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Paper No. 64
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UPL LTD.,
Petitioner,

v.

AGROFRESH INC.,
Patent Owner.

Case IPR2017-01919
Patent 9,394,216 B2

Before CHRISTOPHER CRUMBLEY, MICHELLE N. ANKENBRAND, and JULIA HEANEY, *Administrative Patent Judges.*

HEANEY, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
Finding Claims 1–21 Unpatentable
35 U.S.C. § 318(a) and 37 C.F.R. 42.73

Dismissing as Moot Patent Owner's Motion to Exclude
37 C.F.R. § 42.64(c)

I. INTRODUCTION

UPL Ltd. ("Petitioner") challenges the patentability of claims 1–21 of U.S. Patent No. 9,394,216 B2 ("the '216 patent," Ex. 1001). We have jurisdiction under 35 U.S.C. § 6. This final written decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has demonstrated by a preponderance of the evidence that each of the challenged claims is unpatentable.

A. Procedural History

Petitioner filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review under 35 U.S.C. § 311. Agrofresh, Inc. ("Patent Owner") filed a Preliminary Response. Paper 6 ("Prelim. Resp."). We determined that the information presented in the Petition established that there was a reasonable likelihood that Petitioner would prevail in challenging claims 1–21 of the '216 patent under 35 U.S.C. §§ 102 and 103. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on March 7, 2018, as to claims 1–21 of the '216 patent. Paper 8 ("Dec. on Inst.").

During the course of trial, Patent Owner filed a Patent Owner Response (Paper 32, "PO Resp."), Petitioner filed a Reply to the Patent Owner Response (Paper 42, "Pet. Reply"), and Patent Owner filed a Sur-Reply (Paper 48, "PO Sur-Reply").

Petitioner filed a Declaration of Mircea Dincă, Ph.D. (Ex. 1003) with its Petition. Petitioner also filed a Supplemental Declaration of Dr. Dincă (Ex. 1038). Patent Owner cross-examined Dr. Dincă and filed a transcript of his deposition testimony as Exhibit 2047.

With the Preliminary Response, Patent Owner filed a Declaration of Krista S. Walton, Ph.D. (Ex. 2005). Patent Owner filed a Supplemental Declaration of Dr. Walton (Ex. 2049) with its Patent Owner Response. Petitioner cross-examined Dr. Walton and filed a transcript of her deposition testimony as Exhibit 1054. Patent Owner also filed a Declaration of Dr. Ann Beaulieu (Ex. 2045)[1] with its Patent Owner Response, and Petitioner cross-examiner Dr. Beaulieu and filed a transcript of her deposition testimony as Exhibit 1055. Patent Owner also filed a transcript of the deposition testimony of Dr. Robert Lynn Oakes as Exhibit 2046.[2]

Patent Owner filed a Motion to Exclude Evidence seeking to exclude from the record Petitioner's Exhibit 1047 (Paper 52), to which Petitioner filed an Opposition (Paper 57), and Patent Owner filed a Reply (Paper 58). None of Petitioner's papers discuss or cite Exhibit 1047.

We held an oral hearing on December 3, 2018; a transcript of the hearing is included in the record. Paper 63 ("Tr.").

B. Related Proceedings

Petitioner identifies the following pending litigation involving the '216 patent: *AgroFresh, Inc. v. MirTech, Inc.*, No. 1:16-cv00662 (D. Del.). Pet. 64.

Patent Owner identifies the following patent applications, which claim priority to the '216 patent: U.S. Patent Application Serial No. 15/206,707,

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[1] Dr. Beaulieu has been employed by Patent Owner in the position of global regulatory director since 2006. Ex. 1055, 7.

[2] Dr. Oakes is employed as the 1-MCP global project manager at Decco U.S. Post-Harvest, Inc., which Petitioner identifies as a real party in interest. Paper 32, 2.

filed July 11, 2016, and U.S. Patent Application Serial No. 15/673,054, filed August 9, 2017. Paper 5, 2. Both of these applications are currently being examined.

C. The '216 Patent

The '216 patent, titled "Complexes of 1-methylcyclopropene with metal coordination polymer networks," issued on July 19, 2016. The '216 patent relates to "adsorption complexes that include 1-methylcyclopropene (1-MCP) and a metal coordination polymer network (MCPN), wherein the MCPN is a porous material, and the 1-MCP is adsorbed into the MCPN." Ex. 1001, Abstract. The '216 patent also discloses "kits for containing 1-MCP that include the adsorption complex in a 1-MCP impermeable package," and "methods of releasing 1-MCP from the kit that include application of aqueous fluids, heat, and pressure." *Id.*

According to the specification, "[c]yclopropene compounds are widely used to advantageously control the effect of ethylene in plants to delay ripening and senescence, for example to extend the shelf life of harvested products." *Id.* at 1:31–34. Due to their inherent volatility and potential to undergo oxidation, however, cyclopropenes cannot be stored in the gaseous state for long periods of time, and 1-MCP in particular is "flammable and poses a risk for explosion when compressed." *Id.* at 1:35–39. Before the '216 patent, it was known to store and use 1-MCP by forming a complex with molecular encapsulation agents such as cyclodextrin, a cyclic oligosaccharide made of six or more α-D-glucopyranose units that are linked through (α-1,4)-glycosidic bonds. *Id.* at 4:46–53 (citing U.S. Pat. No. 6,017,849 to Daly). Of the available

cyclodextrins, complexes of 1-MCP with α-cyclodextrin were commercially available. *Id.* at 5:1–11.

The specification further explains that the MCPNs described in the embodiments of the '216 patent "are a less costly option for sequestering 1-MCP for safe handling and use." *Id.* at 5:12–13. The specification defines "MCPN Composition" as "[a] porous metal containing composition that is capable of adsorbing 1-MCP. A MCPN may include a metal node, such as Mg, Mn, Ca, Cu, Al, Zn, Fe, or Co, that is coupled to one or more ligands, such as an amino acid or a food additive, such as citric acid." *Id.* at 3:60–65; *see also id.* at 5:16–23. The specification states that "[a]dsorption is distinct from molecular encapsulation, which is a specific binding process whereby a substrate selectively fits into an encapsulation site." *Id.* at 3:19–21; *see also id.* at 5:14–16 (distinguishing MCPNs from cyclodextrin because "more options are available, since a 'lock and key' type size-based fit is not required with an adsorption-based complexation process").

The '216 patent discloses methods for adsorption of 1-MCP into an MCPN (*id.* at Example 3) and compares complexes formed between 1-MCP and MCPNs to prior art encapsulants (cyclodextrins). *Id.* at Example 6, Table 2. The '216 patent also describes methods for releasing 1-MCP from the MCPN-1-MCP complex, such as breaking open the structure of the MCPN by contact with water (*id.* at 7:18–25), and includes data comparing the release rate of 1-MCP from MCPNs and from cyclodextrins (*id.* at Examples 8–9).

D. Illustrative Claims

Claims 1, 6, 13, and 21 are the independent claims of the '216 patent. Claims 1 and 6, reproduced below with formatting added for readability, are illustrative of the challenged claims:

> 1. An adsorption complex comprising 1-methylcyclopropene (1-MCP) and a metal coordination polymer network (MCPN),
>
> wherein the MCPN is a porous material selected from magnesium formate; [Ca(4,4'-sulfonyldibenzoate).H_2O]; Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine); Zn_2(tcbpe) (wherein tcbpe is a reaction product of tetra-(4-bromo-phenyl)ethylene (tpe-Br) and 4-(methoxycarbonyl) phenylboronic acid); [Zn_2(biphenyldicarboxylate)$_2$(1,2-bipyridylethene)].2DMF, $Mg_3(O_2C—C_{10}—H_6—CO_2)_3$; aluminum terephthalate; Cu_3(benzene-1,3,5-tricarboxylate)$_2$; Fe(1,3,5-benzenetricarboxylate); 2-methylimidazole zinc salt; Co(2-methylimidazole)$_2$; or Al(OH)fumarate,
>
> and the 1-MCP is adsorbed into the MCPN.
>
> 6. A kit for containing 1-MCP, the kit comprising:
>
> an adsorption complex formulation comprising:
>
> 1-MCP; and
>
> a MCPN,
>
> wherein the adsorption complex comprises 0.001 weight percent to 25 weight percent 1-MCP,
>
> wherein the MCPN is a porous material selected from magnesium formate; [Ca(4,4'-sulfonyldibenzoate). H_2O]; Cu-2,4,6-tris(3,5- dicarboxylphenylamino)-1,3,5-triazine); Zn_2(tcbpe) (wherein tcbpe is a reaction product of tetra-(4-bromo-phenyl)ethylene (tpe-Br) and 4-(methoxycarbonyl) phenylboronic acid); [Zn_2(biphenyldicarboxylate)$_2$ (1,2-bipyridylethene)]. 2DMF, $Mg_3(O_2C—C_{10}—H_6—CO_2)_3$; aluminum terephthalate; Cu_3(benzene-1,3,5-tricarboxylate)$_2$;

> Fe(1,3,5-benzenetricarboxylate); 2-methylimidazole zinc salt; Co(2-methylimidazole)$_2$; or Al(OH)fumarate, and
>
> wherein the 1-MCP is adsorbed into the MCPN; and
>
> a 1-MCP-impermeable package, wherein the 1-MCP impermeable package contains the adsorption complex.

Ex. 1001, 20:27–39, 48–67. Claims 2–5 depend from claim 1, and claims 7–12 depend from claim 6. Claim 13 recites "[a] method of releasing 1-MCP from an adsorption complex formulation kit" as recited in claim 6, wherein the method comprises "contacting the 1-MCP-impermeable package with an aqueous fluid." *Id.* at 21:16–22:7. Claims 14–20 depend from claim 13. Claim 21 recites "[a]n adsorption complex comprising 1-MCP and a magnesium formate coordination polymer network," which is one of the MCPNs recited in claims 1, 6, and 13. *Id.* at 22:27–30; Pet. 3–4.

