position to modify Brown to add a cysteine compound based on Giacino depends on mischaracterizing Giacino as

promoting the addition of cysteine compounds, when Giacino instead promotes a taurine-based process. Ultimately, the only consistent rationale in Grounds 1A-1C is the improper, hindsight-driven motivation to piece together disparate references and ingredients to copy the challenged claims. This, of course, is inadequate to demonstrate obviousness.

Petitioner's remaining grounds are equally deficient. Petitioner relies on Rovaart to provide a meat-like food product *free of animal heme-containing protein*, but relies on Conrad's teaching to add *actual animal blood* to a wheat-filler for mixed meat products to address the discoloration impact of the wheat-filler on the meat to which Conrad teaches it should be added. Petitioner then adds a third reference, Crane, to teach that it was possible to produce recombinant functional heme-binding proteins. However, Crane never discusses food products (and instead, *e.g.*, blood transfusions), and Petitioner fails to show Crane is analogous art or that a POSA looking to Conrad's teachings to add animal blood to meat/wheat mixtures would look instead to recombinant technology relevant to blood transfusions. Moreover, each set of Grounds 2A-2D and 3A-3D rely on unsupported inherency arguments to reach the volatile compounds/aroma requirements of the claims, ignore the form requirements of the claims, and fail to demonstrate that the final combination would satisfy the "free of animal heme-containing protein" limitation of the claims.

Petitioner uses hindsight and fails to provide a supportable motivation or rationale to combine the cited references. Petitioner also ignores the extensive unexpected results and teachings that support no reasonable expectation of success with the combinations. The '241 patent reflects the work of Patent Owner Impossible Foods, Inc. ("Patent Owner"), which is widely recognized as being the first to incorporate heme-containing proteins into plant-based meat products. EX2002 (Goldfine, "A brief history of Impossible Foods: how 'bleeding' plant-based burgers started a food industry trend"). Impossible Foods' innovations did not come overnight—"five years of research and hundreds of iterations" brought a final version of a plant-based meat product able to recreate the aromas, taste, and texture of animal meat such that "[m]ore than 1,500 consumers couldn't tell the difference between a meat burger and the Impossible burger...." *Id.*

For the reasons detailed below, institution of *inter partes* review should be *denied*.

II. OVERVIEW OF THE '241 PATENT

The '241 patent recognizes that "current plant-based meat substitutes have largely failed to cause a shift to a vegetarian diet," owing to the "fail[ure] to replicate the experience of cooking and eating meat." *Id.*, 1:50-53. Prior substitute products contrasted with meat products by providing "a texture and mouthfeel that are more homogenous than that of equivalent meat products." *Id.*, 1:54-56. Also

absent was the ability of these plant-based substitutes to “replicate aromas, flavors, and other key features associated with cooking meat.” *Id.*, 1:56-60. While prior substitute products appeal to an established vegetarian/vegan base, these products “have failed to appeal to the larger consumer segment accustomed to eating meat.” *Id.*, 1:60-64.

The '241 patent provides “methods and compositions for modulating the flavor and/or aroma profile of consumable products,” including plant-based food products. *Id.*, 2:3-7. By adding such compositions, plant-based food products can be made “to give the cooked consumable food product a particular meaty taste and smell” and “hav[e] a cooked flavor and/or aroma profile that is more meat like.” *Id.*, 3:4-19, 19:47-64; EX2002 (“The Impossible Burger bleeds, sizzles and tastes just like meat....”). The compositions described can be formulated to be free of animal products, thus adding to its desirability and ability to improve the meat flavor of plant-based food products. *See* EX1001, Abstract.

III. CLAIM CONSTRUCTION

A claim subject to *inter partes* review receives its plain and ordinary meaning, interpreted in light of the specification of the patent in which it appears. *See* 37 C.F.R. § 42.100(b). Petitioner asserts that no claim construction is required. Pet., 17, 21. In at least two aspects, however, Petitioner ignores express limitations of the claims. Though no express construction is required to deny institution,

Petitioner cannot succeed, particularly on Ground 1A, without misconstruing the claims.

A. Petitioner Should Not Be Permitted to Read The Required Component Concentrations Out Of The Claims

Petitioner's first attempt to read express limitations out of the claims is through its reliance on an erroneous product-by-process interpretation of the claims. *See* Pet., 18-21. Claim 1 of the '241 patent recites a meat-like-food product that, both in structural and functional terms, is the result of the combination of certain recited ingredients in specifically recited amounts. Because Brown indisputably fails to disclose the claim-recited sulfur-containing component concentration, Petitioner's Ground 1A depends on reading this express claim limitation out of the claims. *See* Pet., 29 (relying exclusively on Giacino to disclose this limitation). However, as discussed below, the recited component concentrations are not mere process limitations and are entitled to patentable weight. As such, Petitioner's arguments regarding Brown alone necessarily fail. *See infra*, section IV.A.1.

Independent claims 1 and 22 recite a meat-like-food product that is produced by combining "one or more plant proteins" with "a heme-containing protein," at least one sugar compound, and at least one of four sulfur-containing compounds. Claim 1 further recites specific amounts for the heme-containing protein (at least 60% on a dry weight basis) and the at least one sulfur-containing compound (in a

concentration of at least 1.5 mM) that are added to result in the meat-like-food product. Petitioner alleges these limitations lack patentable weight because they are “process limitations” that “do not impart any structural or functional differences” to the claimed meat-like-food product. Pet., 19-20; *see also id.*, 29; *Greenliant Sys., Inc. v. Xicor LLC*, 692 F.3d 1261, 1268 (Fed. Cir. 2012) (process limitation has patentable weight when the limitation provides structural or functional differences distinguishing it from the prior art). Petitioner is wrong.

The component concentration elements of the challenged claims must be given patentable weight because they impart both structural (*i.e.*, the presence of a sulfur-containing compound, a sugar compound, and a heme-containing protein) and functional differences (*i.e.*, the release of volatile compounds upon heating that have a meat-associated aroma) to the claimed meat-like-food product, as compared to a product produced without the limitations of the claims. *See Amgen Inc. v. F. Hoffman-La Roche Ltd.*, 580 F.3d 1340, 1365–67 (Fed. Cir. 2009) (process had patentable weight when a compound purified from a different source than the prior art had a higher molecular weight and different chemical charge than the compound of the prior art). Petitioner ignores the claim language and does not even come close to satisfying its burden to demonstrate that these limitations provide no structural or functional difference.

The specification provides additional evidence confirming that these limitations provide structural and functional differences to the claimed product. For instance, the '241 patent explains that heating some combinations of flavor precursors and iron complexes will produce non-meat-like flavor and aroma profiles (*e.g.*, broccoli) while others will produce the required meat-like flavor and aroma profile. EX1001, 12:58-13:6, Table 2. The '241 patent provides numerous examples using varying concentrations of flavor precursors and amounts of heme-protein in a food product to produce different and improved flavor and/or aroma profiles. *See, e.g., id.*, 20:7-35 (Example 1, “replica burgers containing LegH were rated significantly beefier, bloodier, [and] more savory” than control burgers), 21:15-31 (Example 2, replica burger with flavor precursor mixture “were described as having bouillon, gravy, meaty, bloody, savory, and beefy notes”). The patent specification thus confirms that the recited component concentrations provide structural and functional differences distinguishing the product from the prior art.

The prosecution history further confirms that the recited component concentrations provide structural and functional differences. The Holz-Schietinger Declaration was cited during prosecution of the '241 patent to show that twenty-eight volatile compounds were produced when leghemoglobin, ribose, and cysteine were combined in specific amounts. *See* EX1150, 98-102. These volatile compounds were not produced when the combination of these components were

not present, supporting that combining the claimed ingredients in the claimed amounts results in a structural and functional difference. *Id.* Petitioner acknowledges the submission of this data during prosecution, but nevertheless disputes the results based on an improper incorporation by reference of more than 50 pages of the declaration of Dr. McGorin. Pet., 20 (citing EX1005, Section VIII). Petitioner's improper argument should be rejected. *See* 37 C.F.R. §42.6(a)(3).

