

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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PROAMPAC HOLDINGS INC.,

Petitioner

v.

SIGMA TECHNOLOGIES INTERNATIONAL, LLC,

Patent Owner

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Case IPR2025-01143  
U.S. Patent No. 11,072,148

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**PATENT OWNER'S PRELIMINARY RESPONSE**

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**PATENT OWNER’S EXHIBIT LIST**

| <b>Exhibit No.</b> | <b>DESCRIPTION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| 2001               | ProAmpac’s <i>First Amended Answer and Counterclaims</i> from Parallel Litigation                                                                                                                                                                                                                                                                                                                                                                                               |
| 2002               | Declaration of Steven Yializis                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2003               | Docket Entries from Parallel Litigation (As Of Aug. 27, 2025)                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2004               | Oral Order Entered 08/14/25 in Parallel Litigation Denying (Without Prejudice) ProAmpac’s Motion to Stay Pending IPR                                                                                                                                                                                                                                                                                                                                                            |
| 2005               | Parallel Litigation <i>Scheduling Order</i> entered 03/14/25                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 2006               | Parallel Litigation <i>Joint Stipulation and [Proposed] Order Substituting Parties and Changing Case Caption</i> (filed 06/25/25)                                                                                                                                                                                                                                                                                                                                               |
| 2007               | <i>Defendant/Counterclaim Plaintiff ProAmpac Holdings Inc.’s Initial Invalidity Contentions</i> (served 08/27/25)                                                                                                                                                                                                                                                                                                                                                               |
| 2008               | Dennis Crouch, <i>Estoppel Gutted: A Pelican’s Guide to Patent Litigation</i> , PatentlyO.com (May 7, 2025).                                                                                                                                                                                                                                                                                                                                                                    |
| 2009               | Andrew Zappia, Bryan Smith, and Nicolas Gallo, <i>How IPR Estoppel Ruling May Clash with PTAB Landscape</i> , Law360.com (Jun. 17, 2025).                                                                                                                                                                                                                                                                                                                                       |
| 2010               | Scott R. Boalick, Chief Administrative Patent Judge, <i>Guidance on USPTO’s Recission of ‘Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation,’</i> (Mar. 24, 2025),<br><a href="https://www.uspto.gov/sites/default/files/documents/guidance_memo_on_interim_procedure_recission_20250324.pdf">https://www.uspto.gov/sites/default/files/documents/guidance_memo_on_interim_procedure_recission_20250324.pdf</a> |
| 2011               | Coke Morgan Stewart, USPTO Acting Director, <i>Interim Processes for PTAB Workload Management</i> (Mar. 26, 2025),<br><a href="https://www.uspto.gov/sites/default/files/documents/InterimProcesses-PTABWorkloadMgmt-20250326.pdf">https://www.uspto.gov/sites/default/files/documents/InterimProcesses-PTABWorkloadMgmt-20250326.pdf</a> .                                                                                                                                     |

| Exhibit No. | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| 2012        | <i>Apple, Inc. v. Fintiv, Inc.</i> , IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2013        | <i>Dabico Airport Sol'ns Inc. v. AXA Power APS</i> , IPR2025-00408, Paper 21, 2025 Pat. App. LEXIS 3168 (P.T.A.B. Jun. 18, 2025) (nonprecedential).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2014        | <i>Ecto World, LLC v. RAI Strategic Holdings, Inc.</i> , IPR2024-01280, Paper 13 (P.T.A.B. May 19, 2025) (precedential).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 2015        | <i>Hospira, Inc. v. Genentech, Inc.</i> , IPR2017-00739, Paper 16 (PTAB Jul. 27, 2017) (informative).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 2016        | <i>Motorola Sol'ns, Inc. v. Stellar, LLC</i> , IPR2024-01205, Paper 19 (Stewart Mar. 28, 2025).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 2017        | <i>Samsung Elecs. Co. v. GhengisComm Holdings, LLC</i> , IPR2025-00788, Paper 11 (P.T.A.B. Aug. 25, 2025).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 2018        | <i>Sotera Wireless, Inc. v. Masimo Corp.</i> , IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) (precedential as to § II.A)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2019        | Coke Morgan Stewart, USPTO Acting Director, <i>Enforcement and Non-Waiver of 37 C.F.R. § 42.104(b)(4) and Permissible Uses of General Knowledge in Inter Partes Reviews</i> (Jul. 31, 2025), <a href="https://www.uspto.gov/sites/default/files/documents/aapa_memo_final_signed.pdf?utm_campaign=subscriptioncenter&amp;utm_content=&amp;utm_medium=email&amp;utm_name=&amp;utm_source=govdelivery&amp;utm_term=">https://www.uspto.gov/sites/default/files/documents/aapa_memo_final_signed.pdf?utm_campaign=subscriptioncenter&amp;utm_content=&amp;utm_medium=email&amp;utm_name=&amp;utm_source=govdelivery&amp;utm_term=</a> |
| 2020        | Declaration of Ruoxi Ma, Ph.D.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2021        | Curriculum vitae of Dr. Ruoxi (Rachel) Ma                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2022        | “ <i>Biopolymer Films from Glucomannan: The effects of Citric Acid Crosslinking on Barrier Properties</i> ,” in <i>Journal of Print and Media Research Technology</i> , Research 7(2018)1, 19-25.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2023        | “ <i>Screen Printed Moisture Sensor and Its Application on Smart Packaging</i> ,” in <i>The Technical Association of Graphic Arts Proceedings 2021</i> , pgs. 191-203 (focusing on material-layer substrates and substrates/coating surface interactions)                                                                                                                                                                                                                                                                                                                                                                          |

| Exhibit<br>No. | DESCRIPTION                                                                                                                                                                                                                                                                                                                                          |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2024           | <i>Method for Formulating Silver-Doped Lanthanum Titanate Photochromic Ink</i> (CN103804986A), issued May 21, 2014.                                                                                                                                                                                                                                  |
| 2025           | Friel, John M., and Edwin Nungesser. “ <i>Acrylic Polymers as Coatings Binders.</i> ” Paint and Coating Testing Manual - Fifteenth Edition of the Gardner-Sward Handbook: (MNL 17-2nd), edited by JV Koleske, no. MNL17, ASTM International, 2012, pp. 49–64,<br><a href="https://doi.org/10.1520/MNL12186M">https://doi.org/10.1520/MNL12186M</a> . |
| 2026           | Gündüz, Güngör. <i>Chemistry Materials and Properties of Surface Coatings: Traditional and Evolving Technologies</i> . DEStech Publications, 2015                                                                                                                                                                                                    |
| 2027           | <i>Pigment Coating and Surface Sizing of Paper</i> . Vol. bk. 11., Fapet Oy, 2000. Chapter 6: Binders, section Coating binders, @ page 191. This reference covers binders, including latex and acrylic, their functions, properties, and implications for coating formation.                                                                         |
| 2028           | <i>Recycled Fiber and Deinking</i> . Vol. bk. 7, Fapet Oy, 2000. Chapter 11, page 441-504.                                                                                                                                                                                                                                                           |

## I. INTRODUCTION

The Petition fails to establish a reasonable likelihood that any challenged claim of U.S. Patent No. 11,072,148 (EX1001, the “’148 Patent”) is unpatentable under 35 U.S.C. § 314(a). Rather than pointing to express disclosures in the cited references, Petitioner relies on conclusory expert assertions and hindsight-driven reconstructions to fill gaps the prior art does not supply.