E. Instituted Grounds of Unpatentability

We instituted *inter partes* review of claims 1–21 of the '216 patent on the following grounds (Paper 8):

	Reference(s)	Statutory Basis	Claims Challenged
1.	Edgington[3]	§ 102(a)(2)[4]	1–5 and 21
2.	Edgington, Lee,[5] and Kostansek[6]	§ 103	6–20
3.	Daly[7] and Edgington	§ 103	1–5 and 21
4.	Daly, Edgington, and Ho[8]	§ 103	6–20

[3] WO 2016/037043 A1, pub. Mar. 10, 2016 ("Edgington") (Ex. 1004). Petitioner also cites to Ex. 1005, the U.S. Provisional Application to which Edgington claims priority. With one exception (i.e., our analysis of dependent claim 14), we reference only Ex. 1004 herein because Petitioner does not rely on Ex. 1005 as separate evidence of, or for any separate argument in support of, the proposed grounds of unpatentability.

[4] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112–29, which was enacted on September 16, 2011, made amendments to 35 U.S.C. §§ 102, 103. AIA § 3(b), (c). Those amendments became effective eighteen months later on March 16, 2013. *Id.* at § 3(n). Because the application from which the '216 patent issued was filed after the effective date of the AIA, all citations herein to 35 U.S.C. § 102, 103 are to the post-AIA versions.

[5] Younsuk S. Lee et al., *Development of a 1-Methylcyclopropene (1-MCP) Sachet Release System*, 71 J. FOOD SCI. C1–C6 (2006) ("Lee") (Ex. 1006)

[6] U.S. Patent No. 6,548,448 B2, issued Apr. 15, 2003 ("Kostansek") (Ex. 1007).

[7] U.S. Patent No. 6,017,849, issued Jan. 25, 2000 ("Daly") (Ex. 1008).

[8] Thao M. Ho et al., *Encapsulation of gases in power solid matrices and their applications*: *A review*, 259 POWDER TECH. 87–108 (2014) ("Ho") (Ex. 1009).

II. ANALYSIS

A. Claim Construction

Because this *inter partes* review is based on a petition filed before November 13, 2018, we construe the claims by applying the "broadest reasonable construction in light of the specification of the patent." 37 C.F.R. § 42.100(b) (2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under that standard, claim terms are given their ordinary and customary meaning in view of the specification, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definitions for claim terms must be set forth with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Only those terms which are in controversy need be construed, and only to the extent necessary to resolve the controversy. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs.* in the context of an *inter partes* review).

In our Institution Decision, we provided preliminary constructions of the following terms:

Term	Construction
"adsorption complex"	a complex of a cyclopropene compound and an MCPN
"metal coordination polymer network (MCPN)"	a porous metal containing composition that is capable of adsorbing 1-MCP
"1-MCP is adsorbed into the MCPN"	no construction necessary

Term	Construction
"1-MCP impermeable"	having low or no permeability to 1-MCP

Dec. 15–19. In the post-institution papers, neither party disputes our construction of MCPN. PO Resp. 17; Pet. Reply 1. Having considered the arguments and evidence, we maintain our construction of MCPN, based on the definition provided in the specification. Dec. 17 (citing Ex. 1001, 3:60–65). We address below the parties' arguments as to construction of the other three terms discussed in our Institution Decision. The columns in each table below set forth Petitioner's and Patent Owner's positions at trial, and our construction after considering the entire record.

1. "adsorption complex"

Petitioner	Patent Owner	PTAB
a complex of a cyclopropene compound and an MCPN	a compound in which at least some of the 1-MCP molecules have formed chemical bonds with an MCPN, including by both chemisorption and physisorption	a complex of a cyclopropene compound and an MCPN

In our Institution Decision, we construed "adsorption complex" based on the definition provided in the specification. Dec. 15–16 (citing Ex. 1001, 3:25–29 ("Adsorption complex: A complex of a cyclopropene compound and a metal coordination polymer network (MCPN)."). In its post-institution papers, Patent Owner acknowledges that the specification provides a definition of "adsorption complex" and "adsorption" (Ex. 1001, 3:13–14), and that the specification does not separately define "complex." PO Resp. 16. Patent Owner, however, asserts that the ordinary meaning of

"complex" supports its proposed construction because it provides that a complex is "formed by the union of simpler substances (as compounds or ions) and held together by forces that are chemical (i.e., dependent on specific properties of particular atomic structures) rather than physical." *Id.* (citing *Complex, In Chemistry*, BRITANNICA.COM (Nov. 24, 2011), https://www.britannica.com/science/complex-in-chemistry). Patent Owner also relies on Dr. Walton's testimony that a person of ordinary skill in the art would understand the term "complex" to include chemisorption (Ex. 2005 ¶¶ 43–47; Ex. 2049 ¶¶ 9–16), and that Example 8 of the '216 patent specification supports a construction of "complex" that requires chemisorption because it shows the introduction of water is required to release 1-MCP from the MCPN (Ex. 2049 ¶ 18). PO Resp. 16. Patent Owner further argues that Dr. Dincă admitted at his deposition that the ordinary meaning of "complex" to a person of skill in the art involves a chemical bond between constituents. *Id.* (citing Ex. 2047, 129–132).

Patent Owner further asserts that Daly, which is cited in the '216 patent (Ex. 1001, 4:46–53), supports a construction of "complex" that requires chemisorption because Daly states that "a chemical bond or chemisorption is necessary" to hold 1-MCP in a complex within α-cyclodextrin "until ready for use." PO Sur-Reply 2 (citing Ex. 1008, 3:64–4:3).

Petitioner argues that intrinsic evidence does not support Patent Owner's proposed construction. Pet. Reply 2–3. Petitioner asserts that "numerous passages of the ['216] patent showing that water is not necessary for 1-MCP release" contradict Dr. Walton's testimony that the introduction of water in Example 8 shows that chemisorption is necessary *Id.* at 3 (citing

Ex. 1001, Abstract; 7:26–28; 7:39–46; 14:35–47 (Example 9); claim 12[9]). Petitioner further asserts Dr. Dincă's testimony shows that at least five of the MCPNs among the twelve MCPNs recited in claim 1 would not form chemical bonds with 1-MCP. *Id.* at 3–4 (citing Ex. 2047, 146–47)). Petitioner also disputes Patent Owner's characterization of Dr. Dincă's testimony concerning the ordinary meaning of "complex." *Id.* at 3.

Having considered the parties' arguments and evidence, we decline to construe "adsorption complex" as requiring that 1-MCP form a chemical bond with MCPN. As an initial matter, in determining the broadest reasonable interpretation, we take into account that the inventor chose to be his own lexicographer by defining "adsorption complex" in the specification. *See In re Bass*, 314 F.3d 575, 577 (Fed. Cir. 2002) ("In examining a patent claim, the PTO must apply the broadest reasonable meaning to the claim language, taking into account any definitions presented in the specification. Words in a claim are to be given their ordinary and accustomed meaning unless the inventor chose to be his own lexicographer in the specification." (citation omitted)). Thus, Patent Owner's argument that we should apply the ordinary meaning of "complex" in determining the construction of "adsorption complex" is not persuasive. Accordingly, we do not rely on Dr. Walton's testimony concerning the ordinary meaning of

[9] Claim 12 recites a kit "wherein the 1-MCP is released from the adsorption complex when the MCPN is contacted with at least one aqueous fluid, by heat, or by positive or negative pressure."

complex," or Dr. Dincă's purported admission that a "complex" necessarily involves a chemical bond.

Further, Patent Owner's contention that the specification supports its construction of "complex" is not persuasive because it does not square with Dr. Dincă's unrebutted testimony that at least five of the MCPNs among the twelve MCPNs recited in claim 1 would not form chemical bonds with 1-MCP, nor with the specification's examples that describe release of 1-MCP without water. Having considered Dr. Dincă's redirect and recross deposition testimony about those five MCPNs (Ex. 2047, 146:15–148:5, 148:11–152:17), we find it credible, and disagree with Patent Owner's assertion that no facts or data support Dr. Dincă's opinion. On the other hand, Patent Owner's contention that the examples in the '216 specification describing release of 1-MCP by pressure or temperature changes are "evidence that the 1-MCP is held in the complex by bonds stronger than mere van der Waals forces" (PO Sur-Reply 4) is unsupported attorney argument. Having considered the evidence and arguments of both parties, we find that Patent Owner's proposed construction omits embodiments that the independent claims encompass, and we therefore decline to adopt it.

2. "1-MCP is adsorbed into the MCPN"

Petitioner	Patent Owner	PTAB
no construction necessary	The 1-MCP molecule has been introduced into the MCPN, for example, through an adsorption vessel or with the aid of continuous agitation,	no construction necessary

Petitioner	Patent Owner	PTAB
	so as to form a multitude of complexes	

In our Institution Decision, we determined it was not necessary to construe "1-MCP is adsorbed into the MCPN" because Patent Owner did not argue that any prior art reference disclosed an adsorption complex comprising an MCPN, yet did not disclose "1-MCP is adsorbed into the MCPN." Dec. 17. In its Response, Patent Owner argues that "ignoring this claim term gives undue breadth to prior art that disclose 'adsorbent materials,' but not the adsorption of 1-MCP into an MCPN." PO Resp. 18. Patent Owner's argument, however, does not identify such prior art. *Id.* Nor does Patent Owner present further argument or evidence about this claim term beyond those in its Preliminary Response. Paper 6, 22–23. Arguments made in a Preliminary Response are waived unless reasserted in the Patent Owner's Response. Paper 9, 3. Accordingly, for the reasons set forth in the Institution Decision, we determine that it is not necessary to expressly construe this phrase.