Even if considered on the merits, Dr. McGorin's arguments should be rejected. They provide no evidence that the claimed combination of components do not produce different volatile compounds or a different volatile compound profile, as compared to volatile compounds that would be produced from a product prepared without the combination of the claimed components in the claimed amounts. To the contrary, Dr. McGorin's testimony suggests that there *is* a difference in the volatile profile between a product formed by combining the claimed components as recited, as compared to a product formed without this combination. *See, e.g.*, EX1005, ¶217 ("heat-reacting the Maillard precursors ribose and cysteine with different heme-containing proteins leads to the production of *different* volatile profiles" (emphasis added)). Petitioner's cursory attempt to read elements out of the claims should be rejected.

B. Petitioner’s Erroneous Reading of “A Compound” Results in an Improper Conflation of Separately Claimed Components

The challenged claims recite that the meat-like-food product contains “a compound” selected from a group of sulfur-containing compounds. While Petitioner contends that “[t]he term ‘compound’ has a plain meaning and does not require construction for purposes of this proceeding,” Petitioner nevertheless advances a construction that the term “is not limited to *free* compounds of the claimed...sulfur-containing precursors (*i.e.*, compounds not chemically bound to the structure of another compound).” Pet., 21 (original emphasis). Based on this interpretation, Petitioner’s “Grounds 1A-1C maps ‘*a compound* selected from cysteine...’” to the pea flour disclosed in Brown. *Id.* (original emphasis).

Notwithstanding Petitioner’s assertions that the claimed “compound” recited in the challenged claims is not limited to “free compounds,” Petitioner’s interpretation results in Petitioner erroneously reading out express limitations of the claims. The challenged claims not only recite that the meat-like-food product includes “a compound” selected from a group of sulfur-containing compounds, but also “one or more plant proteins.” Petitioner’s claim construction regarding the claimed sulfur-containing compounds (*i.e.*, that they are not limited to “free compounds”) appears to be an attempt to justify Petitioner’s mapping of Brown’s pea flour to not only the claimed sulfur-containing compounds, but also to the claimed “one or more plant proteins.” Petitioner’s reliance on the same

component—pea flour—to satisfy two separately recited claim elements is improper because it improperly conflates two express and separate limitations of the claim into one.

“Where a claim lists elements separately, ‘the clear implication of the claim language’ is that those elements are ‘distinct component[s]’ of the patented invention.” *Becton, Dickinson and Co. v. Tyco Healthcare Group, LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010) (quoting *Gaus v. Conair Corp.*, 363 F.3d 1284, 1288 (Fed. Cir. 2004) (alterations in original); *see also Hopkins Mfg. Corp. v. Cequent Performances Prods., Inc.*, IPR2015-00613, Paper 9 at 11-12 (PTAB Aug. 7, 2015) (denying institution when petitioner relied on a single structure as disclosing separate and distinct control signals). Here, the challenged claims recite the claimed “one or more plant proteins” and the claimed sulfur-containing compounds separately, thus indicating that the elements are “distinct components” of the patent invention.

While Petitioner’s reliance on pea flour to satisfy two distinct components of the claim appears to be based on its assertion that the claimed “sulfur-containing precursor(s) composition” is not necessarily limited to “free compounds” (Pet., 21-22, 29 n.8.), Petitioner provides no explanation as to why an assertion that a “sulfur-containing precursor(s) composition” includes compositions that are not “free compounds” necessarily leads to the conclusion that the same component,

i.e., pea flour, can satisfy both elements of the claimed meat-like-food product. Indeed, that the claimed “one or more plant proteins” is distinct from the claimed “compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof” is evident from the claim itself, which requires that the two components be ***combined*** with one another. Merely because the claimed “compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof” may also encompass compounds that are “chemically bound to the structure of another compound” (*see* Pet., 21) does not detract from the plain reading of the claim that the compound is a separate component of the claimed invention, which is subsequently combined with the “one or more plant proteins” as specifically claimed.

This is also confirmed by the specification of the '241 patent. For example, in Example 1, the specification distinguishes between “[r]eplica burgers containing the ingredients in Table 4 and the flavor precursors cysteine (10 mM), glutamic acid (10 mM), glucose (10 mM), and thiamine (1 mM).” EX1001, 20:4-10. The ingredients listed in Table 4 include a number of plant proteins, such as pea vicilin, soy protein concentrate, pea legumin, soy protein isolate, and wheat gluten. *Id.*, 20:36-52; *see also id.*, 37:21-38:30 (Example 11, describing addition of a “magic mix,” containing cysteine and thiamine, added to “the meat replica” of Table 4); EX1150, 447 (listing separate support for the claimed “one or more plant proteins”

and sulfur-containing precursors). The specification’s description of these components as separate and distinct—*e.g.*, the plant protein “ingredients” of Table 4 that are prepared with the “flavor precursors” cysteine and thiamine—further supports the understanding that the claimed “one or more plant proteins” and the claimed “compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof” are different structural elements. *See Becton, Dickinson*, 616 F.3d at 1254-55 (confirming claimed elements as separate structures when “the specification comports with the plain language of the claims”).

Accordingly, to the extent Petitioner’s claim construction of the claimed sulfur-containing compound is based on applying the same component to two separate elements of the claimed invention, Petitioner’s reading is improper. Because Petitioner’s Ground 1A relies on this erroneous reading of the claim in asserting that Brown alone teaches the claimed invention, Petitioner’s Ground 1A fails for this reason.

IV. GROUNDS 1A-1C FAIL

Petitioner asserts three grounds, nominally referred to as Grounds 1A, 1B, and 1C, based on combinations of Brown (EX1012), Giacino (EX1015), Ronai (EX1132), and Rolan (EX1021). As detailed below, Petitioner fails to show a reasonable likelihood that it will prevail on the asserted grounds.

A. Ground 1A Fails

Petitioner's Ground 1A presents two alternative positions, both of which fail for several reasons. First, Petitioner asserts "Brown discloses or renders obvious every limitation of the independent claims." Pet., 27. However, Petitioner's arguments with respect to Brown alone fail because Brown does not qualify as prior art. Moreover, even if it did, Petitioner's arguments fail because they are premised on ignoring express limitations of the claims, namely, the addition of a sulfur-containing precursor in a specific concentration. Second, Petitioner argues in the alternative that a POSA would have been motivated to combine Brown with Giacino to supply the missing sulfur-containing precursors in the missing concentration amounts. With respect to this alternative ground, Petitioner's contentions are also deficient because they rest on conclusory allegations limited primarily to identifying features that were independently known in the prior art without sufficiently identifying why a POSA would have had reason to combine those features in the manner proposed. This is illustrated by Petitioner's mischaracterization of the teachings of Brown and Giacino and inconsistent arguments about what each reference discloses.

1. Brown is not prior art

Petitioner asserts that the '241 patent is not entitled to its earliest claimed priority date of January 11, 2013, and thus Brown qualifies as prior art to the '241

patent. *See* Pet., 13-17, 23-24. As noted by Petitioner, the '241 patent claims priority to U.S. Patent Application No. 13/941,211 (the "'211 application"), filed on July 12, 2013. Petitioner applies the '211 application's filing date as the earliest priority date of the '241 patent and does not establish that the '211 application fails to provide written description support for the challenged claims. *See* Pet., 13 (merely asserting, in a footnote and without evidence, the '211 application "also fails to provide support" for the challenged claims), 23.

The '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, including the disclosures relied upon by Petitioner in its grounds of challenge. *See* EX2012, [0006], [0011], [0018], [0089], [0095], [00189], [00260], [00272]-[00273], [00295]-[00296], [00299], [00307], [00362]-[00364], [00373], [00376]-[00383]; *cf.* Pet., 27-34.

Reference to the '069 provisional, Brown, and the '205 provisional was unintentionally omitted from the '241 patent's priority chain. Impossible has taken measures to correct this unintentional omission through the filing of a petition and certificate of correction with the Office for those patents within the affected family

that are currently not subject to an *inter partes* review proceeding. *See* EX2001. For the '241 patent, Impossible will seek authorization with the Board to file a motion asking the Board to cede its jurisdiction so that Impossible can seek a certificate of correction from the Director. 37 C.F.R. § 1.323. When granted, Brown would fail to qualify as prior art under pre-AIA provisions, and thus Petitioner's Grounds 1A-1C fail for at least this reason.

Moreover, as discussed in more detail below, even if Brown qualifies as prior art, Grounds 1A-1C fail to render any of the claims obvious.