At its core, the ’148 Patent, through its independent claims in the aggregate, requires a low emissivity, paper-containing packaging material incorporating an aluminized polymeric film that (i) is recyclable, (ii) in certain claims, achieves an optical density (“OD”) of  $< 0.09$  during a specific repulping “treatment” (i.e., the repulping test set forth in the claims), and (iii) in all cases oxidizes fully in the resulting pulp during the claimed repulping treatment. These same three elements—recyclability, the treatment, and  $OD < 0.09$ /no visible aluminum—are precisely the limitations missing from Petitioner’s cited art and constitute holes in every ground. None of ProAmpac’s references—alone or in combination—teach these claim-critical requirements. Nor does Petitioner articulate any reasoned motivation with a rational underpinning to combine them.

Reference-by-reference the gaps are the same. Gundlach neither discloses the claimed treatment nor the required recyclability outcomes (including  $OD < 0.09$  / no visible aluminum in the resulting pulp) indeed, Gundlach’s use of heavy weight

polymers is inconsistent with recyclability. Yializis focuses on protecting thin aluminum films from oxidation (as opposed to the '148 patent's claimed controlled oxidation during repulping) and is silent on repulpability. Rebouillat concerns breathable Tyvek® cargo covers/bubble mailers—not repulpable, recyclable paper packaging—and contains no Voluntary Standard treatment or  $OD < 0.09$  result. The Fibre Box Association Voluntary Standard is applicant admitted prior art (“AAPA”) and is (at most) a testing protocol; it does not disclose structures that meet the claims and, when invoked as applicant-admitted background, cannot serve as the basis of a ground.

As detailed below, each Ground fails for the same fundamental reasons. Ground 1 (Gundlach) fails because Gundlach lacks recyclability, lacks the claimed treatment, and lacks  $OD < 0.09$ . Ground 2 (Gundlach + Yializis) fails because Yializis teaches away from the required oxidation and supplies no recyclability, treatment, or  $OD < 0.09$ . Ground 3 (Gundlach + Rebouillat) fails because Rebouillat is non-analogous transport/cargo art, discloses no recyclability/treatment/ $OD < 0.09$ , and otherwise does not fill Gundlach's gaps. Ground 4 (Gundlach + Voluntary Standard) fails because the Voluntary Standard cannot be used as the basis for a ground under § 311(b) since it is AAPA and in any event is only a protocol that cannot cure Gundlach's missing structural limitations. Grounds 5 and 6 (multi-reference stacks) fail because adding Yializis/Rebouillat and the Voluntary Standard

still leaves the same missing elements and rests on hindsight, not an articulated rationale with a rational underpinning. There also is no reasoned motivation to combine the references asserted in Ground 2 – 6.

Petitioner’s case thus reduces to an expert-driven attempt to bridge missing disclosures with generalized *ipse dixit* statements. That is not enough. The Examiner already evaluated the closest art—including metallized films, radiant barrier packaging, and repulpability standards—and allowed the claims for precisely the reasons ProAmpac’s Petition fails: There is no prior art disclosure of a low emissivity packaging combined with the other elements of the claims.

This preliminary response includes the detailed testimony of Dr. Ruoxi (Rachel) Ma (EX2020, “Declaration of Ruoxi Ma, Ph.D.”), whose expertise in metalized films, polymer coatings, and recyclability protocols provides a far more credible, technically grounded analysis than Petitioner’s less qualified declarant, Mr. May. Dr. Ma explains why Gundlach’s base coat polymers are fundamentally incompatible with the repulping treatment and recyclability, why Yializis teaches away from the claimed oxidation goals, and why neither Rebouillat nor the Voluntary Standard supply the missing limitations. Dr. Ma’s testimony, grounded in industry standards and scientific principles, underscores that Petitioner’s expert relies on speculation rather than evidence.

Because the Petition rests on cumulative references, hindsight-driven

combinations, and expert speculation, it falls well short of the statutory threshold required by 35 U.S.C. § 314(a).

In addition, as set forth in the separately filed Patent Owner’s Request for Discretionary Denial brief (Paper 7), institution should be denied under § 314(a) and related precedent because parallel proceedings<sup>1</sup> and equitable factors further weigh against institution. The discretionary factors are particularly strong here given the advanced parallel infringement action pending in the District of Delaware, where ProAmpac is the defendant and the same ’148 Patent is already being litigated. Sigma has granted an exclusive license to Pratt Retail Specialties, LLC, which is enforcing the ’148 Patent in that action (EX1009 ¶7). For these reasons, and for those explained in greater detail in the following sections, institution should be denied.

## **II. SUMMARY OF THE ’148 PATENT**

### **A. The ’148 Patent**

The ’148 Patent discloses and claims a low emissivity recyclable packaging material that, based on a number of claimed criteria, “contains a particular aluminized polymeric film with emissivity of equal to, or less than 0.10 yet sufficiently thin to withstand and satisfy industrial requirements of the recycling process.”<sup>2</sup> EX1001, Abstract. The low emissivity (i.e., high reflectivity) makes the

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<sup>1</sup> *Pratt Retail Specialties, LLC v. ProAmpac Holdings Inc.*, C.A. No. 1:24-cv-1073-RGA (D. Del.).

<sup>2</sup> The term “emissivity” refers to the ability of heat, received by a given surface, to

material highly insulating while post-treatment low optical density leads to transparency of the aluminum, thereby rendering the pulp recyclable. EX2020 ¶39.