3. "1-MCP impermeable"

Petitioner	Patent Owner	PTAB
having low or no gas permeability to 1-MCP	1-MCP will not pass through for at least three days within a detection limit of 10 ppb	having low or no gas permeability to 1-MCP

In our Institution Decision, we preliminarily determined that the broadest reasonable interpretation of "1-MCP impermeable" is "having low or no permeability to 1-MCP" and invited the parties to present further

arguments and evidence addressing specifically the ’216 patent specification and claims. Dec. 19. In its Response, Patent Owner points to the specification’s definition of “permeance or permeation,” which includes the statement “[p]ermeable materials are those through which gases or liquids may pass.” PO Resp. 18 (citing Ex. 1001, 3:66–4:2). Patent Owner argues that “impermeable,” therefore, means materials through which gases or liquids may not pass. *Id.* Patent Owner further relies on the specification’s description of embodiments including “fillers inside the capsules” that minimize the loss of 1-MCP and “achieve at least 90% active ingredient retention in the formulation, when no heat, pressure or aqueous based solution such as water is used for releasing the active ingredient.” *Id.* at 19 (citing Ex. 1001, 6:49–57). Patent Owner asserts that Example 17 discloses three capsule embodiments that are impermeable to 1-MCP for between three and nine days based on a detection limit of 10 ppb, and thus, Patent Owner argues, “makes clear that the ’216 patent is equating 100% retention of the active ingredient with impermeability to 1-MCP.” *Id.* at 19–20 (citing Ex. 1001, 19:19–34, 51, Table 9; Ex. 2049 ¶¶ 21–24 (identifying formulations MCPN-SOL, MCPN-LF from Example 17)).

Petitioner argues that the specification describes capsule and sachet embodiments that the claims encompass as “having not necessarily zero, but low, gas permeability to 1-MCP.” Pet. Reply 6 (citing claim 7 (reciting a capsule, flexible pouch, or rigid container) and claim 14 (reciting a sachet)). Petitioner asserts that the specification describes the capsule embodiments as having low gas permeability properties (citing 6:33–38), and the sachet embodiments as using polymeric films inherently having a range of 1-MCP transmission rates with “no preference among these transmission rates but

. . . an objective of inhibiting the ethylene response . . . by releasing sufficient 1-MCP at the appropriate time." *Id.* at 7 (citing Ex. 1001, 7:18–28, 7:52–57, 8:6–15).

Petitioner further argues that the specification does not support limiting "1-MCP impermeable" as Patent Owner proposes, because the data for active ingredient retention in the formulations in Table 9 are based on the fillers inside the capsules. *Id.* at 8. Petitioner asserts that the specification recognizes only that a capsule package "*may* include fillers" and discloses examples that have no fillers. *Id.* Petitioner further asserts that the specification discloses that even if fillers are considered part of the package, they "should be chosen to retain at least 90% of the 1-MCP in the capsule formulation." (*id.* (citing Ex. 1001, 6:49–57, 7:50–8:34)), which undercuts Patent Owner's argument that "impermeable" means gas or liquid may not pass.

Having considered the parties' proposed constructions, the claim language, and the evidence of record, we determine that "1-MCP impermeable" should be construed as "having low or no gas permeability to 1-MCP" for the following reasons. Although the specification does not define "impermeable," it defines "permeable materials" as "those through which gases or liquids may pass." Ex. 1001, 3:66–4:5. This definition is not limited to any particular detection limit or timeframe for measuring permeability. Further, the specification describes capsules that have "low gas permeability properties" (*id.* at 6:33–38), and to the extent a person of ordinary skill in the art would relate retention or transmission of 1-MCP to impermeability, the specification also describes capsule embodiments that have low permeability to 1-MCP. *Id.* at 6:53–55 (describing capsule

formulations that achieve at least 90% active ingredient retention). Example 17 and Table 9 describe the percent retention of 1-MCP for seven tablet and capsule formulations, including five formulations having at least 90% active ingredient retention at nine days, and two having 100% retention at nine days. *Id.* at 18:50–19:50. For the sachet embodiments, the specification describes a range of 1-MCP transmission rates labeled "FL-1," from 800 or higher to 150,000 or lower, in units of cm^3 per day across a 1 m^2 surface area of a film having 25.4 micron thickness. *Id.* at 7:50–8:22.

Thus, the intrinsic evidence supports a construction of "1-MCP impermeable" that allows for "low or no" permeability to 1-MCP because that construction encompasses all of the embodiments the specification describes, as well as the embodiments that claims 7 and 14 recite. Patent Owner's proposed construction, on the other hand, is based on retention rates for only three of the formulations in Example 17 and Table 9 (i.e., formulations MCPN-G, MCPN-LF, and MCPN-SOL). Nothing in Example 17 or Table 9, however, describes any of the formulations (including the three on which Patent Owner relies) as "impermeable." Indeed, the term "impermeable" is only used in Example 17 and Table 9 to refer to glycerol (i.e., "Glycerol by itself is impermeable to 1-MCP" (*id.* at 19:33–34)), not to the tablets or capsules tested. Limiting the claims to three of the formulations in Example 17 and Table 9, especially when the specification does not distinguish those three formulations from the others disclosed, would improperly read embodiments into the claims. *See Superguide Corp. v. DirecTV Enter., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) ("[A] particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment.").

In determining the construction of "1-MCP impermeable" we need not resolve the parties' dispute as to whether the term "1-MCP impermeable package" encompasses fillers used inside the package. *See* PO Resp. 21; Pet. Reply 6–8. Even if we consider fillers as part of the "1-MCP impermeable package," we nonetheless have determined that Patent Owner's proposed construction, which is based on only three formulations in Example 17 and Table 9, is overly restrictive. Further, Patent Owner concedes that we need not separately construe the term "package," which is only recited in some of the challenged claims, in order to decide whether Petitioner has carried its burden as to the instituted grounds of unpatentability. Tr. 64–65.

B. Level of Ordinary Skill in the Art

In the Institution Decision, we accepted Patent Owner's definition of a person of ordinary skill in the art as follows: a person of ordinary skill in the art would have had a Bachelor's degree in chemistry or chemical engineering and one to two years of experience with 1-MCP encapsulation or complexing and its ability to inhibit ethylene binding in plants. Dec. 8. Neither party objects to this determination. Accordingly, for the reasons set forth in the Institution Decision, we adopt the foregoing definition for purposes of this decision. Further, based on Dr. Dincă's and Dr. Walton's statements of qualifications and curricula vitae, we find that both experts are qualified to opine as to the knowledge and perspective of a person of

ordinary skill in the art at the time of the invention. *See* Ex. 1003, App. A; Ex. 2005, App. A.

C. Principles of Law

Anticipation requires that each limitation in a claim is found in a single prior art reference, arranged as recited in the claim. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). Prior art references must be "considered together with the knowledge of one of ordinary skill in the pertinent art." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

A claim is unpatentable under § 103 if "the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when in evidence, objective indicia of non-obviousness (i.e., secondary considerations). *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). For objective indicia of nonobviousness to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention. *Classco, Inc., v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016).

To prevail on its challenges, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). "In an [*inter partes* review], the petitioner has

the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). Petitioner does not satisfy its burden of proving obviousness by employing "mere conclusory statements." *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

D. Prior Art References

1. Edgington (Ex. 1004)

Edgington describes systems and methods for prolonging the shelf-life of produce (Ex. 1004, Abstract), and, in particular, a food storage system including a container and a porous adsorbent material. *Id.* ¶ 5. According to Edgington, adsorbent materials based on metal organic frameworks ("MOFs") can extend the shelf-life of fresh-cut or whole produce by "managing gas exchange and/or storage environment atmosphere carbon dioxide, oxygen, ethylene, water vapor (relative humidity), and other plant related volatiles … [within] modified atmosphere packaging (MAP) either incorporating the adsorbent material into packaging film, or package insert or applied to commodity directly . . . ." *Id.* ¶ 54. For example, the adsorbent material may be contained within a sachet and help to control the gas atmosphere and humidity in a container by adsorbing "ethylene and other species that may contribute to off-flavor of the produce," volatile organic compounds, and "chemical species including at least one ketone, aldehyde, ester, phenol, quinone, or combinations thereof." *Id.* ¶ 64. Edgington's Figure 1 "illustrates the flow of chemical species in an illustrative produce

container" and shows lettuce consuming oxygen and producing carbon dioxide, ethylene, and water vapors. *Id.* ¶¶ 31, 63.

Edgington teaches embodiments where the adsorbent material is based on an MOF that includes a metal selected from the group consisting of Al, Mg, Zn, Cu, Zr and a combination thereof, and at least one moiety selected from the group consisting of fumaric acid, formic acid, 2-methylimidazole, and trimesic acid. *Id.* ¶¶ 17, 65, Table 1.

2. Lee (Ex. 1006)

Lee describes testing done on the release of 1-MCP from several adsorbing agents, i.e., silica gel, activated clay, and activated carbon, packaged within sachets made from Tyvek®, paper, low-density polyethylene (LDPE), and polyvinyl acetate (PVA). Ex. 1006, Abstract. Lee recognizes that 1-MCP can prolong the storage life of fresh produce by inhibiting the role of ethylene in ripening. *Id.* at C1.[10] Lee's "Materials and Methods" section states that the 1-MCP was supplied as EthylBloc powder, a commercial product of AgroFresh that uses α-cyclodextrin as the molecular encapsulation agent for 1-MCP. *Id.* Lee specifically discusses partition coefficients for the adsorbing agents and sachet materials as a way of "indicat[ing] the degree of attraction of 1-MCP to the matrix" (*id.* at C3–C4, Tables 1–2) and recognizes that interaction of 1-MCP with the solid matrix and the packaging film "can be affected by polarity, molecular structure, solubility, and active adsorption sites in the matrix." *Id.* at C4.