2. Petitioner fails to establish Brown discloses “a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof in a concentration of at least 1.5 mM”

Petitioner asserts that Brown discloses the claimed “compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof” because Brown discloses “[o]ne exemplary formula for a ‘muscle replica’” that includes “pea flour,” which “contains cystine, thiamine, and methionine.” Pet., 27, 29 (citing EX1012, [0364]). Petitioner fails to establish that Brown discloses this claim element for two reasons. First, Petitioner ignores that the recited sulfur-containing compound is an element claimed separately from the recited plant protein element and, in doing so, Petitioner improperly relies on Brown's pea flour to satisfy both of these elements. Second, Petitioner improperly reads out the recited sulfur-containing compound concentrations, but, when this limitation is

properly accorded patentable weight, Petitioner fails to show (indeed, does not even allege) that Brown’s muscle replica satisfies this limitation.

As explained above, claim 1 recites a meat-like-food product that contains at least two components: a “compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof” and “one or more plant proteins.” *See supra*, section II.B. Petitioner relies on Brown’s pea flour not only to satisfy the former sulfur-containing compound element, but also to satisfy the latter plant protein element. Pet., 28. However, Petitioner’s reliance on the same component—pea flour—to satisfy two separate elements of the claims is improper. When a claim lists elements separately, as is the case here, the “clear implication” of the language is that those elements are “distinct components” of the invention. *Becton, Dickinson*, 616 F.3d at 1254. This understanding is further supported by the ’241 patent’s specification, which treats these elements distinctly. *See* EX1001, 20:4-10, 20:36-52, 37:21-38:30; EX1150, 447; *supra*, section II.B.

Petitioner provides no justification as to why a single component—*i.e.*, Brown’s pea flour—can satisfy the two separately claimed sulfur-containing compound element and the plant protein element. While Petitioner argues that the claimed sulfur-containing compound is not limited to “free compounds,” which allows it to map the claim element to Brown’s pea flour (Pet., 29 n.8), such a reading alone does not justify reading out claim language that treats two elements

of the patented invention—*i.e.*, “one or more plant proteins” and a sulfur-containing compound—as distinct components. Thus, for this reason, Petitioner fails to establish that Brown alone renders obvious the challenged claims.

Second, Petitioner’s reliance on Brown alone rests on its reading out of claim language reciting that the sulfur-containing compounds are added “in a concentration of at least 1.5 mM.” *See* Pet., 29. Petitioner therefore does not assert that the “cystine, thiamine, and methionine” contained in the pea flour is included “in a concentration of at least 1.5 mM.” As explained above, Petitioner fails to satisfy its burden in demonstrating that the concentration amounts recited in claim 1 are not entitled to patentable weight. *Supra*, section II.A. To the contrary, the component concentration elements impart both a structural and functional difference to a meat-like-food product by affecting the flavor and aroma profile of the end product, as demonstrated by the numerous examples taught by the ’241 patent and its prosecution history. *See* EX1001, 12:58-13:6, Table 2, 20:7-35, 21:15-31; EX1150, 98-102; *supra*, section II.A. Thus, because Petitioner provides no argument that Brown’s muscle replica meets the claimed concentration limitations, Petitioner’s arguments with respect to Brown alone fail for this additional reason.

3. Petitioner fails to establish that a POSA would have been motivated to combine Brown and Giacino

With respect to Petitioner’s alternative position that a POSA would have combined Brown with Giacino, Petitioner’s arguments also fail because they are conclusory, inconsistent with Petitioner’s own assertions regarding the teachings of the applied references, and rely on selective picking and choosing that have no basis in the references themselves.

First, Petitioner’s starting point for even prompting modification to Brown is legally insufficient. Petitioner begins its analysis with the assertion that a POSA “would understand that Brown’s composition *could be* modified....” Pet., 29. Yet, whether a POSA *could* modify a reference is insufficient to establish a motivation to combine; it must be shown that a POSA *would* have modified the reference as proposed. *See Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (obviousness requires showing whether a POSA “not only could have made but would have been motivated to make the combinations or modifications of prior art to arrive at the claimed invention”). Petitioner’s reliance on Giacino’s separate use of cysteine and thiamine in a particular example is also insufficient to establish a reason why a POSA would have been motivated to modify Brown in the first place. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (“[A] patent composed of several elements is not proved obvious

merely by demonstrating that each of its elements was, independently, known in the prior art.”).

Petitioner’s sole stated rationale for modifying Brown further underscores its deficient showing in establishing that a POSA would have been motivated to combine Brown and Giacino as proposed. Specifically, Petitioner contends that a POSA would have modified Brown to add cysteine and thiamine to “impart a beef flavor/aroma.” Pet., 29. Yet, Petitioner’s own petition is replete with assertions that Brown’s products already “impart a beef flavor/aroma.” See Pet., 24 (Brown’s meat substitutes “accurately mimic[] the taste, texture, or color of a meat product”), 27 (heating Brown’s muscle replica produces volatile compounds that “are often associated with the aroma of cooked meat” and Brown “teaches that heme can be used to generate meaty flavor/aroma”), 33-34. Petitioner fails to explain why a POSA would look to modify Brown to achieve an effect that Petitioner asserts is already present, particularly to a reference that predates Brown by over forty years. Petitioner provides no further reasoning that resolves this inconsistency, other than its conclusory assertions that a POSA “could” modify Brown.

In its hindsight-driven quest to modify Brown to add cysteine and thiamine, Petitioner cherry-picks components from Giacino. For instance, Giacino teaches that reacting taurine and thiamine “*without* the inclusion of additional ingredients,”

provides a “perfectly well suited” meat flavor. EX1015, 3:58-63 (emphasis added). Yet, Petitioner proposes a different combination—cysteine and thiamine—without any explanation why a POSA would have been motivated to select those particular components over Giacino’s taurine-based combination. Other than cysteine’s recitation in the claims of the challenged patent, Petitioner identifies no reason to pluck cysteine from Giacino and use it to modify Brown, which Petitioner acknowledges teaches an entirely different means to impart meaty flavor/aroma—the inclusion of a heme-containing protein. *See* EX1012, [00354], [00363]; Pet., 27 (Brown “teaches that heme can be used to generate meaty flavor/aroma”). Petitioner’s unprincipled picking-and-choosing of specific components to copy the challenged claims demonstrates Petitioner’s improper hindsight. *See Apple Inc. v. Voip-pal.com, LLC*, IPR2016-01201, Paper 54 (Nov. 20, 2017) (rejecting petitioner’s arguments because they were “not grounded in what a skilled artisan would have gleaned from the teachings of the prior art,” and were “instead an impermissible exercise of hindsight with the claims of the [challenged] patent serving as a guide”).

Finally, Petitioner’s obviousness analysis for Brown and Giacino rests on repeated mischaracterizations of the references. For instance, Petitioner alleges that “Brown invites a POSITA to modify its composition to add ‘amino acids’ which result in ‘characteristic flavor and frag[r]ance components similar to meat.’”

Id., 30 (alterations omitted) (citing EX1012, [00362]-[00363], [00295]). However, Brown provides no such invitation, and instead discusses amino acids in the context of its own embodiments that already include those components. *See* EX1012, [00362]-[00363], [00295]. Indeed, Petitioner’s own analysis relies on assertions that Brown’s muscle replica already contains amino acids, including the same amino acids Petitioner proposes adding in view of Giacino (cystine and thiamine), and is “visually similar to or indistinguishable” to meat. Pet., 29, 34; *see also* EX1012, [0006] (“the invention provides a meat substitute composition” that “accurately mimics the taste, texture, or color of a meat product derived from animal sources”), [00284].

Further, Petitioner misconstrues Giacino as stating that “[c]ysteine, especially, is ‘highly desirable’” in the context of its “novel flavor compositions.” Pet., 30 (citing EX1015, 4:47-49, 5:17-18). In the portions relied upon by Petitioner, Giacino is explaining that, in terms of *prior-art* compositions, cysteine was viewed, “[u]nder some circumstances,” as “highly desirable,” but Giacino’s invention “is effective essentially completely to eliminate this requirement.” EX1015, 4:47-53. In other words, Giacino presents its compositions as an *improvement* because it eliminates the need for cysteine entirely. Petitioner’s selective reading of Giacino ignores the actual context of Giacino’s

characterization of cysteine, which further highlights Petitioner's failure to establish the POSA's motivation to modify Brown as proposed.