The innovative packaging material is illustrated in one embodiment at Figure 6 of the '148 Patent:

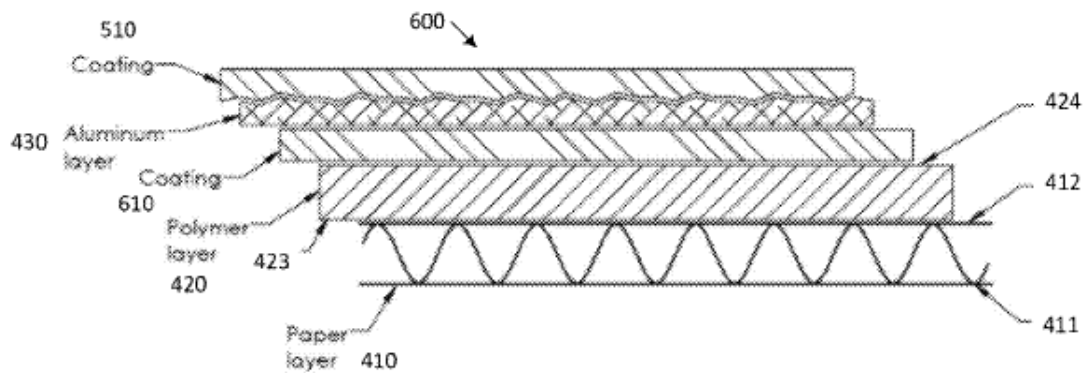


Fig. 6

At the time of the invention, paper-containing packaging with a reflective insulation or radiant barrier insulation was regularly used to facilitate thermal insulation of temperature sensitive food and pharmaceutical goods. EX1001, 1:15-22. Insulation properties were derived from two groups of materials: traditional insulation materials (like foams and fibrous insulation); and reflective insulation (like aluminum foils or other low emissivity material). *Id.* at 3:53-67. Traditional

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radiate from the surface, which is measurable according to the test method discussed in ASTM C1371. *See also* EX1001, 6:29-34.

insulation materials tend to be bulky, sometimes rigid, and significantly increase the overall weight of the packaging. *Id.* Reflective insulation materials contribute significantly less weight to the packaging, however, the method and application of the materials historically made the whole paper-containing package unrecyclable. *Id.*

The '148 Patent explains how it seeks to overcome the limitations of other paper-containing packaging by addressing the “problem(s) caused by the inability of the related art to fully recycle a low-emissivity packaging material.” EX1001, 4:39-41. That is, Steven Yializis and Luke Rogers invented a way to maintain superior thermal insulation while simultaneously ensuring the packaging and materials remain fully recyclable in commercial processes.

“[C]urrent methods and applications of low-emissivity material impairs the recyclability of the total package, which understandably causes problems in related industries. Thus, there is a need for low-emissivity packaging material that is fully recyclable.”

EX1001, 3:65-4:3.

To achieve this goal, the patent teaches various claimed embodiments including various “stack” configurations—low emissivity packaging combined with the unique characteristics not found in the prior art. The “stacks” include combinations of multiple layers of paper (including corrugated fiberboard), polymer,

aluminum, and an optional protective coating. Importantly, all of the configurations maintain complete recyclability in commercial processes as determined through testing described within the patent.

To ensure complete recyclability, the patent discloses a specific repulping treatment based on the Voluntary Standard (EX1007). This treatment requires that the material used in the packaging meet the established industry standards for repulpability and recycling in a two-step performance test. EX1001, 4:64-5:11. The first step assesses repulpability or the ability of a material to be broken down and dispersed into water for use in papermaking.<sup>3</sup> The test requires the material to be blended and disintegrated into water which is then passed over a 0.01” screen. EX1001, 5:12-16. The portion of the material that passes through the screen (considered suitable for reuse) and the portion of the material that does not pass through the screen (considered unusable, sent to landfill) are dried and weighed separately. *Id.* at 5:16-27. If 85% or more of the total material (measured as percentage of total dry weight) is reusable, the material is classified as repulpable. *Id.* at 5:27-30.

The second step determines recyclability of the material. The reusable pulp from step one, called the accepted pulp (or accepts), is pressed into sheets using a Carver press. *Id.* at 5:31-34. The sheets are then inspected for visual defects or

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<sup>3</sup> Smook, Gary A, Handbook for Pulp & Paper Technologists (3d ed. 2002).

“spots” using TAPPI methods. *Id.* at 5:37-53. Dirt, aluminum foil, and polymeric coatings are examples of materials that are commonly found in pulp during the recycling process which result in rejectable visual defects. *Id.* at 5:54-6:4. The ’148 Patent, however, discloses a reflective insulation or radiant barrier that is both visually transparent and does not adhere to the paper material during this treatment. *Id.* at 6:4-9. The low emissivity (i.e., high reflectivity) renders the claimed material a good insulator, and the post-treatment low optical density leads to transparency of the pulp rendering the pulp recyclable. EX2020 ¶39.

Therefore, the claims of the ’148 Patent render the packaging material fully recyclable in commercial processes while maintaining superior thermal insulation for the transportation of temperature-sensitive goods like food, pharmaceuticals and other perishable products.

## **B. The Prosecution History**

The application for the ’148 Patent was filed on January 1, 2019 as application no. 16/238,998 (the “’998 Application”) claiming the benefit of U.S. Provisional Patent Application no. 62/614,568 filed on January 8, 2018. The ’998 Application was filed with 16 claims, including five (5) independent claims. *See* EX1002, “Prosecution File History for U.S. Patent No. 11,072,148.” On July 11, 2019, the ’998 Application was published as U.S. Patent Application Publication No. US-2019-0210321-A1. *Id.* at 76.

During prosecution, on June 25, 2020, the Office issued a non-final office action initially rejecting all 16 claims under, *inter alia*, 35 U.S.C. § 103 as being unpatentable over various combinations of Tilton (US 2017/0272163) in view of Shimizu et al. (US 2017/0129216; “Shimizu”), Wadsworth et al. (US 2011/0020570; “Wadsworth”), and Gregory (US 4,952,278; “Gregory”). *Id.* at 77-101. On the same date as the non-final office action, the Office filed its Notice of References Cited listing nine references that were considered by the Examiner, including not only the four cited in the § 103 rejection, but also *inter alia* U.S. Patent Publication No. 2018/0022073 to Sasaki et al. (“Sasaki”). *Id.* at 102; *see also* EX1001, References Cited.

None of these references disclosed the critical elements of the '148 Patent. Tilton discloses multilayer radiant barrier laminates but uses protective polymer films that increases emissivity and adds non-repulpable weight. Tilton does not disclose recyclability under the Voluntary Standard,  $OD < 0.09$ , or maintaining emissivity  $\leq 0.10$  during and until repulping. Shimizu teaches metallized structures for barrier films but is focused on adhesion and barrier properties, not recyclability or controlled oxidation. Shimizu has no disclosure of emissivity  $\leq 0.10$  or  $OD < 0.09$ . Wadsworth deals with barrier boards with polymer coatings. Its emphasis is moisture/oxygen barriers and does not address recyclability or aluminum emissivity/OD. Gregory is directed to high-opacity paper using expanded fibers and

pigments, unrelated to emissivity, OD, or recyclability. Sasaki discloses multilayer gas-barrier laminates for food/electronics packaging, with focus on durability/adhesion. Sasaki includes no teaching of recyclability or the claimed treatment steps. In short, the closest art failed to disclose low emissivity coupled with (i) recyclability, (ii) the claimed treatment protocol, or (iii) the OD <0.09 result.

Patent Owner responded to the non-final office action on December 22, 2020 addressing all issues raised in the non-final office action. EX1002, 116-134.