Lee also describes testing the permeability of 1-MCP and water vapor through the sachet materials. *Id.*, Tables 3–4. Lee discusses transmission

[10] We refer to the page numbers Petitioner added, not the original page numbers of the document.

rates, permeability coefficients, and diffusion coefficients through the LDPE and PVA sachet materials for water vapor and 1-MCP, and concludes that "PVA is more suitable for slow release of 1-MCP gas than LDPE because PVA has higher water vapor permeability and the same lower permeability to 1-MCP gas." *Id.* at C6.

3. Kostansek (Ex. 1007)

Kostansek describes "delivery systems for cyclopropenes in which the cyclopropene, either free or encapsulated within a molecular encapsulation agent[,] is incorporated into produce packaging materials." Ex. 1007, Abstract. Kostansek further discloses that "[t]he cyclopropene can be incorporated directly into many types of packaging materials or it can first be encapsulated into a molecular encapsulation agent which is then subsequently incorporated into packaging materials. We have found that moisture from humid air surrounding produce is often sufficient to release the amounts of cyclopropene required for effective treatment of the produce." *Id.* at 1:41–2:1.

4. Daly (Ex. 1008)

Daly describes complexes formed from molecular encapsulation agents, such as cyclodextrin, and cyclopropene derivatives, such as 1-MCP. Ex. 1008, Abstract. Daly states that "[t]hese molecular encapsulation agent complexes provide a convenient and safe means for storing and transporting the compounds capable of inhibiting the ethylene response in plants." *Id.* at 1:33–36. Daly further describes methods of delivering the ethylene inhibitor to plants, by "contacting the molecular encapsulation agent complex with a solvent capable of dissolving molecular encapsulation agent, thereby liberating the compound capable of inhibiting the ethylene response so it can

contact the plant." *Id.* at 1:46–50. Daly further explains that its complexes "can be sealed into a package for retail and wholesale use." *Id.* at 12:27–30.

E. Ground 1: Anticipation by Edgington

Petitioner contends that Edgington discloses every limitation of claims 1–5 and 21. Pet. 21–28. Petitioner supports its argument with citations to Edgington that correspond to each limitation of the claims, and with Dr. Dincă's Declaration. *Id.* (citing Ex. 1004, Abstract, ¶¶ 4, 54, 55, 63, 65, 84–95, 101, Table 1, Figure 1; Ex. 1003 ¶¶ 36, 75–77, 81–83, 85, 89, 90–91, 95, 127). We first discuss claim 1, then turn to claims 2–5 and 21.

1. Claim 1

The parties' dispute as to claim 1 is whether Petitioner shows that Edgington discloses an "adsorption complex" or "1-MCP adsorbed into an MCPN." *See, e.g.*, PO Resp. 32–40. Petitioner asserts that Edgington discloses "an adsorption complex" comprising 1-MCP and an MCPN, and "1-MCP adsorbed into the MCPN," based primarily on Figure 1 of Edgington, reproduced below. Pet. 24.

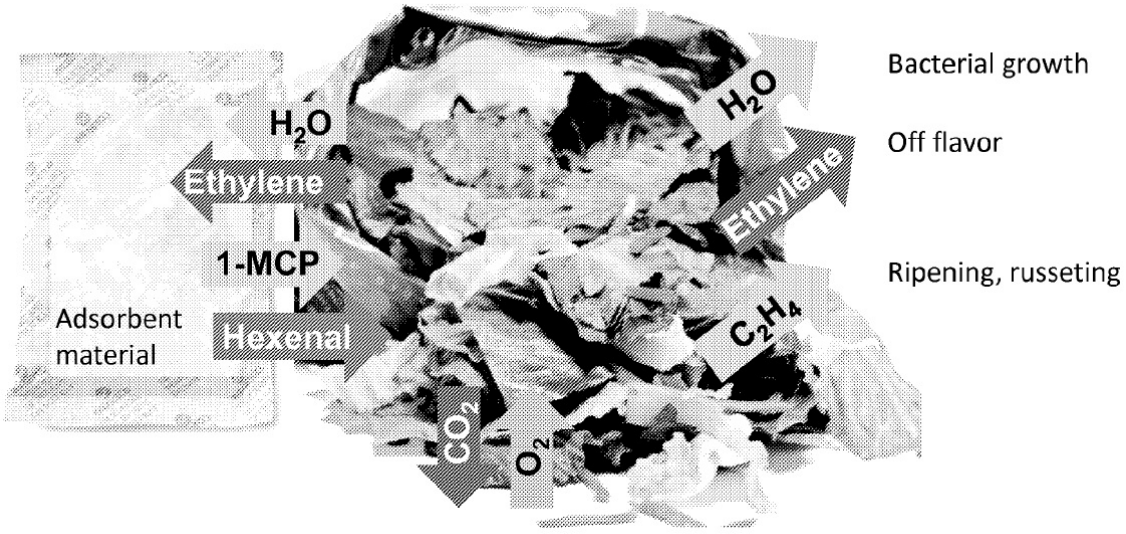

Figure 1 of Edgington "illustrates the flow of chemical species in an illustrative produce container" (Ex. 1004 ¶ 63) in a schematic including a sachet labeled "Adsorbent Material" adjacent to an image of lettuce, arrows labeled "H_2O" and "Ethylene" pointing away from the lettuce and into the Adsorbent Material, arrows labeled "1-MCP" and "Hexenal" pointing away from the Adsorbent Material and into the lettuce, arrows labeled "CO_2," "C_2H_4," "Ethylene," and "H_2O" pointing out of the lettuce, and an arrow labeled "O_2" pointing into the lettuce. *Id.* Fig. 1, ¶¶ 63, 77 (explaining that Figure 1 illustrates "adsorbent material disposed within a sachet"). Petitioner contends that a person of ordinary skill in the art would understand Figure 1 as showing that 1-MCP had been adsorbed in the adsorbent material, i.e., an adsorption complex, because Edgington states that adsorbent materials are used to manage gas exchange "by adsorption/desorption," and techniques for adsorbing gases such as 1-MCP in MOFs were well known in the prior art. Pet. 24 (citing Ex. 1003 ¶¶ 36, 83; Ex. 1004 ¶ 77).

Petitioner further argues that Edgington expressly discloses the use of at least four of the MCPNs recited in "the MCPN limitation"[11] of claim 1, i.e., Al(OH)fumarate, magnesium formate, 2- methylimidazole zinc salt, and Cu_3(benzene-1,3,5-tricarboxylate)$_2$, as adsorbent materials for "plant related volatiles" such as 1-MCP as shown in Figure 1. Pet. 25 (citing Ex. 1004, Table 1, Figure 1; Ex. 1003 ¶¶ 81–82). Petitioner relies on Dr. Dincă's testimony that a person of ordinary skill in the art would know that the four "Exemplary Adsorbent Materials" in Edgington's Table 1—branded

[11] "The MCPN limitation" refers to the limitation of claim 1 that lists a group of twelve MCPN compounds. Ex. 1001, 20:29–38.

Basolite A520, Basosive M050, Basolite Z1200, and Basolite C300—are commercial versions of Al(OH)fumarate, magnesium formate, 2-methylimidazole zinc salt, and Cu_3(benzene-1,3,5-tricarboxylate)$_2$ produced by BASF. Ex. 1003 ¶¶ 78–82. Patent Owner does not dispute that four of the branded adsorbent materials in Edgington Table 1 correspond to four of the MCPNs recited in claim 1. Based on the information and arguments presented, and as explained below, we find that Petitioner establishes by a preponderance of the evidence that Edgington discloses an adsorption complex and 1-MCP adsorbed into an MCPN.

Patent Owner argues that Edgington does not contain an enabling disclosure of an "adsorption complex" or "1-MCP is adsorbed into a 1-MCPN." PO Resp. 32–40. Specifically, Patent Owner argues that (1) a person of ordinary skill in the art would not view Edgington as disclosing an "adsorption complex" or "1-MCP is adsorbed into a 1-MCPN" under Patent Owner's proposed constructions because Figure 1 merely shows 1-MCP "in the vicinity" of an adsorbent material, and structural properties of an MOF alone do not determine if it will adsorb 1-MCP (*id.* at 32–34); (2) Figure 1 is incomprehensible (*id.* at 34–39); and (3) a person of ordinary skill would not use the same material both to adsorb ethylene and release 1-MCP at the same time (*id.* at 39–40). To the extent Patent Owner's arguments are based on its proposed construction of "adsorption complex," which we decline to adopt for the reasons discussed above, we do not address them further. Rather, we focus on Patent Owner's arguments and evidence that Edgington is not an enabling disclosure.

Patent Owner argues that Edgington's Figure 1 is incomprehensible for several reasons relating to the labeling and direction of the arrows

depicted in relation to the adsorbent material and head of lettuce, such as the arrows that "show both water and ethylene flowing into an adsorbent material" even though a person of ordinary skill would understand that is not technically possible. PO Resp. 35–36. Patent Owner also asserts, based on the level of ordinary skill in the art we determined above, that a person of ordinary skill would not necessarily have been familiar with MOFs or adsorbent materials. *Id.* at 8. Patent Owner argues that no evidence supports Petitioner's assertion that a person of ordinary skill would have immediately recognized a disclosure of 1-MCP adsorbed into the adsorbent material in Figure 1, and asserts that Dr. Dincă admitted on cross-examination that there is no basis for reading Figure 1 that way. PO Resp. 36–37; PO Sur-Reply 8–9 (citing Ex. 2047, 72–75).