Given the above, Petitioner fails to establish that a POSA would have been motivated to combine Brown and Giacino as proposed, and thus, Petitioner's Ground 1A fails for this reason.

4. Petitioner's arguments for independent claim 22 fail

Because "[t]here is substantial overlap between independent claims 1 and 22," Petitioner relies on the same arguments raised for claim 1 in asserting the obviousness of claim 22 over Brown and Giacino. Pet., 41. Accordingly, for the same reasons provided above, Petitioner's Ground 1A fails with respect to claim 22 as well.

5. Petitioner's arguments for dependent claims 8-9, 12-21, and 23 fail

Dependent claims 8-9, 12-21, and 23 depend from either independent claim 1 or claim 22. As such, Petitioner fails to establish the obviousness of these claims over Brown and Giacino for the same reasons identified above with respect to claim 1.

B. Grounds 1B and 1C Fail

Grounds 1B and 1C further rely on Ronai and Rolan, respectively, as allegedly rendering obvious dependent claims 2, 3, 10, and 11. These dependent

claims depend from claim 1, and thus, are not shown to be unpatentable for the same reasons described above with respect to claim 1.

V. GROUNDS 2A-2D FAIL

Petitioner raises four additional grounds, Grounds 2A-2D, based on combinations of Rovaart (EX1125), Conrad (EX1013), Crane (EX1014), Ronai, Giacino, and Rolan. Petitioner fails to establish a reasonable likelihood of prevailing on any of these grounds.

A. Ground 2A Fails

As explained below, Petitioner's Ground 2A fails for several reasons. First, Petitioner's proposed combination depends on Crane, which is not analogous art. Second, Ground 1A is premised on tortured readings of the applied references in an attempt to fashion together the claimed invention. Moreover, Petitioner fails to establish that its proposed combination discloses each and every limitation of the claims. For these reasons, Petitioner's Ground 2A fails.

1. Petitioner fails to show Crane is analogous art

Petitioner's Ground 2A relies on replacing Conrad's animal blood with Crane's recombinant heme proteins in order to arrive at a meat-like-food product recited in the claims. *See* Pet., 50-54. As threshold matter, Petitioner's Ground 2A fails because Petitioner does not establish (indeed, does not even attempt to establish) that Crane is analogous art under the proper legal framework.

“A reference qualifies as prior art for an obviousness determination only when it is analogous to the claimed invention.” *Airbus S.A.S. v. Firepass Corp.*, 941 F.3d 1374, 1379 (Fed. Cir. 2019). A reference is analogous art when the reference is either (1) “from the same field of endeavor, regardless of the problem addressed” by the reference, or (2) “if the reference is not within the field of the inventor’s endeavor,” the reference “still is reasonably pertinent to the particular problem with which the inventor is involved.” *Donner Tech., LLC v. Pro Stage Gear, LLC*, 979 F.3d 1353, 1359 (Fed. Cir. 2020). Petitioner makes no attempt to establish Crane as analogous art under this legal framework, although it does so with respect to other references applied in its petition. *Cf.* Pet., 30 (“Brown and Giacino are analogous art to the ’241 patent”), 46 (“Rovaart is analogous art”).

First, Petitioner fails to establish that Crane is “from the same field of endeavor” as the ’241 patent. As Petitioner acknowledges, “[t]he ’241 patent’s claims are directed to methods for preparing meat-like-food products.” Pet., 11; *see also* EX1001, 1:25-28 (stating the field of invention “relates to food products”). Yet, nowhere does Crane even mention meat, meat-like-food products, or even food products generally, much less how to prepare such products. Instead, Crane is expressly directed to “methods of producing recombinant functional heme-binding proteins...and methods of identifying agents that modulate the activity of heme-binding proteins.” EX1014, Abstract. Thus, Petitioner fails to

show Crane is analogous art under the first part of the test. *See Airbus*, 941 F.3d at 1381 (affirming non-analogous art finding when a reasonable factfinder could not conclude that “a reference that is expressly directed to exercise equipment and fails to mention the word ‘fire’ even a single time” would “fall[] within the field of fire prevention and suppression”).

Second, Petitioner fails to show Crane is “reasonably pertinent to the particular problem with which the inventor is involved.” As noted by the Federal Circuit, this test “ultimately rests on the extent to which the reference of interest and the claimed invention relate to a similar problem or purpose.” *Donner Tech.*, 979 F.3d at 1359. As described in the ’241 patent, the problem solved by the inventors was to provide meat-like-food products that overcome the limitations of prior-art meat substitutes, “which largely fail to replicate the experience of cooking and eating meat,” “fail[] to cause a shift to a vegetarian diet,” and lack “appeal to the larger consumer segment accustomed to eating meat.” EX1001, 1:50-64. The ’241 patent explains that “[i]t would be useful to have improved plant-based meat substitutes which better replicate the aromas and flavors of meat, particularly during and/or after cooking.” *Id.*, 1:64-67; *see also id.*, 2:3-5 (“Provided herein are methods and compositions for modulating the flavor and/or aroma profile of consumable food products....”).

In contrast, Crane is directed to the problem of producing recombinant heme-binding proteins with complete heme incorporation. *See* EX1014, [0003]-[0005]. Entirely absent from Crane is any mention that the recombinant heme-binding proteins with complete heme incorporation produced by its methods are relevant to improving meat-associated flavors or aromas in meat-like-food products, or even food products in general. Indeed, the uses that Crane does identify for the recombinant heme-binding proteins produced by its methods stand in stark contrast to the production of food products. *See, e.g., id.*, [0062] (“Recombinant hemoglobin preparations are used as effective and safe oxygen carriers as an alternative to blood transfusion.”), [0063] (“preclinical screening assays that are designed to predict drug metabolism and toxicity”), [0066] (production of “bio-ethanol and chemical feedstocks for commercial use”).

Petitioner fails to demonstrate Crane’s facially distinct problem would have been viewed by a POSA as “reasonably pertinent” to the problem faced by the inventors of the ’241 patent, which was not directed to how to generate recombinant proteins, but instead how to generate meat substitutes that accurately replicate meat.

Accordingly, for the reasons above, Petitioner fails to show that Crane is analogous art to the ’241 patent. Because Petitioner’s Ground 2A relies on Crane to replace the animal-sourced blood of Rovaart and Conrad in its combination, the

ground necessarily fails because Crane is not within the scope and content of prior art in an obviousness determination. At a minimum, Crane's status as non-analogous art undermines Petitioner's rationale for obviousness because the petition fails to establish why a POSA would be motivated to look to Crane—a reference entirely unrelated to food products—for guidance on how to supplement a meat-like-food product. *See In re Klein*, 647 F.3d 1343, 1350-1351 (Fed. Cir. 2011), (“If [a reference] is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it.”) (citing *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992)).

2. Petitioner's illogical combination of Rovaart, Conrad, and Crane is transparent hindsight

Notwithstanding Petitioner's failure to establish Crane as analogous art, Petitioner's purported reasons as to why a POSA would have been motivated to combine Rovaart, Conrad, and Crane to arrive at the claimed invention are premised on an illogical and unsubstantiated rationale. Petitioner's analysis starts with a porous, soy-based food product of Rovaart that, by Petitioner's own assertions, already imitates the flavor and texture of meat. *See Pet.*, 48-49. Petitioner then turns to Conrad's “wheat meat,” a product designed to add bulk to actual meat, and its incorporation of blood to add color and flavor to the wheat-based extender. *Id.*, 49-50. Petitioner proposes incorporating that same blood to Rovaart's soy-based porous product for the same purported reasons mentioned in

Conrad, but Petitioner provides no explanation as to why a POSA would have sought to use a blood colorant meant for a wheat-filler for mixed meat like Conrad's in a soy-based porous product like Rovaart's. A further confounding feature underlying its combination is Petitioner's subsequent abandonment of Conrad's blood in favor of an entirely different substitute—the recombinant heme proteins disclosed in Crane, a molecular biology reference that says nothing about food products. *See id.*, Pet., 50-54. As detailed below, the petition never grapples with any of these issues.