It was against this backdrop that the Examiner explicitly allowed the '148 Patent, stating that the cited art failed to teach maintaining emissivity  $\leq 0.10$  coupled with (i) recyclability, (ii) the claimed treatment protocol, or (iii) the OD <0.09 result. These same three missing elements remain absent from Petitioner's references here. On March 29, 2021, the Office issued a Final Office Action allowing claims 8-16 and rejecting claims 1-7. *Id.* at 136-47. Dependent claims 4 and 5 were deemed to be allowable if rewritten in independent form, including all of the limitations of the base claim. Subsequently, Patent Owner filed its Response after Final Action on April 5, 2021. *Id.* at 157-65. In response, Patent Owner amended independent claim 1 to include limitations of the allowable claim 4, which now placed claims 1-7 in condition for allowance.

On April 28, 2021, the Office mailed its Notice of Allowance and Fee(s) Due, in which claims 1–3 and 5–16 were allowed. *Id.* at 168-74. In its Allowability Notice, the Office stated as reasons for allowance that:

- Regarding claim 1, the most relevant prior art is Tilton and Shimizu. The combination of Tilton and Shimizu do not disclose maintaining the emissivity at the claimed value.
- Regarding claims 8 and 10, the most relevant prior art is Tilton. The cited prior art fails to disclose or make obvious said aluminum layer acquiring and [sic] optical density of less than 0.09.
- Regarding claims 15 and 16, the most relevant prior art is Tilton. The cited prior art fails to disclose or make obvious the packaging having an emissivity that is equal to or smaller than a first value of 0.10. [*Id.*]

These reasons for allowance mirror the same deficiencies in Petitioner's references today: none of them disclose low emissivity packaging coupled with (i) recyclability, (ii) the claimed treatment protocol, or (iii) the  $OD < 0.09$  result. The Examiner's reasoning remains fully applicable here.

The '148 Patent issued on July 27, 2021 with 15 claims, including five independent claims (EX1001).

### **III. CLAIM CONSTRUCTION**

Consistent with the positions of the Patent Owner's exclusive licensee in the

related district court litigation, the Board should apply plain and ordinary meaning, informed by the specification and prosecution history, to all challenged claim terms under the standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Indeed Dr. Ma acknowledges that she did not require more than a plain and ordinary meaning of the claim terms and further noted that “Mr. May too said it was not necessary to engage in claim construction” for the ’148 Patent analysis. EX2020, ¶32.

For purposes of this Preliminary Response, Patent Owner acknowledges that the Petition states that “no terms need construction to resolve the controversy in this forum” (Paper 1, 10) and therefore does not adopt any meanings other than the plain and ordinary meaning of terms in view of the specification and prosecution history.<sup>4</sup> To the extent Petitioner advances extra-textual constructions that broaden or narrow the claims beyond what a skilled artisan would understand from the intrinsic record, those proposals should be rejected as inconsistent with *Phillips* and its progeny. See *Phillips*, 415 F.3d at 1312–14.

Accordingly, and in alignment with Patent Owner’s positions in the parallel district court action, the Board should resolve this IPR under the plain-and ordinary-meaning standard.

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<sup>4</sup> In the district court litigation, however, Petitioner has asserted that 10 claim terms require construction as well as 6 terms that Petitioner deems to be indefinite and/or lacking enablement.

#### **IV. LEVEL OF ORDINARY SKILL IN THE ART**

Patent owner submits that a person of ordinary skill in the art (“POSITA”) would have had at least a bachelor’s degree in packaging, chemical engineering, materials science, or paper engineering, or an equivalent field, and at least 5 years of experience in developing or evaluating packaging materials. Relevant experience could include repulpability and recyclability of barrier films, laminates, coatings, recyclability assessments, or thermal management in packaging applications. Additional academic training (e.g., a master’s degree) could compensate for less work experience, and conversely, more extensive work experience could compensate for formal education. Such a person would have been familiar with commonly used packaging materials (paper, polymers, thin films, metalized layers), as well as with standard testing methods used in the field (e.g., recyclability, repulpability, and barrier performance). EX2020, ¶31.

Patent Owner submits that this definition of POSITA is more accurate than Petitioner’s POSITA, but Patent Owner is not aware of an issue raised by the Petition where the difference in the definition of POSITA impacts the outcome.

#### **V. PRIOR ART CITED**

##### **A. Gundlach (EX1005)**

Gundlach discloses “a film for use in association with packaging useable with foodstuffs having product contact.” EX1005, Abstract. While Gundlach appears to

overlap superficially with the '148 Patent, its purpose and teachings are entirely different. Gundlach only identifies the problem of recyclability of thermal packaging materials in passing—acknowledging that prior art packaging was “not well suited for recycling or composting” (*Id.* at [0006]) and that it “would be advantageous” to develop packaging combining low emissivity with recyclability (*Id.* at [0007])—Gundlach, however, *never provides that solution*.

Instead, Gundlach’s base coat structures employ high-molecular-weight polymers that are fundamentally *incompatible* with the repulping treatment or recyclability required by the '148 Patent and would, in fact, create “significant recycling problems, not advantages.” EX2020, ¶¶48, 50, 70.

Gundlach tests performance of its packaging material by measuring the leaching of liquids—specifically, pickle juice and peanut oil. EX1005, [0052]. Using various stack configurations and layer thicknesses, performance was rated based on the amount of liquid that “leached through the different layers and began to saturate the base material.” *Id.* at [0057].

Gundlach’s only discussion of thermal insulation is disclosure of a metallized layer applied “directly to the outer base layer in an optical density of between 1.5 and 4.5 optical density.” EX1005, [0009]. Not only does this fall far outside of the range established by the '148 Patent (0.09 or less), but the overall structure Gundlach discloses is unrecyclable. Indeed, Gundlach never mentions recyclability of its

disclosed structure, under any treatment, much less the claimed treatment, and the reference never produces the full, post-treatment oxidation outcome required by the claims.

Gundlach also is cumulative of the art already considered during prosecution; and institution of the Petition should be denied under 35 U.S.C. § 325(d) for this reason in addition to the other reasons addressed herein. The Examiner reviewed prior metallized packaging references—including Tilton, Shimizu, Wadsworth, Gregory, and Sasaki—all of which disclosed low-emissivity laminates but failed to show the claimed combination of (i) emissivity  $\leq 0.10$ , tied together with (ii) recyclability under the claimed repulping treatment, and (iii) OD  $< 0.09$ /"no visible aluminum." (see, for example, "Reason's for Allowance", EX1002 at p.173.) Gundlach also discloses metalized packaging and low-emissivity laminates but does not supply these same missing elements. It mentions low-emissivity foil layers but does not disclose emissivity values in the claimed range, does not tie emissivity to recyclability or oxidation outcomes, and does not disclose the required treatment or OD threshold. Furthermore, Petitioner never addresses why the Examiner's detailed analysis during prosecution and subsequent reasons for allowance was erroneous. Where a petition does nothing more than re-argue substantially the same teachings without showing examiner error, the Board should deny institution.<sup>5</sup>

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<sup>5</sup> See *Ecto World, LLC v. RAI Strategic Holdings, Inc.*, IPR2024-01280, Paper 13 at

**B. Yializis (EX1006)**

Yializis presents a study in minimizing the oxidation and corrosion of vacuum deposited aluminum. EX1006, Abstract. The stated purpose of Yializis is “to identify multi-layer, thin film, structures capable of withstanding extreme environments...designed to *protect thin films from the effects of corrosion and oxidation.*” (emphasis added) *Id.* at 755.