As an initial matter, we do not agree with Patent Owner's interpretation of our determination of the level of ordinary skill. Contrary to Patent Owner's argument, although the level of ordinary skill does not expressly refer to MOFs and adsorbent materials, it allows for experience with such materials, by reference to "1-MCP encapsulation or complexing." Dr. Dincă testified that techniques for adsorbing gases into MOFs were well known in the art at the time of filing the '216 patent (Ex.1003 ¶¶ 36, 83), and the record supports his testimony in that regard. *See, e.g.*, Ex. 1003 ¶ 54 (disclosing MOFs for managing gas exchange); *see generally* Ex. 1014; Ex. 1015; Ex. 1019; Ex. 1020. Further, we find that Dr. Dincă's testimony sufficiently supports Petitioner's assertion that a person of ordinary skill would have recognized that 1-MCP is adsorbed into the adsorbent material in Edgington's Figure 1. Ex. 1003 ¶¶ 75–83.

We do not agree with Patent Owner that Dr. Dincă's cross-examination testimony about the flow of gases depicted by the arrows in Figure 1 is inconsistent with his declaration testimony. Specifically, Patent Owner relies on the following testimony (Ex. 2047, 74:6–75:12):

> Q And based on what you told me earlier, that water would displace ethylene, that -- if any had been adsorbed, depending on the concentration, correct?
> MR. FUES: Objection.
> A That is -- that is beside the point of what Figure 1 actually shows. That's not what I read from Figure 1.
> BY MR. TYLER:
> Q What do you read from Figure 1?
> A In what context?
> Q In the context we're discussing.
> A I read that there's an arrow that shows ethylene going into the adsorbent material and/or there's an arrow that describes water going into the adsorbent material, it doesn't necessarily mean that they all -- they both happen at the same time.
> Q Okay. You understand that in a package with lettuce in it, sealed package with lettuce in it, the lettuce will give off water vapor, correct?
>
> A Presumably, yes.
> Q And that water vapor then could be adsorbed into the adsorbent material, correct?
> A Yes.
> Q And if the adsorbent material had previously adsorbed any ethylene, as to what you told me earlier, the water could displace that ethylene?
> MR. FUES: Objection.
> A If the adsorbent material adsorbed any ethylene. I'm not saying that it does, according to this figure.

Dr. Dincă's response that "I'm not saying that it does [adsorb ethylene], according to this figure" was in the context of his previous testimony that "it doesn't necessarily mean that they all – they both happen at the same time." *Id.* at 74:21–22. We do not agree with Patent Owner's argument that Dr. Dincă's response meant ethylene is *never* adsorbed into the adsorbent material of Figure 1. We find that Dr. Dincă's interpretation of Figure 1, as showing a variety of gas flows relevant to plant storage without implying that all of the flows are occurring simultaneously, is reasonable in view of Edgington's disclosure as a whole, and in particular its statement that strategies using MOFs to manage gas exchange may be used singularly or in combination. *See* Ex. 1003 ¶¶ 77, 83; Ex. 1004 ¶ 54.

Patent Owner asserts that a person of ordinary skill would not have understood Edgington's Figure 1, because of conflicting labeling and direction on some of the arrows, and the depiction of both water and ethylene flowing into an adsorbent material. PO Resp. 34–37; PO Sur-Reply 9. Thus, Patent Owner concludes that because Figure 1 shows processes that can compete with each other, it does not disclose that 1-MCP is adsorbed into the adsorbent material. *Id.* We find this assertion less credible than Petitioner's evidence and arguments, in part because it fails to address why a person of ordinary skill would assume that 1-MCP is released from *anything other than* the adsorbent material depicted in Figure 1. Further, Patent Owner's conclusion that a person of ordinary skill would interpret Figure 1 as "incomprehensible" (PO Resp. 34), thereby disclosing nothing, essentially offers no rebuttal to Dr. Dincă's testimony. We decline to find that a person of ordinary skill, confronted with potential inconsistencies in Figure 1, would conclude that it discloses nothing. Accordingly, we determine that a

preponderance of the evidence supports Petitioner's interpretation of Figure 1.

Patent Owner further argues that a BASF publication ("Chopra," Ex. 2042)[12] corroborates its assertion that Edgington is not an enabling disclosure of 1-MCP adsorbed into an MCPN. PO Resp. 37–39. Chopra was published after the '216 patent issued and is not prior art. Ex. 2042, 48. According to Patent Owner, Chopra shows that three years after filing Edgington, BASF was still funding research into whether its own MOFs had any utility to adsorb or desorb gases to manage plant physiology, and its leading 1-MCP expert only tentatively concluded that MOFs "have the potential to sorb, store, and release gaseous compounds that impact plant physiology . . . ." PO Resp. 38–39 (citing Ex. 2042, Abstract). This, argues Patent Owner, confirms that Edgington is not an enabling disclosure of using MOFs to adsorb 1-MCP and release it to block ethylene receptors. *Id.* at 39.

We disagree with Patent Owner's argument that Chopra reflects how a person of ordinary skill would have understood Edgington. A statement made by BASF, a third party, several years after the '216 patent issued, bears tangential relevance to how a person of ordinary skill in the art would have understood Edgington's disclosure as of the '216 patent's priority date. Further, additional evidence on which Petitioner relies—a 2016 e-mail from an employee of Patent Owner, Dr. Ghosh—suggests that Patent Owner itself understood at the time the '216 patent issued that "adsorption of gases by

[12] Sangeeta Chopra et al., *Metal-organic frameworks have utility in adsorption and release of ethylene and 1-methylcyclopropene in fresh produce packaging*, 130 POST HARVEST BIOLOGY AND TECHNOLOGY 48–55 (2017) (Ex. 2042).

MOF (metal organic frameworks) is not new" and that BASF likely "had data regarding the adsorption of ethylene" "quite a few years ago." Ex. 1049. We find that this evidence contradicts Patent Owner's assertions as to how a person of ordinary skill in the art would have understood Edgington.

Finally, Patent Owner argues that Edgington is not an enabling disclosure because it shows the same adsorbent material that releases 1-MCP and hexenal adsorbs ethylene, even though a person of ordinary skill would have understood "these actions cannot all take place at once." PO Resp. 39–40 (citing Ex. 2005 ¶¶ 113–114, 117; Ex. 2049 ¶¶ 34–39). Dr. Walton testifies that a person of ordinary skill in the art of adsorbing volatile compounds would not have been motivated both to bind ethylene receptors on a plant with 1-MCP and adsorb ethylene from the atmosphere surrounding the plant, and even if the ordinary artisan would have been so motivated, the same adsorbent material would not be used for both purposes. Ex. 2005 ¶¶ 113, 114, 117 ("It is unreasonable to expect a single adsorbent material to simultaneously adsorb ethylene *and* water only (so the CO_2 and O_2 in the atmosphere seem not to be contacted with the adsorbent) while also somehow releasing 1-MCP and hexanal.").

We are not persuaded by this argument, because it does not consider Edgington's disclosure as a whole. Edgington is not limited to Figure 1; its specification describes MOFs as preferred adsorbents for scrubbing ethylene, as well as for delivery of other volatile organic compounds. Ex. 1004 ¶¶ 54–55. Edgington also discloses that strategies using MOFs to manage gas exchange *may be used singularly or in combination*. *Id.*; *see also* Ex. 1003 ¶¶ 77, 83 (explaining how a person of ordinary skill in the art

would understand Edgington's disclosure). For the reasons described above, we find that Edgington does not require that all of the actions depicted in Figure 1 take place at the same time. We further find that Edgington discloses an "adsorption complex" and "1-MCP adsorbed into an MCPN" as claim 1 recites.

Further, we find that Petitioner demonstrates that Edgington discloses the remaining limitations of claim 1. Petitioner directs us to evidence showing that Edgington expressly discloses the use of at least four of the MCPNs recited in claim 1, i.e. Al(OH)fumarate, magnesium formate, 2-methylimidazole zinc salt, and Cu_3(benzene-1,3,5-tricarboxylate)$_2$, as adsorbent materials for "plant related volatiles" such as 1-MCP as shown in Figure 1. Pet. 25 (citing Ex. 1004, Table 1, Figure 1; Ex. 1003 ¶¶ 81–82). Patent Owner does not dispute that four of the branded adsorbent materials listed in Edgington's Table 1 correspond to four of the MCPNs recited in claim 1. Accordingly, we determine that Petitioner has shown by a preponderance of the evidence that Edgington anticipates claim 1.

2. Claims 2–5 and 21

Regarding dependent claims 2–5, Petitioner argues that Edgington discloses each of the additional limitations set forth in those claims. Pet. 25–27. Petitioner also argues that Edgington discloses each of the limitations of independent claim 21. We address each of these claims below, and incorporate herein our analysis above as to the limitations of claim 1. Patent Owner does not separately challenge Petitioner's arguments and evidence as they relate to any of these claims.

Claim 2 recites the additional limitation "the MCPN has a mean pore diameter of 1 to 50 Å." Ex. 1001. Petitioner directs us to evidence showing

that Edgington expressly discloses this size limitation. Pet. 26 (citing Ex. 1003 ¶ 85; Ex. 1004, Table 1). Accordingly, we find that Petitioner has shown by a preponderance of the evidence that Edgington anticipates claim 2.