Simply put, rather than being based on an articulated rationale rooted logically in the prior art's teachings, Petitioner's combination is a litigation-driven claim mapping exercise that merely reconstructs the claimed invention through hindsight. Such a rationale is insufficient to establish obviousness and thus Petitioner's Ground 2A fails for this additional reason.

a) Petitioner's motivation to combine Rovaart and Conrad is deficient

Petitioner's combination first relies on the modification of Rovaart in view of Conrad. *See* Pet., 49-50. While Petitioner contends that Rovaart discloses a soy-based porous product "having a meat-like taste" (Pet., 48), Petitioner nevertheless asserts that a POSA would have turned to Conrad and sought to add its "composition that comprises a heme-containing protein"—*i.e.*, blood—to provide "meaty flavor in addition to other benefits," including "meat colour." Pet.,

50. Petitioner’s reasoning, however, is unavailing because it fails to address and account for the distinct products and purposes of Rovaart and Conrad—a soy-based porous product on the one hand, and a wheat-based meat extender on the other—and fails to explain why a POSA would have sought a solution disclosed by one (the addition of blood) and applied it to the other.

First, Petitioner ignores the differences between the products disclosed in Rovaart and Conrad. For instance, Conrad is directed to a mixed meat product where, due to the general expense of meat itself, “some” of it is replaced with a meat replacement product made from wheat (*i.e.*, “wheat meat”). EX1013, 1:25-40. Because the wheat meat “has a brown-yellow color deriving partly from the brown bran and partly from the yellow gluten,” Conrad discloses that its “colour can advantageously be transferred into meat colour by adding thereto up to 15% by weight of blood, preferably the hemoglobin part separated off from blood...” *Id.*, 4:3-8. Conrad also states that “[t]he addition of blood/hemoglobin further gives a desired taste improvement as it improves the meat flavour of the final product.” *Id.*, 4:13-16. Thus, Conrad is directed to the production of a wheat-based product designed to replace some portion of meat itself, thereby extending the meat and making the meat product cheaper. However, because Conrad is effectively diluting actual meat with a product that is decidedly not meat in terms of both color and

taste, Conrad discloses adding in animal blood to the extender (*i.e.*, the “wheat meat”) to recover color and taste lost by the addition of the wheat to mixed meat.

Rovaart, on the other hand, is concerned with the production of expanded porous food products that already have a meat-like flavor, with Petitioner specifically pointing to its use of soybean flour as the protein element of its product. *See* EX1125, Abstract, 2:58-61 (“products obtained by the process in accordance with the invention have a flavour of meat that is clearly more pronounced and fuller”); Pet., 48. Further, Rovaart expresses no desire to change or improve the color of its products. Petitioner fails to explain why a POSA 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.

In other words, the references concern two different products directed to two different problems. *Personal Web Tech., LLC v. Apple, Inc.*, 848 F.3d 987 (Fed. Cir. 2017) (Board reversed where no adequate explanation of “*how* the combination of the [obviousness] references was supposed to work”) (original emphasis). Petitioner’s purported reasons for combining the two references fail to account for these differences and Petitioner fails to explain how a POSA would

have understood Rovaart's soy-based porous products as having the same problems in relation to flavor and color as Conrad's wheat-based extender that Conrad seeks to solve with blood. Moreover, Petitioner ignores the component differences in the products themselves—one based on soy, the other based on wheat—and fails to explain how a POSA would have understood that any improvement to flavor and color caused by the addition of blood to one type of product (wheat) would necessarily occur in the other (soy).

Petitioner's attempted explanation for how a POSA would have understood Rovaart's soy-based porous products as having the same problems in relation to flavor and color as Conrad's wheat-based extender further fail because it is based on a mischaracterization of Rovaart. In particular, Petitioner argues that "Rovaart teaches the desirability of enhancing the meaty flavor of Rovaart's products." Pet., 49 (emphasis omitted). However, Petitioner's argument relies on a selective reading of the background of Rovaart. See EX1125, 1:24-37. Rovaart only mentions flavoring agents in the background to *describe the deficiencies of the prior art* that utilizes flavoring agents. *Id.* In particular, previous methods required preparation of food products and then subsequent flavoring treatment. *Id.* In contrast to these previous methods, Rovaart specifically indicates that its method is distinguishable because it can impart meat-like flavor in a single operation *without the flavoring treatment step*. Therefore, upon a reading of

Rovaart as a whole, a person of skill in the art would have no reason to complicate the simple production steps of Rovaart with the addition of a flavoring treatment, when the Rovaart product already has a “meat flavour.”

Accordingly, for this reason, Petitioner’s rationale for combining Rovaart and Conrad fails to satisfy its burden in establishing a reasonable likelihood of success on the merits.

b) Petitioner’s motivation to further combine Rovaart and Conrad with Crane is deficient

Petitioner’s tortured analysis of the prior art to reach the claimed invention is further highlighted by its reliance on Crane. In particular, Petitioner’s Ground 2A relies on an additional step—not only would a POSA seek to add blood for purported flavor and taste benefits to Rovaart’s products, the POSA would further be motivated to substitute that blood with an entirely different composition, namely, heme-containing proteins produced recombinantly using the methods disclosed in Crane. *See* Pet., 50-54. Petitioner provides three purported reasons for why a POSA would have further combined Crane with Rovaart and Conrad. *Id.*, 50-52. In addition to failing to establish Crane was analogous art (*see supra*, section V.A.1), each of Petitioner’s alleged reasons for the combination is premised on mischaracterizations and strained readings of the applied references that fail to provide an objective-based rationale supporting a finding of obviousness.

Petitioner first asserts that a POSA “would be motivated to substitute Conrad’s conventionally-obtained hemoglobin with heme-proteins from alternative sources because obtaining blood from slaughtered animals incurs the same environmental consequences, expenses, and other ramifications as cultivating animals for meat.” Pet., 50-51. Yet, aside from its expert say-so, the references themselves do not support this viewpoint.

For example, Petitioner argues that “Conrad teaches or suggests this motivation, as Conrad teaches utilizing meat replicas in place of ‘animal meat’” (Pet., 51 (citing EX1013, 1:25-40)), but Petitioner mischaracterizes Conrad. As noted above, Conrad seeks to *add* “wheat meat” *into* meat itself, which Conrad states is beneficial from “a nutritional point of view and from a cost benefit point of view.” EX1013, 1:25-40. Conrad explains that the “nutritional” benefit of adding “wheat meat” to a meat product is to add fiber, while the “cost benefit” aspect is so that “costs can be lowered compared with a pure meat product” through its extension with the “wheat meat.” *Id.*, 1:28-49. Conrad provides no suggestion to avoid meat or meat-based products due to “environmental consequences, expenses, and other ramifications,” as Petitioner suggests. The same can be said for Petitioner’s primary reference, Rovaart, which expressly teaches inclusion of proteins that are of “animal” origin. EX1125, 1:8-13.

Petitioner’s reliance on Crane as also teaching or suggesting this motivation is likewise a hindsight-driven leap that is not supported by the reference. Pet., 51 (“Crane also teaches or suggests this motivation, as Crane teaches using its recombinant heme-proteins in place of conventionally-sourced proteins.”) (citing EX1014, [0062]). The passage in Crane that Petitioner relies upon to support its assertion merely references the use of its recombinant hemoglobin preparations “as effective and safe oxygen carriers as an alternative to blood transfusion.” EX1014, [0062]. However, Crane’s suggestion to use its recombinant hemoglobin preparations as an alternative to conventional *blood transfusions* provides no basis for suggesting that those same preparations would be suitable as replacements for animal-sourced components (*e.g.*, blood) in *food products* in order to avoid the “environmental consequences, expenses, and other ramifications” associated with “cultivating animals for meat.” Petitioner’s attempt to link a suggestion to use recombinant hemoglobin as an oxygen carrier for blood transfusions to an untaught reason to use the same in food products is unsound and unsubstantiated.

For its second reason, Petitioner argues that a POSA would have been motivated to turn to Crane because “Conrad teaches avoiding conventionally-sourced meat due to its relative expense, and it teaches preparing its products with the aim of lowering costs of manufacture” and “Crane teaches that heme-proteins can be produced via a ‘simple and inexpensive method’....” Pet., 51. Again,

Petitioner mischaracterizes the references and makes an apples-to-oranges comparison.