This objective is the polar opposite of that of the '148 Patent. The '148 Patent seeks to maintain a low emissivity using a deposited aluminum layer that is achieved through such a particular application, while also ensuring the aluminum is fully oxidized in the recycling process for sufficient repulplability. That is to say, the '148 Patent discloses and claims a structure with an aluminum layer that has low emissivity (i.e., high reflectivity) while in use, but then degrades by becoming fully oxidized during the repulping process. Yializis, by contrast, seeks to maintain emissivity by preventing aluminum oxidation through passivation layers and polymer coatings (*Id.* at 756). Its teaching is not only silent on recyclability but actively discourages the controlled oxidation required by the claims (i.e., the

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6 (USPTO Dir. May 13, 2025) (precedential) (“[I]f the Examiner applied the asserted prior art or substantially the same prior art during examination, then a petitioner must demonstrate that, for example, the previously presented art teaches the limitations of the challenged claims, and that no reasonable examiner could have found otherwise.”); *see also id.* at 7 (“Petitioner should identify and explain the Office’s alleged error in issuing the challenged patent and why that error is material to patentability.”).

aluminum layer is durable). EX2020, ¶57.

Further, Yializis contains no disclosure of recyclability or repulpability testing, no reference to the Voluntary Standard, and no OD values under repulping conditions. Its multilayer, anti-oxidation strategies are fundamentally incompatible with the repulping-driven oxidation outcomes required by the '148 Patent.

In summary, there is no indication that Yializis contemplated the use of the aluminum for fully recyclable, thermally insulated packaging at the time of its publication.

### **C. The Voluntary Standard Reference (EX1007)**

The Voluntary Standard Reference is cited in the '148 Patent only as the industry protocol for evaluating repulpability, not as a structural disclosure. The specification states:

“Repulping is the first stage in paper recycling. Features of the method employed for testing the repulpability of a paper-based containers are summarized in Part I of the document titled ‘The Voluntary Standard For Repulping and Recycling Corrugated Fiberboard Treated to Improve Its Performance in the Presence of Water and Water Vapor’, published by the Fibre Box Association (available at fibre-box.org), *the disclosure of which is incorporated herein by reference for all purposes.*”

(emphasis added) EX1001, 4:64-5:5.

The '148 Patent then restates the first repulpability step of the Voluntary Standard protocol to define the claimed “treatment.” *Id.* at 5:11-6:23. But critically, the Voluntary Standard itself is only a test method. It prescribes how to measure fiber yield, stickies count, and recyclability, but does not disclose any packaging structures, aluminized films, or OD outcomes that would satisfy the claims. A protocol is not a teaching of the structures required to pass that protocol.

The Petition itself characterizes the Voluntary Standard as the admitted industry test. For example, Petitioner cites the '148 Patent's express incorporation of the Voluntary Standard as “evidence” that the test was known and used in the field (Petition at 6–7, *citing* EX1001, 4:64-5:11). Petitioner goes further and states: “The Voluntary Standard Reference is *admitted prior art* [.]” (emphasis added) *Id.* at 6. Petitioner has thus clearly and unmistakably characterized the Voluntary Standard reference as applicant-admitted prior art (AAPA). Under Federal Circuit precedent, AAPA cannot serve as the “basis” of an IPR ground. *See Qualcomm Inc. v. Apple Inc.*, 134 F.4th 1355 (Fed. Cir. 2025) (confirming AAPA cannot serve as the basis of an IPR ground under § 311(b)).

Thus, the Voluntary Standard is limited in two critical respects: (1) as a testing protocol, it cannot disclose the claim elements of recyclable structures or OD <0.09/substantially transparent outcomes; and (2) when invoked as AAPA—as Petitioner has done here—it *cannot* serve as the basis for an IPR ground under §

311(b). For these reasons, the Voluntary Standard cannot cure Gundlach’s missing limitations.

**D. Rebouillat (EX1008)**

Rebouillat describes “a breathable product for protecting articles in mass transportation and cold chain applications.” EX1008, [0002]. More specifically, Rebouillat addresses the buildup of humidity and condensation resulting in a “greenhouse effect” inside packages containing temperature-sensitive goods that are exposed to surface temperature changes. *Id.* at [0005]. Rebouillat focuses on testing the water vapor transmission rate of packaging that contains distinctly different layers for a purpose entirely different than that of the ’148 Patent.

Rebouillat’s configurations include such variations as: a “reflective sheet...made of a Tyvek®” (*Id.* at [0032]); “a low emissivity fire retardant cover” (*Id.* at [0033, 0034, 0035]); “honeycomb or similar non-woven structure...and a protective lacquer” for improved structural strength (*Id.* at [0037]); and “an active cooling layer (ACL)...a sealed enclosure containing a wicking sorbent imbibed with a liquid coolant in which the phase changes take place (liquid-vapor, vapor-liquid) (*Id.* at [0038]). All of these layers in the stack would necessarily negatively impact the recyclability of the packaging as a whole though no consideration is given to it in the totality of Rebouillat—because it is not an objective of the material or a problem it seeks to solve.

While Rebouillat does seek to capture a low emissivity in its material configuration, its optimal range of emissivity is far outside and above that of the '148 Patent:

“A further aim of the present invention is to improve the thermal insulation properties of a cover or sheet through a combination of layers preferably having on its inner surface a layer having a low emissivity of less than 0.35, preferably less than 0.25, and more preferably less than 0.15 so as to reduce radiant heat transfer from the sheet to the protected product or cargo.”

EX1008, [0043].

## **VI. Improper Ipse Dixit/“Common Sense by Another Name”**

Petitioner’s declarant, Mr. May, never uses the phrase “common sense,” but repeatedly couches missing claim elements in statements that are nothing more than attorney argument dressed up as expert opinion. The law is clear: conclusory statements by an expert—without factual support in a patent or printed publication—cannot fill missing limitations. See *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380–81 (Fed. Cir. 2016) (rejecting reliance on conclusory expert assertions); *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363 (Fed. Cir. 2016) (warning against invoking “common sense” to supply missing claim limitations); 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data ... is entitled

to little or no weight.”).