Claim 3 recites the additional limitation "the MCPN is thermally stable at a temperature of 100° C to 575° C." Ex. 1001. Petitioner directs us to evidence showing that Edgington discloses its adsorbent materials can be heated prior to use to temperatures within the temperature range of claim 3. Pet. 27 (citing Ex. 1003 ¶ 87; Ex. 1004 ¶ 101). Petitioner also asserts that magnesium formate, which Edgington expressly discloses as an adsorbent material, is known to thermally decompose at 400° C. *Id.* (citing Ex. 1001, 18:26–48; Ex. 1003 ¶ 87; Ex. 1004, Table 1). Accordingly, we find that Petitioner has shown by a preponderance of the evidence that Edgington anticipates claim 3.

Claim 4 recites the additional limitation "the MCPN has an accessible pore volume of 1% to 50%." Ex. 1001. Petitioner asserts that total porosity is an inherent property of any given MOF species. Pet. 27. Petitioner directs us to evidence showing that two of the MOFs Edgington discloses are known to have total porosity within the range of claim 4. *Id.* (citing Ex. 1003 ¶¶ 90–91; Ex. 1014; Ex. 1023). Accordingly, we find that Petitioner has shown by a preponderance of the evidence that Edgington anticipates claim 4.

Claim 5 recites the additional limitation "a particle size of the MCPN is 0.05 mm to 3 mm." Ex. 1001. Petitioner directs us to evidence showing that Edgington expressly discloses the particle size distribution of the four listed MOFs overlaps the range of claim 5. Pet. 26 (citing Ex. 1003 ¶ 85,

Table 1). Accordingly, we find that Petitioner has shown by a preponderance of the evidence that Edgington anticipates claim 5.

Independent claim 21 recites "[a]n adsorption complex comprising 1-MCP and a magnesium formate coordination polymer network," which is one of the MCPNs recited in claim 1. Ex. 1001, 22:27–30. Petitioner directs us to evidence showing that Edgington expressly discloses magnesium formate in Table 1. Pet. 28 (citing Ex. 1001, Table 1; Ex. 1003 ¶ 95). Accordingly, we find that Petitioner has shown by a preponderance of the evidence that Edgington anticipates claim 21.

F. Ground 2: Obviousness over Edgington, Lee, and Kostansek

Petitioner contends that claims 6–20 are unpatentable because the disclosures of Edgington, Lee, and Kostansek would have led a person of ordinary skill in the art to a kit comprising all of the limitations recited in claims 6–12, and a method of releasing 1-MCP from such a kit, as recited in claims 13–20. Pet. 28–45. Patent Owner challenges the disclosures of the references, and Petitioner's rationale for combining them. PO Resp. 41–54. We first discuss independent claims 6 and 13, and then turn to claims 7–12 and 14–20.

1. Claims 6 and 13

Independent claim 6 is similar to claim 1, except that claim 6 is directed to "[a] kit for containing the 1-MCP," recites a certain weight percentage range of 1-MCP comprising the adsorption complex, and requires "a 1-MCP-impermeable package" that "contains the adsorption complex." Ex. 1001, 20:48–67. Independent claim 13 is similar to claim 6, except that claim 13 is directed to "[a] method of releasing . . . 1-MCP . . .

from an adsorption complex formulation kit" "comprising contacting the 1-MCP-impermeable package with an aqueous fluid." *Id.* at 21:16–22:7.

Petitioner mainly relies on the same arguments and evidence relating to Edgington that we discuss above in connection with Petitioner's assertion that Edgington anticipates claims 1–5 and 21. Specifically, Petitioner contends that Edgington teaches that MOFs can be used to adsorb ethylene within produce storage systems and identifies four of the claimed MCPNs suitable for such use, as well as metal centers and organic ligands whose combination would have led one of skill in the art to at least ten of the twelve MCPNs recited in claims 6 and 13. *Id.* at 28–29, 31–33 (citing Ex. 1004 ¶¶ 54, 91–94, Table 1). Petitioner further contends that Lee also describes using porous adsorbing agents to control the atmosphere in food storage systems, that 1-MCP is useful for such purpose, and that it is desirable to adsorb 1-MCP within an adsorbing agent to control release of 1-MCP within produce packaging. *Id.* at 29 (citing Ex. 1006).

Petitioner argues that Edgington would have led a person of ordinary skill in the art to seek ways to further shield produce from the effects of ethylene, and that Lee, addressing the same problem, teaches adsorbing 1-MCP in an adsorbent material for use in produce storage. Pet. 31. Further, Petitioner argues that those skilled in the art would have had a reason to use Edgington's MOFs for 1-MCP adsorption as Edgington's Figure 1 suggests, and it would have been obvious that a material suitable for adsorbing ethylene would also be suitable for adsorbing 1-MCP, thus providing a reasonable expectation of success. *Id.* at 31–32. Petitioner further argues that a person of ordinary skill in the art would have found Kostansek's teaching of materials for packaging 1-MCP complexes readily

combinable with Edgington and Lee. *Id.* at 30 (citing Ex. 1007, 1:58–2:10, 6:12–21).

As to the weight percent range of 0.001 wt% to 25 wt% 1-MCP comprising the adsorption complex recited in claims 6 and 13, Petitioner argues that the range is "so broad [that it encompasses] all practicable embodiments of at least some of the adsorption complexes taught by Edgington and Lee." *Id.* at 33. Petitioner relies on Dr. Dincă's testimony, which explains that adsorbing 1-MCP in magnesium formate or Ca(4,4'-sulfonyldibenzoate) would necessarily result in an adsorption complex that could not have more than 25 wt% 1-MCP, and that it would have been obvious to load more than 0.001 wt% 1-MCP because of the known usefulness of 1-MCP. *Id.* (citing Ex. 1003 ¶¶ 107–114).

Petitioner argues that the limitation requiring the 1-MCP-MCPN adsorption complex to be contained inside a "1-MCP-impermeable package" also would have been obvious because a person of ordinary skill in the art would have understood the benefit of packaging 1-MCP complexes so as to prevent the loss of 1-MCP, and, thus, would have been led to store them in 1-MCP-impermeable packaging. Pet. 34–35 (citing Ex. 1003 ¶ 119). Petitioner also relies on Edgington and Lee as teaching placement of the adsorption complex within produce packaging to release 1-MCP (Pet. 34), and Dr. Dincă's testimony that Lee teaches an LDPE film sachet has extremely low permeability to 1-MCP. Ex. 1003 ¶¶ 50, 118 (citing Ex. 1006, C5). Petitioner further relies on Kostansek as teaching exemplary 1-MCP complexes packaged in LDPE and polyvinyl alcohol, which the '216 patent recognizes as suitable for encapsulating 1-MCP-MCPN adsorption

complexes due to its "low gas permeability properties." Pet. 34 (citing Ex. 1001, 6:33–38).

As to the final step of claim 13, "contacting the 1-MCP-impermeable package with an aqueous fluid," Petitioner relies on Edgington's and Lee's teachings of using adsorbent materials such as 1-MCP complexes in a produce storage container, and their teachings that produce releases water into its storage environment. *Id*. at 40 (citing Ex. 1004 ¶ 2, Fig. 1; Ex. 1006, C6; Ex. 1003 ¶ 139). Petitioner further relies on Kostansek's teaching of at least partially water soluble PVOH film for packaging 1-MCP/cyclodextrin complexes. *Id.* at 35–36 (citing Ex. 1007, 24:7–33). Petitioner argues that a skilled artisan would have had a reason to package Edgington and Lee's 1-MCP complexes in Kostansek's PVOH film and to incorporate the package in a storage container. *Id*. at 34–35, 40 (citing Ex. 1003 ¶¶ 118–19); Ex. 1007, 6:12–20. Petitioner further argues that using the 1-MCP-MCPN adsorption kit of claim 13 in produce storage would have exposed the kit's package to water (e.g., water that the produce releases), which would have resulted in water contacting the packaging film. *Id*. at 40–41. Such exposure, argues Petitioner, would have resulted in water contacting the MCPN, thereby triggering the release of 1-MCP, as Edgington and Lee teach. *Id.* at 41.

Patent Owner argues that Lee and Kostansek do not remedy the deficiencies of Edgington, and therefore the combination of references does not render claims 6 and 13 obvious for the same reasons that Patent Owner argues that Edgington does not anticipate, i.e., the combined teachings do not disclose an "adsorption complex" or "1-MCP is adsorbed into a 1-MCPN." PO Resp. 47–48, 53. This argument, however, is based on Patent

Owner's assertion that Dr. Dincă admitted that the adsorbent material of Edgington's Figure 1 never adsorbs ethylene (PO Resp. 48), which we address above in connection with Edgington as an anticipating reference. Again, we do not agree that Dr. Dincă's cross-examination testimony about Figure 1 is inconsistent with his declaration testimony, which reasonably reads Edgington for all it contains. Ex. 1003 ¶¶ 102–105. Further, as discussed above, we find that Edgington discloses multiple strategies for extending produce shelf-life using MOFs, by "managing gas exchange and/or storage environment atmosphere carbon dioxide, oxygen, ethylene, water vapor (relative humidity), and other plant related volatiles either singularly, combined, or combinations by adsorption/desorption." Ex. 1004 ¶ 54; *see supra* § II.E.1. Accordingly, we do not find Patent Owner's arguments about Edgington in relation to the obviousness ground persuasive.

Patent Owner does not address Petitioner's arguments that the combined teachings of Edgington, Lee, and Kostansek teach the remaining limitations of claims 6 and 13. Having reviewed Petitioner's contentions and evidence as summarized above, we find that Petitioner shows by a preponderance of the evidence that the combination of Edgington, Lee, and Kostansek teaches all of the limitations of claims 6 and 13.