In particular, Conrad's discussion of "lowering costs" is in reference to the cost savings achieved by extending a meat product with a wheat-based product compared to the same product made from "pure meat." EX1013, 1:28-49.

Notably, this cost savings is achieved even *with* the inclusion of animal blood in the wheat meat. *Id.*, 4:3-16. Thus, any implication by Petitioner that Conrad's mention of "lowering costs" somehow suggests avoiding meat entirely, or even animal-sourced ingredients generally, is misleading.

Moreover, Crane's reference to its "simple and inexpensive method" to achieve "high fidelity incorporation of heme into recombinantly overexpressed heme proteins" is in comparison to *other methods of that type*. While Petitioner cites to certain paragraphs of Crane to support its generic reliance on "cost savings," none of these passages actually make such a connection. Pet., 51-52 (citing EX1014, [0014], [0043], [0085]). For example, Crane compares its methods to other prior-art methods that address "heme incorporation into recombinant proteins" and explains that "[t]he present invention is directed to overcoming these and other deficiencies in the art." EX1014, [0004]-[0008]. In this sense, Crane explains "[t]he present invention is a straightforward and inexpensive method for high fidelity incorporation of heme into recombinantly

overexpressed heme proteins.” *Id.*, [0014]. Crane also describes that, in the context of its invention, “[f]ungal protein expression systems” are “more efficient and economical” compared to “mammalian expression systems” for recombinantly producing its proteins and, in the particular “simple and inexpensive method of co-expressing ferrochelatase,” fully incorporated heme proteins in *E. coli* may be effectively produced. *Id.*, [0043], [0085]. All of these passages are in relation to the specific field in which Crane is focused: the production of recombinant heme-binding proteins in various cell culture systems. Apart from its unfounded reading of Crane, Petitioner provides no evidence that a POSA would have understood the recombinantly-produced heme-proteins of Crane would somehow “lower[] costs” relative to the naturally-occurring, animal-obtained blood used in Conrad.

As its third reason, Petitioner argues that “Crane’s heme-proteins can be purified, which is desirable for a commercial application such as foodstuffs like Rovaart’s meat substitute product...” Pet., 52. But Crane makes no mention of incorporating its heme-proteins into food products. Simply because Crane’s heme-proteins “can be” purified (e.g., for blood transfusions) provides no rationale for combining Crane with Rovaart and Conrad. *See Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (obviousness requires showing whether a POSA “not only could have made but would have been motivated to make the combinations or modifications of prior art to arrive at the claimed invention”).

Accordingly, for these reasons, Petitioner fails to establish that a POSA would have been motivated to combine Rovaart, Conrad, and Crane.

3. Petitioner fails to establish that a POSA would have had a reasonable expectation of success in combining Rovaart, Conrad, and Crane

Petitioner contends a POSA would “substitute Conrad’s blood-sourced hemoglobin with Crane’s recombinantly-produced heme-proteins” because a POSA “would expect doing so to contribute (1) desirable aroma/flavor, (2) desirable meat-like coloration, and (3) desirable meat-like nutrition,” with a reasonable expectation of success. Pet., 50, 52-54. Petitioner bases this assertion on the notion that “Crane’s recombinant hemoglobin is the same as Conrad’s hemoglobin.” *Id.*, 52. However, aside from conclusory expert testimony, neither Conrad nor Crane makes this connection. As Petitioner admits, Conrad utilizes “the ‘hemoglobin part of whole blood,’” which a POSA “would understand to primarily contain red blood cells that comprise hemoglobin protein.” Pet., 50. Petitioner provides no evidence supporting the contention that the recombinantly-produced, isolated heme proteins of Crane would have been viewed as equivalent to “red blood cells that comprise hemoglobin protein” of Conrad, such that a POSA would have expected the same properties of the latter to occur in the former and that the latter would impart the same effects when added to different products. *See Motif Foodworks, Inc. v. Impossible Foods Inc.*, IPR2022-00887, Paper 7 at 20

(rejecting Petitioner’s substitution of colorants because “Petitioner does not establish sufficiently that a [POSA] would have had reason to make that substitution or that using different types of colorants for such different products are interchangeable”).

The evidence in the prosecution record also supports the unpredictable effect of heme proteins on flavor and aroma. Citing to the Proulx Thesis (*see* EX1148, 2715, citing to EX2003), Patent Owner emphasized that food products with heme could be adversely affected by off-flavors and rancidity, quoting Proulx’s work as recognizing that “[f]ortification [with] iron has *a potential negative effect on organoleptic quality* of maize products, in that soluble forms of iron can cause *oxidative rancidity*.” EX1148, 2715. Patent Owner submitted numerous declarations, including by Dr. Keith R. Cadwallader, who stated:

This is a significant discovery since a person having ordinary skill in the art would not have anticipated that the inclusion of a heme protein would have any beneficial effect on flavor. In fact, iron, and specifically heme iron, has been most often associated with *causing deleterious off-odor consequences in foods and especially meat products*.

Id., 2715-2716 (emphasis added). Petitioner’s own evidence in the record supports this. *See, e.g.*, EX1028, 70 (“In general, total iron was not a good indicator of beef flavor attributes”); *id.* (“[H]eme iron been thought to be a pro-oxidant that may

influence meat flavor due to its reaction to produce radicals that can promote lipid oxidation in biological systems.”); EX1048, Abstract (“WOF (Warmed-Over Flavor) is catalyzed by the non-heme iron released from meat pigments during cooking.”); *see also* EX2013, 178. A POSA, thus, would not have had a reasonable expectation of success of combining a heme iron-containing protein into a meat product without deleterious effects, including off-flavors and off-odors, *see* EX1048, 2716, further emphasizing Petitioner’s hindsight exercise of mapping the prior art onto the ’306 patent claims.

Accordingly, for these reasons, Petitioner fails to establish that a POSA would have been motivated to combine Rovaart, Conrad and Crane with a reasonable expectation of success.

4. Petitioner fails to establish that the combination of Rovaart, Conrad, and Crane discloses each element of claim 1

In addition to its hindsight-based combination of the references, Petitioner also fails to sufficiently establish that the combination discloses each and every limitation of the challenged claims.

a) Petitioner fails to establish the combination of Rovaart, Conrad, and Crane discloses a meat-like-food product that is “free of animal heme-containing protein”

Claim 1 requires that the “meat-like-food product,” in addition to containing “a heme-containing protein,” is also “free of animal heme-containing protein.”

Petitioner relies on Rovaart as allegedly disclosing this limitation, specifically pointing to Rovaart’s “Example 1,” which Petitioner asserts lists ingredients that do not contain animal protein or animal heme-containing protein. Pet., 56 (citing EX1125, 3:33-37). Petitioner, however, fails to establish that the relied-upon references disclose the claim limitation because Petitioner’s arguments are not commensurate with its proposed combination, which relies on the *modification* of Rovaart’s products in view of Conrad and Crane.

Petitioner’s sole basis for contending that the claimed element “free of animal heme-containing protein” is met is Example 1 of Rovaart, but Petitioner’s obviousness case is not so limited. While Petitioner relies on “Example 1” in relation to this particular claim limitation, Petitioner also relies on Rovaart’s general teachings regarding its porous products in support of its obviousness case. *See, e.g.*, Pet., 46 (citing EX1125, 1:5-13), 47 (relying on general description of the invention) (citing EX1125, 1:38-48), 48, 55, 57 (relying on other Examples disclosed in Rovaart). More importantly, Petitioner’s obviousness analysis also rests on *modifying* Rovaart’s porous products to include additional ingredients in view of Conrad and Crane. In this sense, Rovaart’s general teaching that its food products alternatively includes “proteins of animal or microbial origin” (EX1125, 1:61-62), establishes that Petitioner’s *combination* would not have been understood to be “free of animal heme-containing protein.”

Indeed, Petitioner’s own obviousness arguments initially propose adding animal heme-containing protein to improve the meat flavor of Rovaart’s product. In particular, Petitioner proposes the addition of “a heme-containing protein” that would “further enhance Rovaart’s products’ meaty flavor” based on Conrad, which discloses the addition of *animal* blood/hemoglobin, to “improve the meat flavour of the final product.” *Id.*, 50 (citing EX1013, 4:3-17) (emphasis omitted).