Mr. May does precisely what precedent forbids. For example:

- ¶90: asserts that it was “common at the time of the invention to measure emissivity” using ASTM C1371, but provides no evidence that Gundlach or any other prior art reference actually measured emissivity at all.
- ¶105: claims it was a “common consideration” to make coatings “as thin as possible” (<1 micron) but cites no prior art teaching or data supporting this alleged practice.
- ¶¶156-157: declares that a POSITA “would have been familiar” with Yializis techniques and “standard, predictable stacks” without pointing to any structural disclosure in Gundlach or Yializis that meets *inter alia* the claim’s recyclability and OD <0.09 requirements.
- ¶¶185-186: repeats the mantra that the claimed laminates were “standard, predictable” and “well-known” but never ties this to any actual teaching of recyclability, oxidation, or OD thresholds—much less in any of the cited references.
- ¶¶205-206: concludes that a POSITA would have “embraced” recyclable packaging and “readily turned to the Voluntary Standard” because it was “widely considered the gold standard”—again without a printed publication that supplies the missing structural limitations.

EX1003.

These are precisely the kinds of conclusory expert assertions that the PTAB and Federal Circuit have cautioned against: they substitute unsupported opinion for evidence. Petitioner fails to carry its burden of proof under 35 U.S.C. § 316(e), and improperly attempts to base a ground on expert *ipse dixit* rather than patents or printed publications as required by § 311(b).

**VII. Ground 1 Fails: Gundlach does not disclose each and every element of Claims 1-2, 4, 6-11, and 13-15.**

In Ground 1, Petitioner asserts that claims 1-2, 4, 6-11, and 13-15 are anticipated by Gundlach. To anticipate a claim, a prior art reference must disclose *every limitation* of the claimed invention, either expressly or inherently. *Rapoport v. Dement*, 254 F.3d 1053, 1057 (Fed. Cir. 2001). The question of anticipation is not whether a prior art reference suggests the claimed subject matter, but whether one skilled in the art would reasonably understand or infer from a prior art reference that every claim element is disclosed in that reference. *AstraZeneca LP v. Apotex, Inc.*, 633 F.3d 1042, 1055 (Fed. Cir. 2010). Where even one limitation is missing, anticipation fails. And here Petitioner's anticipation theory fails at the outset because Gundlach (EX1005) does not disclose *several* claim-critical limitations of the '148 Patent.

Petitioner attempts to salvage Gundlach by relying on their expert's *ipse dixit*

that the missing elements are inherently present. Inherency, however, requires *necessity*, not mere possibility. “To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is *necessarily present* in the thing described *in the reference*, and that it would be so recognized by persons of ordinary skill.” *Cont’l Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991)(emphasis added). Inherency therefore requires that the limitation be necessarily present in the prior art reference itself, not supplied by another reference or introduced by hindsight.

Ground 1 fails this standard. Gundlach does not disclose, either expressly or inherently: a low emissivity packaging coupled with (i) the requirement that the packaging or material be recyclable; (ii) repulping under the required “treatment”; or (iii) the optical density (“OD”) requirement of less than 0.09 after repulping. Each gap is fatal to anticipation.

**A. Gundlach Does Not Disclose Repulpability or Recyclability**

Each independent claim of the ’148 Patent (claims 1, 7, 9, 14, and 15) expressly recites “recyclable packaging” and requires packaging that is *recyclable*, including full oxidation of the aluminum layer in the accepts during repulping (see, e.g., EX1001, 5:12-6:9; 9:58-10:67).

By contrast, while Gundlach acknowledges—in passing—that *prior art*

packaging was “not well suited for recycling or composting” (EX1005, [0006]) Gundlach *never* provides a solution. In the Petition, ProAmpac attempts to assert anticipation by making general statements that Gundlach’s “packaging material [has] characteristics that are well suited for paper recycling and commercial or industrial composting” (Petition at 18, *citing* EX1005 at [0007], [0009], [0025]-[0027], [0032]-[0036]). But Gundlach *never actually discloses a recyclable packaging*.

As Dr. Rachel Ma explains:

“While this might suggest Gundlach intended to solve this problem, Gundlach did not. Nowhere in the rest of Gundlach is there any discussion regarding how and why the packaging of Gundlach solves this problem. Indeed, the packaging of Gundlach does not.”

EX2020, ¶44.

Dr. Ma further explains that Gundlach’s base coat structures employ high-molecular-weight polymers that are *incompatible* with the repulping treatment or recyclability of the claims and would, in fact, create “significant recycling problems, not advantages” (EX2020, ¶¶48, 50, 70).

Gundlach does not disclose a recyclable material and therefore does not anticipate under § 102.

**B. Gundlach Does Not Disclose the Claimed “Treatment”**

Each independent claim of the '148 Patent (claims 1, 7, 9, 14, and 15) expressly requires packaging that is *recyclable* through a multi-step repulpability/recyclability process (“treatment”), including full oxidation of the aluminum layer in the accepts during repulping (see, e.g., EX1001, 5:12-6:9; 9:58-10:67). In fact, the independent claims all include claim elements that call for a “treatment” of specific repulping protocols that result in recyclable material: a) blending..., b) disintegrating..., c) separating..., and d) drying. Gundlach does not disclose the claimed “treatment” either expressly or inherently.

Dr. Ma confirms that Gundlach “references no standard or test regarding repulpability or recyclability.” (EX2020, ¶49). In fact, the only testing that Gundlach is concerned with is the leaching of pickle juice and peanut oil into paper substrates (EX1005, [0052]-[0103]) (EX2020, ¶49). Such liquid barrier tests bear no relation to the repulping and oxidation protocols that define recyclability in the '148 Patent.

The Petition’s attempt to import the Voluntary Standard into Gundlach cannot salvage anticipation, because anticipation must be found *within a single reference*. The missing “treatment” cannot be supplied by another reference. Petitioner’s argument fails because recyclability and the specific claimed repulping treatment and claimed outcomes is not necessarily present in Gundlach’s disclosure, especially “where Gundlach’s base coat structure includes high molecular weight polymers that

are not recyclable under industry standards.” (EX2020, ¶71). A POSTIA, therefore, would not read Gundlach and determine that the required recyclable packaging achieved through a multi-step repulpability/recyclability process, including full oxidation of the aluminum layer in the accepts during repulping, was necessarily present in Gundlach.

Gundlach does not disclose the required “treatment” and therefore does not anticipate under § 102.

**C. Gundlach Does Not Disclose the Optical Density Requirement After Repulping Treatment**

Independent claims 7 and 9 add the express requirement that the aluminum acquires  $OD < 0.09$  under the treatment. The ’148 Patent sets this threshold explicitly as the line between visible aluminum and transparent, fully oxidized aluminum. EX1001, 10:47-67. This low OD value is critical: it is a measurable proxy for full oxidation of the thin aluminum film that makes it into the pulp, thereby ensuring that no visible aluminum remains and the recycled sheets are free of flakes, specks or spots.

Gundlach never teaches this. The Petition attempts to map Gundlach’s disclosure of optical density values (EX1005, [0044]-[0045]) to the claims, but those values are entirely unrelated to recyclability or the repulping protocol recited in the ’148 Patent. The ’148 Patent makes clear that  $OD < 0.09$  serves as a proxy for full oxidation of the thin aluminum layer during repulping, rendering the material

visually transparent and thus recyclable. EX1001, 10:52-67. By contrast, Gundlach discloses OD values as high as 2.0–4.0, and does so only in the context of radiant barrier performance, not recyclability or repulpability. EX1005, [0044].