In addition to its arguments regarding Edgington's disclosure, Patent Owner argues that (1) a person of ordinary skill in the art would not have been led to combine the teachings of Edgington and Lee, or Edgington and Kostansek, because the references teach away from each other and the '216 patent; (2) Petitioner's reliance on Edgington as teaching adsorption of ethylene for its obviousness challenge is inconsistent with adsorbing 1-MCP to later release it to block ethylene receptors and delay ripening, which

Patent Owner asserts is the purpose of the '216 patent; (3) the complexity and unpredictability of gas adsorption for a particular adsorbent material would not have provided a reasonable expectation of success in combining Edgington and Lee; and (4) Kostansek does not disclose impermeable packaging. PO Resp. 49–52.

Patent Owner's argument that Edgington and Lee teach away from each other relies on its assertion that Lee expressly teaches use of an inert material, silica gel, to release 1-MCP, whereas Edgington uses "different adsorbent materials and different adsorbates." PO Resp. 49 (citing Ex. 2005 ¶ 131); PO Sur-Reply (citing Ex. 1006, 1). We do not find this argument persuasive, because Edgington also explicitly teaches silica gel as an adsorbent material. Ex. 1004 ¶¶ 57, 113. Patent Owner's argument also relies on its proposed construction of "adsorption complex," which we have declined to adopt.

As to Patent Owner's argument concerning the unpredictability of whether a specific MOF will adsorb any particular gas, and particularly 1-MCP, we have considered Dr. Walton's testimony and other evidence on which Patent Owner relies, but find that a person of ordinary skill in the art would have had a reasonable expectation of success in combining the references' teachings, as set forth below. First, to the extent Patent Owner relies on Chopra as teaching unpredictability of using MOFs to adsorb a particular gas (PO Resp. 37–39), we do not find Chopra relevant, for the reasons discussed above in connection with Edgington as an anticipating reference. *See supra* § II.E.1. Instead, we find persuasive the fact that Edgington expressly discloses the use of at least four of the MCPNs recited in the challenged claims. Ex. 1004, Table 1, Figure 1. Even though

Edgington's experimental results show varying degrees of success of ethylene adsorption for the identified adsorbent materials, Patent Owner does not dispute that Edgington identifies MOFs that the challenged claims encompass that can adsorb ethylene. PO Sur-Reply 11–12. As to Patent Owner's argument that Edgington teaches away from using magnesium formate as an adsorbent material for ethylene because it resulted in "disgusting" lettuce (PO Resp. 51 (citing Ex. 1004, Figure 10; Ex. 1003 ¶ 137)), we disagree that this teaches that magnesium formate would be unsuitable under conditions other than those specifically tested.

Patent Owner's assertion that Kostansek and Lee do not disclose a 1-MCP impermeable package is based on its proposed construction of "1-MCP impermeable," which we have declined to adopt, and accordingly do not find persuasive. PO Resp. 52–53.

Having considered the evidence and arguments presented by both parties on the present record, we find that sufficient evidence, as discussed above, supports Petitioner's argument that a person of ordinary skill in the art would have combined Edgington's teaching of using MOFs to adsorb ethylene within produce storage systems with Lee's teaching of adsorbing 1-MCP within an adsorbing agent to control release of 1-MCP with produce packaging, and Kostansek's teaching of materials for packaging 1-MCP complexes, with a reasonable expectation of success. We determine that Petitioner's evidence outweighs the evidence Patent Owner cites, including that Lee and Kostansek teach away from Edgington's adsorbent materials, and Dr. Walton's testimony concerning the unpredictability of adsorbing 1-MCP into a specific MOF. Accordingly, we determine that Petitioner has

shown by a preponderance of the evidence that claims 6 and 13 are unpatentable.

2. Claims 7–12 and 14–20

Regarding dependent claims 7–12 and 14–20, Petitioner argues that each of these claims would have been obvious to a person of ordinary skill in the art based on the combination of Edgington, Lee, and Kostansek. Pet. 56–59, 60–62. We address each of these claims below, and incorporate herein our analysis above of the limitations of independent claims 6 and 13, from which these claims depend, and our analysis of the reasons to combine Edgington, Lee, and Kostansek. Patent Owner does not separately challenge Petitioner's arguments and evidence as they relate to these dependent claims. PO Resp. 47, 54.

Claims 7 and 14 recite the additional limitations, respectively, of "the 1-MCP-impermeable package is a capsule, a flexible pouch, or a rigid container" and "the 1-MCP-impermeable package comprises a water-vapor permeable sachet." Ex. 1001. Petitioner directs us to evidence showing that Edgington and Lee teach a sachet, or flexible pouch, made of LDPE, or a rigid container, such as a glass jar. Pet. 35 (citing Ex. 1003 ¶122); Pet. 42 (citing Ex. 1003 ¶ 143; Ex. 1006, C4–C5). Petitioner also asserts that Kostansek teaches PVOH films. *Id.* (citing Ex. 1007, 24:7–33). Petitioner further directs us to a disclosure in the Edgington provisional application (Ex. 1005) of water reading the adsorbent material through a sachet. *Id.* (citing Ex. 1005, Fig. 1, ¶ 64). Accordingly, we find that Petitioner has shown by a preponderance of the evidence that claims 7 and 14 would have been obvious over the combination of Edgington, Lee, and Kostansek.

Claim 8 recites the additional limitation "the 1-MCP-impermeable package is at least partially water-soluble." Ex. 1001. Petitioner directs us to evidence showing that Kostansek teaches packaging a 1-MCP/cyclodextrin complex in PVOH film, which was known to be at least partially water soluble. Pet 35–36 (citing Ex. 1003 ¶ 124; Ex. 1007, 24:7–33). Accordingly, we find that Petitioner has shown by a preponderance of the evidence that claim 8 would have been obvious over the combination of Edgington, Lee, and Kostansek.

Claims 9–11 recite the same limitations relating to mean pore diameter, thermal stability, and accessible pore volume as claims 2–4, respectively. Ex. 1001. As discussed for claims 2–4 above in connection with Edgington as an anticipating reference, Petitioner directs us to evidence showing that Edgington discloses each of these properties of the MCPN. *See supra* § II.E.2. Accordingly, we find that Petitioner has shown by a preponderance of the evidence that claims 9–11 would have been obvious over the combination of Edgington, Lee, and Kostansek.

Claim 12 recites the additional limitation "the 1-MCP is released from the adsorption complex when the MCPN is contacted with at least one aqueous fluid by heat, or by positive or negative pressure." Ex. 1001. Petitioner directs us to evidence showing Lee teaches that moisture enhances desorption of 1-MCP from silica gel, and a person of ordinary skill in the art would have expected the same for release of 1-MCP from an MOF. Pet. 38 (citing Ex. 1003 ¶ 134). Petitioner also relies on Edgington's Figure 1 as disclosing water contacting an MOF, which Petitioner contends that a person of ordinary skill in the art would have understood to trigger the release of adsorbed gaseous molecules. *Id.* (citing Ex. 1003 ¶133). Accordingly, we

find that Petitioner has shown by a preponderance of the evidence that claim 12 would have been obvious over the combination of Edgington, Lee, and Kostansek.

Claim 15 recites the additional limitation "contacting the 1-MCP-impermeable package with an aqueous fluid comprises contacting the 1-MCP-impermeable package via transpirational moisture evolution." Ex. 1001. Claim 20 additionally recites that the transpirational water evolution is "from a packaged plant or plant parts." *Id.* As discussed for claim 13, Petitioner directs us to evidence showing that Edgington and Lee teach using adsorption complexes in produce packaging, and that produce releases water to its storage environment. Pet. 40 (citing Ex. 1004 ¶ 2, Fig. 1; Ex. 1006, 6; Ex. 1003 ¶ 139), 42 (citing Ex. 1003 ¶ 146), 45 (citing Ex. 1003 ¶ 156). Accordingly, we find that Petitioner has shown by a preponderance of the evidence that claims 15 and 20 would have been obvious over the combination of Edgington, Lee, and Kostansek.

Claims 16, 18, and 19 recite additional limitations relating to mean pore diameter ("a mean pore diameter of 50 Å or less"), thermal stability ("thermally stable at a temperature of 575° C or less"), and accessible pore volume ("accessible pore volume of 50% or lower") that are the same as, or overlap the ranges recited in, claims 2–4. Ex. 1001. As discussed for claims 2–4 and 9–11 above, Petitioner directs us to evidence showing that Edgington discloses each of these properties of the MCPN. *See supra* § II.E.2. Accordingly, we find that Petitioner has shown by a preponderance

of the evidence that claims 16, 18, and 19 would have been obvious over the combination of Edgington, Lee, and Kostansek.

Claim 17 recites the same limitation relating to particle size of the MCPN as claim 5. Ex. 1001. As discussed for claim 5 above in connection with Edgington as an anticipating reference, Petitioner directs us to evidence showing that Edgington expressly discloses the particle size distribution of the four listed MOFs that overlaps the recited range. Pet. 43; *see supra* § II.E.2. Accordingly, we find that Petitioner has shown by a preponderance of the evidence that claim 17 would have been obvious over the combination of Edgington, Lee, and Kostansek.

G. Objective Indicia of Non-obviousness

Patent Owner asserts that there is evidence of long-felt but unmet need, failure of others, licensing, and industry praise relating to the subject matter of the challenged claims. PO Resp. 61–63. Patent Owner also asserts that Petitioner has submitted evidence of industry skepticism that weighs in favor of non-obviousness. PO Sur-Reply 19–20 (citing Exs. 1049, 1052, 1055). We address the objective evidence of non-obviousness below.