Thus, Petitioner’s rationale supports the inclusion of animal protein given Rovaart’s own teachings that the food products can also include protein of “animal” origin. Petitioner’s unwillingness to address, or even acknowledge, the references as a whole and their teachings as part of the proposed combination further showcases Petitioner’s failure to establish that the applied references disclose a meat-like-food product that is “free of animal heme-containing product.”

Accordingly, for this reason, Petitioner’s Ground 2A fails.

b) Petitioner fails to establish the combination of Rovaart, Conrad, and Crane discloses “wherein cooking the meat-like-food-product results in the production of at least two volatile compounds which have a meat-associated aroma”

Claim 1 also recites that, upon cooking the meat-like-food product, “the production of at least two volatile compounds which have a meat-associated aroma” results. Petitioner relies on Rovaart for this limitation, arguing that a POSA “would recognize [that] heating the Rovaart products will *naturally*

generate at least two volatile compounds associated with meat-like flavor aroma.” Pet., 56-57 (emphasis added). Petitioner’s argument fails because, in addition to failing to address what is disclosed by the proposed combination, Petitioner’s contentions rely on inherency, which Petitioner fails to establish.

Petitioner relies solely on Rovaart as allegedly disclosing the claim element. To be clear, however, Rovaart does not expressly disclose “the production of at least two volatile compounds which have a meat-associated aroma” when its products are heated, nor does Petitioner contend otherwise. Instead, Petitioner’s arguments are based on inherency, but Petitioner fails to reach the high threshold of establishing inherency in obviousness, which requires a showing that the claimed volatile compounds will be ***necessarily*** present as a result of the ***combined*** references’ disclosure. *See In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (inherency requires showing that a characteristic would necessarily be present in disclosure); *Alcon Research, Ltd. v. Apotex Inc.*, 687 F.3d 1362, 1369 (Fed. Cir. 2012) (requirement that the claimed property be “necessarily present” in the prior art); *In re Oelrich*, 666 F.2d 578, 581 (C.C.P.A. 1981)(Inherency “may not be established by probabilities or possibilities,” and “[t]he mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.”); *PAR Pharm., Inc. v. TWI Pharm., Inc.*, 773 F.3d 1186, 1195 (Fed. Cir. 2014) (Inherency is a “high standard,” that is “carefully circumscribed in the context of obviousness.”).

First, Petitioner's inherency showing fails to meet the requisite standard because Petitioner's arguments focus on Rovaart alone, which is not the relevant analysis. Petitioner's ground is premised on the *combined product* of Rovaart, Conrad, and Crane, and Petitioner fails to provide any argument or support that a POSA would recognize that the combined product would necessarily produce "at least two volatile compounds which have a meat-associated aroma." Whether or not Rovaart's products in isolation would produce the claimed compounds is irrelevant because Petitioner is ultimately proposing modification to those products, and it is these combined products that Petitioner must show will *necessarily* produce the claimed volatile compounds.

Furthermore, even if Rovaart is considered in isolation, Petitioner ignores the language of the claims, which recite that the volatile compounds "have a meat-associated *aroma*." Instead, Petitioner equates discussion of "flavors" in Rovaart with the claimed "aroma" to support its contention that "heating the Rovaart products will naturally generate at least two volatile compounds associated with meat-like flavor/aroma." Pet., 57 (citing Example 2 as "a product having the *flavour* of boiled beef); *id.* (citing Example 3 as having a "flavour" similar to that of roast beef). Yet Petitioner provides no explanation or evidence to the assumption that a "meat-like flavor" is the same as the claimed "meat-associated aroma."

Petitioner's flawed inherency argument also conflates Rovaart's manufacturing process, which subjects its food mixtures to high temperatures and increased pressure, with cooking the meat-like-food product as claimed. Pet., 56-57. Rovaart discloses that its "mixture is preferably heated at a temperature of between 160° and 180°C under a pressure of the order of 5 to 150 atmospheres." EX1125, 2:63-65. Elsewhere, Petitioner acknowledges that "heating [Rovaart's composition] at a temperature below 150°C," *i.e.*, cooking temperature,¹ "does not produce the desired flavor." Pet., 49 (quoting EX1125, 2:46-51). Indeed, the '241 patent consistently cooks the product at 150°C. *See, e.g.*, EX1001, Example 1, 20:17 ("After cooking for 5 minutes at 150 C"); Example 2, 21:19, Example 3, 22:17-18 ("[T]he burgers were cooked for 5 minutes at 150 C"); Example 4, 23:27 ("heated to 150 C for 3 minutes"). Petitioner fails to demonstrate that Rovaart's manufacturing process, performed under high temperatures and increased pressures, demonstrates that "cooking" the proposed modified products necessarily produces the required volatile compounds with meat-associated aroma.

Accordingly, Petitioner's Ground 2A fails for this additional reason.

¹ Compare with '241 Patent,.

c) Petitioner fails to establish the combination of Rovaart, Conrad, and Crane discloses “the meat-like food product is in a form selected from the group consisting of...”

Lastly, claim 1 recites that 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.” Petitioner relies on Rovaart as disclosing this limitation. Pet., 58. Petitioner points to Rovaart’s “Example 1” as allegedly teaching a product that “is a ‘textured product’ that is ‘ground,’” which a POSA “would understand...has the form of ground meat.” *Id.* (citing EX1125, 4:15-17). Petitioner also alleges that Rovaart “discloses that when the dough exits the die, it ‘form[s] a continuous cylinder of fibrous expanded material’ with ‘a flavor analogous to that of roast chicken meat,’” which a POSA “would understand...has the form of a hotdog, sausage, or roast.” *Id.* (citing EX1125, 3:58-62). Petitioner, however, mischaracterizes Rovaart’s disclosure and its arguments are unsupported and inconsistent with its own expert’s testimony.

For instance, with respect to Petitioner’s first contention, Petitioner omits that Rovaart discloses that, after the “textured product” is “ground,” it is “rehydrated with 2000 g of water at 4°C for 15 hours.” EX1125, 4:15-17. Petitioner provides no explanation as to how this final form would have been understood to take the form of “ground meat,” and Petitioner’s own expert does not even rely on this aspect of Rovaart in contending that “Rovaart’s food product

has the form of ground meat.” *See* Pet., 58; EX1003, ¶363. Further, for Petitioner’s second contention, Petitioner does not explain how “a continuous cylinder of fibrous expanded material,” which Rovaart only specifically describes in terms of its flavor and generally describes as “an expanded porous structure in its interior” elsewhere (*see, e.g.*, EX1125, 1:51-55), would have been understood to have the form of “a hotdog, sausage, roast,” items of which themselves take disparate forms. More importantly, Petitioner’s assertions contradict its own expert, who contends that the same structure “has the form of ground meat.” EX1003, ¶363. Petitioner’s assertions are simply conclusory and unsupported by the evidence, including its own expert’s testimony.

In the face of this deficient disclosure, Petitioner attempts to provide a catchall argument, asserting that “[i]t also would have been obvious to mold Rovaart’s products into any one of the forms recited in the claims as a matter of ‘routine experimentation.’” Pet., 58. Yet even an assertion of “routine experimentation” needs to find a basis in the prior art itself. *See In re Stepan Co.*, 868 F.3d 1342, 1346 (Fed. Cir. 2017) (“Absent some additional reasoning, the Board’s finding that a skilled artisan would have arrived at the claimed invention through routine optimization is insufficient to support a conclusion of obviousness.”). Petitioner points to nothing in Rovaart (or any reference) showing that a POSA would have been motivated to further modify Rovaart’s formed

products into the forms specifically claimed in claim 1. Instead, Petitioner relies on its expert, who simply makes the conclusory assertion that a POSA would have been “motivated to create these forms because they are forms consumers typically associate with meat....” Pet., 58-59 (citing EX1003, ¶364). Yet, aside from providing no actual basis in the prior art to support this contention, it also contradicts Petitioner’s own characterization of Rovaart’s methods as “advantageous because they are ‘particularly simple’ and ‘the desired texture and taste are obtained in a single operation.’” Pet., 47 (citing EX1125, 1:39-32). Petitioner provides no evidence or explanation as to why a POSA would seek to complicate an advantageously “simple” method to achieve the desired effect by further modifying Rovaart’s formed products into those recited in claim 1.