Dr. Ma explains that “[t]he optical density measurements disclosed in Gundlach are not taken in the context of a repulpability test and are well above the low claimed range of the ’148 Patent – below 0.09 in the claims and the lowest disclosed in Gundlach is 2.0.” EX2020, ¶72. Since, as discussed, above, Gundlach’s use of thick, high-molecular weight polymers forecloses the possibility of accomplishing the repulping treatment or recyclability of the claims and would, in fact, create “significant recycling problems, not advantages” (EX2020, ¶¶48, 50, 70), a POSITA would recognize that the ’148 Patent’s requirement that the aluminum layer achieve an optical density (“OD”) of less than 0.09 *after* undergoing the defined repulping treatment would be fundamentally incompatible with the structures of Gundlach.

Petitioner’s inherency theory—that Gundlach necessarily produces  $OD < 0.09$  after repulping—improperly imports the ’148 Patent’s disclosure into Gundlach. Inherency requires that the limitation be necessarily present in the prior art reference itself, not introduced by hindsight. Importing disclosure from the ’148 Patent itself into a cited reference is classic impermissible hindsight.<sup>6</sup>

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<sup>6</sup> “To draw on hindsight knowledge of the patented invention, when the prior art

Thus, even if Gundlach mentions OD values, they are fundamentally disconnected from the repulping/oxidation context required by the claims. A POSITA would not read Gundlach as disclosing, inherently or expressly, the '148 Patent's requirement that the aluminum layer achieve an optical density ("OD") of less than 0.09 *after* undergoing the defined repulping treatment.

Gundlach does not disclose this necessary requirement and therefore does not anticipate under § 102.

**D. The Dependent Claims are Patentable for the Same Reasons as Their Respective Base Claims**

Each dependent claim incorporates the full set of limitations from its respective base claim, and Petitioner's failure to show that the base limitations are taught or suggested is dispositive. At a minimum, claims depending, either directly or indirectly, from and including the patentable aspects of independent claim 1 (e.g., claims 2-6), claim 7 (e.g., claim 8), and claim 9 (e.g., claims 10-13) are patentable by virtue of that dependency. *Minnesota Mining and Mfg. Co. v. Chemque, Inc.*, 303 F.3d 1294, 1299 (Fed. Cir. 2002); *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988). Moreover, several dependent claims add further narrowing features beyond the already-missing base limitations, which the Petition likewise does not substantively

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does not contain or suggest that knowledge, is to use the invention as a template for its own reconstruction—an illogical and inappropriate process by which to determine patentability.” *Sensonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1570 (Fed. Cir. 1996).

map to the art.

**E. Conclusion on Ground 1**

Ground 1 fails. Gundlach identifies a problem in the art but discloses no solution. It does not disclose recyclable packaging, the required repulping treatment, or the OD <0.09 outcome. Anticipation fails where any single limitation is missing. Here, multiple limitations are absent.

Independent claims 1, 14 and 15 require the claimed “treatment” and “fully oxidized with no visible aluminum present. Gundlach lacks both disclosures. Independent claims 7 and 9 require the claimed “treatment” and OD <0.09. Gundlach lacks both disclosures. All of the independent claims 1, 7, 9, 14, and 15 require that the packaging be recyclable. Gundlach’s base coat structure creates “significant recyclability problems” and, therefore lacks recyclability.

**VIII. Ground 2 Fails: Yializis does not cure the deficiencies of Gundlach.**

In Ground 2, Petitioner asserts that all claims 1–15 are obvious over Gundlach in view of Yializis. The ground fails at the threshold. Gundlach, as discussed above, does not disclose recyclable packaging, the required repulping treatment, or an OD <0.09 outcome. Yializis does not supply these missing limitations—indeed, it teaches in the opposite direction by protecting aluminum from oxidation. Petitioner fails to provide the reasoned rationale with a rational underpinning required under *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007), and *In re Kahn*, 441 F.3d

977, 988 (Fed. Cir. 2006). The combination theory is driven by hindsight rather than evidence and, even if there was a motivation to combine, Yializis does not cure the deficiencies in Gundlach.

**A. Yializis Teaches Protection Against Oxidation, *Not* Oxidation for Recyclability**

The '148 Patent claims depend on aluminum films that are reflective enough to perform as radiant barriers during use, but thin enough such that they *oxidize completely under the repulping treatment*, leaving “no visible aluminum present” (EX1001, 5:12-6:9; 9:58-10:67).

By contrast, Yializis is directed to the opposite goal: preventing oxidation and corrosion of thin vacuum-deposited aluminum. Yializis describes “multi-layer, thin film, structures capable of withstanding extreme environments ... designed to protect thin films from oxidation and corrosion” (EX1006, p. 755, right col.). Its goal is to *preserve* low emissivity performance of metallized films by shielding aluminum from corrosion and oxidation in humid or hot conditions. It proposes plasma passivation and polymer over-coatings to prevent aluminum oxidation. EX1006, 757 *passim*.

Thus, far from supplying the claimed feature, Yializis *teaches away* from it. A reference teaches away when it “criticize[s], discredit[s], or otherwise discourage[s]” the path urged by the challenger. *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016). *See In re*

*Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) (“A reference may be said to teach away when a person of ordinary skill...would be led in a direction divergent from the path taken by the applicant.”).

A POSITA reading Yializis would understand that its multilayer structures are designed to *prevent* oxidation, not achieve it. Specifically, the '148 Patent claims require that the portion of the thin aluminum layer that make it into the paper pulp oxidize fully during repulping, as measured by OD < 0.09 of the accepts and visual transparency. EX1001, 9:58-10:67. Dr. Ma explains that this is a fundamental incompatibility: the claims of the '148 Patent intentionally tailor film thickness so that the aluminum is oxidized during repulping/recycling, while Yializis designs multilayer coatings to avoid that very outcome. EX2020, ¶¶52-58.

Yializis points a POSITA away from controlled oxidation for recyclability. A POSITA would recognize these teachings as opposite in purpose and would not be motivated to look to Yializis to cure the deficiencies of Gundlach.

**B. Yializis Does Not Disclose the Required Recyclability or Treatment**

Like Gundlach, Yializis is silent on recyclability. It contains no reference to recyclability or any repulpability protocol, and it reports no results under such a treatment. EX1006, *passim*. As Dr. Ma explains, “The Yializis article does not address the repulpability and recyclability issues relating to low emissivity, thin aluminum layered packaging material addressed in the '148 Patent...There is no

discussion regarding recyclable fiber yield, stickies count, optical density in connection with repulping or any other recyclability matrix.” EX2020, ¶¶56-57.

Petitioner cannot cure the missing recyclability or treatment steps into Gundlach by citing Yializis, because Yializis discloses none of them.