1. Long-felt but Unmet Need, and Industry Skepticism

Establishing a long-felt but unmet need requires showing that the need was both persistent and recognized by those of ordinary skill in the art. *Orthopedic Equip. Co., Inc. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1382 (Fed. Cir. 1983); *In re Gershon*, 372 F.2d 535, 539 (CCPA 1967). The need must not have been satisfied before the invention of the challenged patent, and the invention of the challenged patent must satisfy the need. *Newell Companies v. Kenney Mfg. Co.*, 864 F.2d 757, 768 (Fed. Cir. 1988); *In re Cavanagh*, 436 F.2d 491, 496 (CCPA 1971).

Patent Owner asserts that there was a need for a 1-MCP carrier that was easier to load and less expensive than α-cyclodextrin after Daly issued in 2000 (PO Resp. 61–62 (citing Exs. 2003, 2045)), and that it took 15 years before Dr. Mir filed the application for the '216 patent, including at least two other failed solutions. *Id.* at 62; PO Sur-Reply 23–24 (citing Exs. 2024, 2043, 2046). As support, Patent Owner directs us to Dr. Oakes's testimony concerning companies from many countries that tried to "cut into AgroFresh's monopoly protected by Daly." PO Resp. 5–6 (citing Ex. 2046, 53–56). As further support, Patent Owner directs us to Dr. Beaulieu's testimony, and to an e-mail Dr. Oakes sent in 2016 stating that "researchers in many countries/companies have tried to find such an effective carrier which could be registered but to no avail." PO Resp. 62 (citing Ex. 2003).

Petitioner argues that the need for an alternative 1-MCP carrier to α-cyclodextrin was due to business-driven market forces, rather than a lack of technical knowledge. Pet. Reply 25. Petitioner asserts that Dr. Beaulieu's testimony does not support a long-felt need, but rather, shows that she lacked knowledge about the full range of marketed 1-MCP products at the time of invention of the '216 patent, which her unawareness of any 1-MCP/MOF product marketed today underscores. Pet. Reply 25 (citing Ex. 1055, 17–21). Petitioner further asserts that the statement in Dr. Oakes's e-mail was self-serving at the time he wrote it,[13] and therefore not as reliable as a statement from a competitor would have been. Pet. Reply 23–24. Petitioner relies on Dr. Ghosh's e-mail, referring to adsorption of gases by

[13] In 2016, Decco, Dr. Oakes's employer, was in a strategic alliance with Dr. Mir involving potential commercialization of the technology in the application for the '216 patent. *See* Paper 21, 2.

MOFs as "not new," likely to "result in high degradation of 1-MCP upon storage," and expensive compared to α-cyclodextrin, and argues that Patent Owner's "contemporaneous reactions to the '216 patent are more probative indicators" of whether there existed an industry-recognized long-felt need. Pet. Reply 24 (citing Ex. 1049).

In response, Patent Owner asserts that Ex. 1049 also includes statements by Dr. Ghosh that are evidence of industry skepticism about adsorption of 1-MCP in MOFs. PO Sur-Reply 21 (citing Ex. 1049, 1). Patent Owner also points to a 2013 e-mail from Dr. Ghosh indicating that 1-MCP's tendency to dimerize and polymerize was well-known, and that "this will be the key issue with the BASF metal-organic frameworks (MOF) because quite a few 1-MCP molecules will be trapped in close proximity and they will react with each other." *Id.* at 20 (citing Ex. 1052, 1).

Having reviewed the parties' arguments and evidence, we determine that there is insufficient evidence to show long-felt but unmet need, or industry skepticism. Dr. Oakes's statement that "researchers in many countries/companies have tried to find such an effective carrier which could be registered but to no avail" (Ex. 2003) is not specific enough as to timing to establish that a need was long-felt, or persistent. Further, we give it less weight because we agree with Petitioner that it was a self-serving statement. The cross-examination testimony of Dr. Oakes to which Patent Owner directs us (PO Resp. 5–6) also does not include evidence of timing that would support a finding of long-felt and persistent need. Similarly, Dr. Beaulieu's Declaration (Ex. 2045) provides insufficient evidence as to when 1-MCP products of other companies were marketed.

As to industry skepticism, we find that the statements in Dr. Ghosh's

e-mails (Exs. 1049, 1052) do not sufficiently establish industry skepticism specifically directed to the subject matter of the challenged claims. For example, Dr. Ghosh's reference to a 1973 paper that discusses the problem of "dimerization and polymerization of cyclopropenes" actually refers to the problem of self-polymerization of cyclopropenes adsorbed in zeolites, not MOFs. Ex. 1052. Similarly, Daly's discussion of self-polymerization problems with storage of 1-MCP (Ex. 1008, 4:41–44) does not relate to a problem with 1-MCP adsorbed in MOFs, but rather to storage in gas tanks.

Thus, we are not persuaded that a preponderance of the evidence supports a finding of long-felt but unmet need or industry skepticism of the subject matter of the challenged claims, in a way that suggests non-obviousness.

2. Industry Praise

As to industry praise, Patent Owner relies on additional statements in Dr. Oakes's 2016 email to support its argument that Petitioner's "contemporaneous reaction to the '216 patent" should be considered as evidence of non-obviousness. PO Resp. 2 (citing Ex. 2003). Specifically, Patent Owner contends that Dr. Oakes praised the '216 patent's technology by extolling the EPA registration of its commercial embodiment as an "accomplishment" that was "hard to overstate" and a reason "to break out the best champagne." *Id.* at 2–3 (citing Ex. 2003). Although Patent Owner attributes the statements of praise to Petitioner "UPL or its privies," as we discuss above, we find Dr. Oakes's e-mail was self-serving at the time he made it, and therefore of little probative value. Patent Owner also relies on a number of exhibits that it asserts refer to the '216 patent as "new" or "novel." PO Resp. 62 (citing Exs. 2003, 2004, 2024, 2026, 2027, 2029,

2030, 2033, 2034). Having reviewed this evidence, some of which consists of statements by the inventor or other types of self-interested statements, we determine that it has limited persuasive value. Further, Patent Owner does not direct us to specific portions of those exhibits that provide industry praise linked to the subject matter of the challenged claims. We therefore determine there is insufficient evidence to support a finding of industry praise.

3. Licensing

As to licensing as objective evidence of non-obviousness, Patent Owner asserts that a licensee took a license to the '216 patent and agreed not to challenge its validity. PO Resp. 8, 62 (citing Ex. 2025). Petitioner does not respond to this assertion.

We agree that the license under the '216 patent supports non-obviousness to some extent. Patent Owner does not direct us to evidence, however, as to whether the license agreement was directed only to the '216 patent, or whether other technology was included. Similarly, Patent Owner directs us to limited evidence of the circumstances surrounding the license agreement, thereby making it difficult to determine on this record whether business reasons other than the merits of the claimed subject matter motivated the licensee to enter into the license agreement. *See In re Antor Media Corp.*, 689 F.3d 1282, 1293–94 (Fed. Cir. 2012) (finding Antor provided no evidence showing that their licensing program was successful either because of the merits of the claimed invention or because they were entered into as business decisions to avoid litigation, because of prior business relationships, or for other economic reasons). On this record, we find that although the license agreement supports non-obviousness of the

'216 patent, we do not give it substantial weight, and we determine that it does not outweigh Petitioner's showing that the claims 6–20 would have been obvious over the combination of Edgington, Lee, and Kostansek.

H. Grounds 3 and 4: Obviousness over Daly and Edgington or Daly, Edgington, and Ho.

Petitioner contends that claims 1–5 and 21 are unpatentable based on the combination of Daly and Edgington, and claims 6–20 are unpatentable over the combination of Daly, Edgington, and Ho. Pet. 45–62. Thus, these grounds of unpatentability challenge claims we have already determined are unpatentable under grounds 1 and 2. Under the circumstances of this case, analyzing additional grounds challenging the same claims, which we have determined to be unpatentable, would not be an efficient use of our time and resources. *See* 35 U.S.C. § 318(a) (providing that the Board "shall issue a final written decision with respect to the patentability of any patent claim challenged by the petitioner and any new claim added" by amendment during the proceeding); Guidance on the Impact of *SAS* on AIA Trial Proceedings (Apr. 26, 2018)[14] ("[I]f the PTAB institutes a trial, the PTAB will institute on all challenges raised in the petition . . . . The final written decision will address, to the extent claims are still pending at the time of decision, all patent claims challenged by the petitioner and all new claims added through the amendment process."). Accordingly, we do not reach Petitioner's asserted grounds based on the combination of Daly and Edgington, or Daly, Edgington, and Ho.

[14] Available at www.uspto.gov/patents-application-process/patent-trial-andappeal-board/trials/guidance-impact-sas-aia-trial.

III. MOTION TO EXCLUDE

Patent Owner moves to exclude Exhibit 1047 submitted by Petitioner. Paper 52. None of Petitioner's papers discuss or cite Exhibit 1047, and we do not discuss or cite Exhibit 1047 in this Decision. Because the presence of Exhibit 1047 in the record, or its exclusion therefrom, would not affect our analysis in this Decision, we dismiss as moot Patent Owner's Motion to Exclude.

IV. CONCLUSION

Petitioner has demonstrated by a preponderance of the evidence that claims 1–5 and 21 of the '216 patent are anticipated by Edgington under 35 U.S.C. § 102.

Petitioner has demonstrated by a preponderance of the evidence that claims 6–20 of the '216 patent would have been obvious over Edgington, Lee, and Kostansek under 35 U.S.C. § 103.

We do not reach Petitioner's additional assertions that claims 1–5 and 21 are unpatentable based on the combination of Daly and Edgington, and claims 6–20 are unpatentable over the combination of Daly, Edgington, and Ho.

I. ORDER

In consideration of the foregoing, it is hereby

ORDERED that claims 1–21 of the '216 patent are held unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is dismissed as moot;

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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