Accordingly, Petitioner fails to establish the obviousness of claim 1 for this additional reason.

B. Grounds 2B-2D Fail

Grounds 2B, 2C, and 2D further rely on Ronai, Giacino, and Rolan, respectively, as allegedly rendering obvious dependent claims 2-3, 8-9, 11-12, and 14. These dependent claims depend from claim 1, and thus, are not shown to be unpatentable for the same reasons described above with respect to claim 1.

VI. GROUNDS 3A-3D FAIL

A. Ground 3A Fails

Petitioner largely advances the same arguments in Ground 3A-3D as it does with its combination based on Rovaart, Conrad, and Crane in Grounds 2A-2D.

“The primary difference between Grounds 2A-2d and Grounds 3A-3D is that Rovaart’s composition is combined with Proulx’s soy leghemoglobin instead of Crane’s recombinant hemoglobin.” Pet., 69. “The analysis for why Rovaart, Crane [sic], Ronai, Giacino, and Rolan disclose claimed elements is otherwise the same.” *Id.*, 69-70. Petitioner asserts that a POSA “would therefore be motivated to combine Proulx’s leghemoglobin with Conrad for the same reasons set forth in Ground 2 for Crane.” Pet., 71.

Given the above, Petitioner fails to establish the obviousness of the challenged claims under Ground 3A for the same reasons given above with respect to Ground 2A. That is, Petitioner fails to show that the combination discloses each and every limitation of the claim, including that the proposed combination of Rovaart, Conrad, and Proulx discloses that its products are “free of animal heme-containing protein,” “the production of at least two volatile compounds which have a meat-associated aroma,” and “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.” *See supra*, section IV.A.1.

Further, Petitioner’s motivation to combine Rovaart, Conrad, and Proulx fails for the same reasons. *See supra*, section IV.A.2. Indeed, Petitioner’s attempt to equate Conrad’s “red blood cells that comprise hemoglobin protein” to Proulx’s “plant-sourced leghemoglobin” is even further afield, and Petitioner points to no basis in the references that a POSA would have expected Proulx’s “plant-sourced leghemoglobin” to provide the same benefits identified by Conrad with its addition of “red blood cells that comprise hemoglobin protein.” Petitioner’s additional reliance on Proulx’s alleged teaching regarding the improved bioavailability of heme iron compared to nonheme iron (Pet., 71-72) is also inapt as Conrad already includes a heme-containing protein to its wheat meat, which is then added to a meat product.

Accordingly, for these reasons, Petitioner’s Ground 3A fails.

B. Grounds 3B-3D Fail

Grounds 3B, 3C, and 3D further rely on Ronai, Giacino, and Rolan, respectively, as allegedly rendering obvious dependent claims 2-3, 8-9, 11-12, and 14. These dependent claims depend from claim 1, and thus, are not shown to be unpatentable for the same reasons described above with respect to claim 1.

VII. INSTITUTION SHOULD BE DENIED UNDER § 325(D)

Separately, the Board should deny institution under § 325(d) 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.

A two-part analysis applies to the Board’s authority to deny institution under § 325(d). *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GMBH*, IPR2019-01469, Paper 6 at 9-10 (precedential). First, the Board considers whether “the same or substantially the same” art or arguments were previously presented to the Office. *Id.*, 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).

A. Petitioner Presents Substantially the Same Art and Arguments Previously Considered by the Office

Two references from Petitioner’s grounds (Brown and Proulx) are listed on the face of the ’241 patent, were disclosed in an Information Disclosure Statement (“IDS”), and were considered by the Examiner. EX1001, 4, 10. The Board has held that an IDS citation alone satisfies the first part of the *Advanced Bionics* test. *Husky Injection Molding Sys., Ltd. v. Plasipak Packaging, Inc.*, IPR2020-00438, Paper 24 at 10-11.

The Examiner also substantively evaluated and applied Proulx during prosecution, as noted by Petitioner. Pet., 72. More importantly, in the '096 patent, the '241 patent's parent, the Examiner allowed its claims over combination with Proulx because they claim flavor additives that "contain no animal products." EX1002, 1180. The Examiner identified Proulx as disclosing "that hemoglobin from soy root nodules (i.e. non-animal heme-containing protein) is a good source of bioavailable iron and can be used as a food fortificant," but the Examiner nevertheless found "there is no motivation to include the fortificant, in combination with the claimed sugars and amino acids to produce meat associated flavors." *Id.*

Petitioner's Rovaart grounds rely on a reference that allegedly teaches an isolated heme-containing protein (Crane, Proulx) and a reference that allegedly teaches a sugar and/or sulfur compound (Rovaart) to arrive at the claimed food flavor additive composition that contains "no animal products." Petitioner expressly uses this same rationale as motivation to combine Rovaart and Conrad with Crane and Proulx, but the Examiner already considered, and rejected, this rationale.

Accordingly, the same arguments that form the basis of Petitioner's grounds have previously been considered by the Office.

B. Petitioner Fails to Demonstrate that the Office Materially Erred

Petitioner makes no assertions that the Office materially erred in its consideration of Proulx, only making claims that the Examiner “did not have the benefit of expert testimony.” Pet., 79-80. Petitioner’s assertion is insufficient to establish material error. *See Advanced Bionics*, Paper 6 at 9 (“If reasonable minds can disagree regarding the purported treatment of the art or arguments, it cannot be said that the Office erred in a manner material to patentability.”).

VIII. CONCLUSION

Accordingly, for at least the reasons set forth above, institution of *inter partes* review should be *denied*.

Respectfully submitted,

Date: March 20, 2023

/Michael T. Rosato/

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Reg. No. 52,182

CERTIFICATE OF COMPLIANCE

Pursuant to §42.24(d), the undersigned certifies that this paper contains no more than 14,000 words, not including the portions of the paper exempted by §42.24(b). According to the word-processing system used to prepare this paper, the paper contains 11,228 words.

Respectfully submitted,

Date: March 20, 2023

/Michael T. Rosato/

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IX. APPENDIX

EXHIBIT NO.	DESCRIPTION
2001	Request for Certificate of Correction, Certificate of Correction and Petition to Accept Unintentionally Delayed Benefit Claims Under 37 C.F.R. §§ 1.78(c) and 1.78(e) for US Patent No. 9,700,067 and US Patent No. 10,172,381
2002	Goldfine, “A brief history of Impossible Foods: how ‘bleeding’ plant-based burgers started a food industry trend,” The Business of Business, https://www.businessofbusiness.com/articles/impossible-foods-plant-based-burgers-milk-food-industry-trend-data/ , Last Accessed July 27, 2022
2003	Proulx, “Diversified strategies for improving iron bioavailability of maize” Ph.D. Thesis, Iowa State University, 2007
2004	Declaration of Dr. Keith Cadwallader, excerpt from ’306 patent prosecution file history, submitted October 17, 2017
2005	Declaration of Dr. Celeste Holz-Schietinger (dated December 2, 2016), excerpt from ’306 patent prosecution file history, submitted October 17, 2017
2006	Declaration of Dr. Celeste Holz-Schietinger (dated August 17, 2017), excerpt from ’306 patent prosecution file history, submitted October 17, 2017
2007	Declaration of Dr. Devin Grant Peterson, excerpt from ’306 patent prosecution file history, submitted October 17, 2017
2008	Declaration of Dr. S. Christopher Davis, excerpt from ’306 patent prosecution file history, submitted October 17, 2017

2009	Declaration of Dr. David Lipman, excerpt from '306 patent prosecution file history, submitted October 17, 2017
2010	U.S. Patent Publication No. 2012/0093994 to Hseih et al.
2011	Cerny, "Formation of aroma compounds from ribose and cysteine during the Maillard Reaction" <i>J. Agric. Food Chem.</i> 51:2714-2721 (2003)
2012	File History of U.S. Provisional Application 61/671,069 filed on July 12, 2012.
2013	G. Reineccius, Flavor Chemistry and Technology"2 nd Ed., 2006, Chap. 7, " <i>Off-Flavors and Taints in Foods</i> ", p.161-199

CERTIFICATE OF SERVICE

I certify that the foregoing Patent Owner's Preliminary Response and Exhibits 2001-2013 were served on this 20th day of March, 2023, on the Petitioner at the following electronic service addresses:

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