**C. Yializis Does Not Disclose the Optical Density Requirement**

Independent claims 7 and 9 require that, under the treatment, the aluminum acquires an OD <0.09. Yializis nowhere discloses OD values under recycling or repulping conditions. Its focus is on *maintaining barrier performance* of metallized films in extreme environments, not transparency or disappearance of aluminum after treatment. EX1006, 755-757.

Thus, even if combined with Gundlach, Yializis does not remedy Gundlach’s failure to disclose the OD <0.09 outcome.

**D. No Reasoned Motivation to Combine**

Petitioner offers no record-supported rationale for why a POSITA would combine Gundlach’s non-recyclable, thick metallized basecoat structures with Yializis’ corrosion-resistant multilayers. To the contrary, such a combination is internally inconsistent: Gundlach seeks liquid-resistant radiant barrier layers, and Yializis teaches protecting thin Al films from oxidizing. The claimed invention, by contrast, requires oxidation during repulping. A POSITA would not be motivated to combine Gundlach and Yializis to arrive at the claimed repulpable, oxidize-away

recyclable packaging. Petitioner’s assumption to combine lacks the “articulated reasoning with some rational underpinning” that the Federal Circuit requires. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

On the record, there is no “gap” in Gundlach that points a POSITA to Yializis’s anti-oxidation strategies and invoking generalities about what was “common knowledge” to a POSITA cannot substitute for a concrete, evidence-based reason a POSITA would have re-engineered the base-coat structured stack of Gundlach to include the thin-film anti-oxidation strategies of Yializis. A skilled artisan would have no expectation of success in adapting Yializis’ anti-oxidation strategies to Gundlach’s food packaging stacks, much less to achieve the ’148 Patent’s repulpability outcomes.

As Dr. Ma notes:

“The Yializis article does not address the repulpability and recyclability issues relating to low emissivity, thin aluminum layered packaging material addressed in the ’148 Patent. Indeed, while the ’148 Patent seeks full oxidization during the pulping test, the Yializis article describes a protective layer to prevent the oxidization and corrosion of the aluminum layer.”

EX2020, ¶56.

As a result, the Petition’s combination of Yializis to fill the gaps of Gundlach rests on conjecture rather than “articulated reasoning with some rational

underpinning,” and thus runs afoul of the Federal Circuit’s requirement in *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006), and *KSR*’s admonition against hindsight, *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–22 (2007).

#### **E. Conclusion on Ground 2**

Gundlach lacks the claim-critical elements of recyclability, treatment, and OD <0.09. Yializis does not cure these deficiencies and, in fact, teaches in the opposite direction—protecting aluminum films from oxidation. Petitioner’s proposed combination rests on hindsight, not on a record-supported rationale with a rational underpinning. Dr. Ma confirms that, “the Gundlach/Yializis article combination still has the three gaps discussed above – no recyclability, no Voluntary Standard and no optical density measure in the context of the repulpability treatment.” EX2020, ¶73. Ground 2 therefore fails.

On this record, the obviousness ground fails as to claims 1-15, and the Board should deny institution for lack of a reasonable likelihood of prevailing under § 103.

#### **IX. Ground 3 Fails: Rebouillat does not cure the deficiencies of Gundlach.**

In Ground 3, Petitioner asserts that claims 1–2 and 4–15 are obvious over Gundlach in view of Rebouillat. This ground fails for multiple reasons. First, as explained in Grounds 1 and 2, Gundlach does not disclose recyclable packaging, the required repulping treatment, or the OD <0.09 outcome. Second, Rebouillat is non-analogous art, directed to barrier films for bubble-wrap and cargo covers, not

recyclable food packaging. Third, Rebouillat, like Yializis, does not disclose or suggest the missing claim limitations, but instead teaches away from the oxidation-for-recyclability design of the '148 Patent. Finally, Petitioner fails to supply the record-supported rationale with a rational underpinning required under *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007), and *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). The combination rests on hindsight rather than a reasoned rationale grounded in the record.

**A. Rebouillat is Non-Analogous Art**

Obviousness can only be based on references that are analogous to the field of the invention. The Federal Circuit applies a two-part test: a reference is analogous if (1) it is from the same field of endeavor, regardless of the problem addressed, or (2) if it is reasonably pertinent to the particular problem with which the inventor is involved. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

The field of endeavor of the '148 Patent is recyclable, food-grade packaging made of thin metallized paperboard, optimized for radiant barrier performance during use but complete oxidation and recyclability upon repulping. EX1001, 1:17-30; 5:12-6:9.

Rebouillat, by contrast, is directed to “breathable product for protective mass transportation and cold chain applications.” EX1008, [0002]. Its background explains that prior art thermal covers were impermeable to gases and water vapor,

causing condensation and a greenhouse effect. EX1008, [0005]. Its solution is a multilayer, breathable reflective sheet with a Tyvek® substrate, a vapor-deposited aluminum layer, and optional protective lacquer or flame-retardant coatings. EX1008, [0032]-[0035]. Rebouillat tests these covers for thermal insulation performance, not for recyclability or repulpability.

A POSITA would not look to Rebouillat for solutions to the recyclability problem acknowledged in Gundlach. Rebouillat is therefore non-analogous art, and cannot be properly combined with Gundlach to show obviousness.

**B. Rebouillat Does Not Disclose Recyclability or the Claimed “Treatment”**

Even setting aside non-analogousness, Rebouillat never discloses recyclable packaging. It uses thick polymer laminates, heat-sealable films, and foil laminates designed to withstand rough handling and moisture ingress. EX1008, [0042]-[0048]. *Nothing* in Rebouillat suggests that its structures can be repulped, much less that the aluminum layer will oxidize to transparency under the claimed “treatment.” Dr. Ma confirms the inability of Rebouillat to be repulped: “Tyvek® is 100% high-density polyethylene that does not repulp into fibers under the TAPPI tests.” EX2020, ¶64.

Thus, Rebouillat cannot supply the claim-critical recyclability or “treatment” limitations absent from Gundlach.

**C. Rebouillat Does Not Disclose the Optical Density Requirement**

Independent claims 7 and 9 require that, under the treatment, the aluminum

oxide has an optical density less than 0.09. Rebouillat nowhere discusses OD values, let alone OD under repulping conditions. Its tests measure cargo temperature profiles, not transparency of aluminum in pulp. As Dr. Ma explains: “Rebouillat fails to disclose the optical density requirement of certain claims of the ’148 Patent.” EX2020, ¶67.

**D. No Reasoned Motivation to Combine**

Petitioner offers no record-supported rationale for why a POSITA would combine Gundlach’s non-recyclable, thick metallized stacks with Rebouillat’s breathable Tyvek-based cargo covers. The problems addressed differ: Gundlach seeks liquid-resistant radiant barrier stacks for food packaging, while Rebouillat seeks breathable thermal covers for bulk cargo. Neither reference addresses recyclability or oxidation during repulping. As Dr. Ma concludes: “The Gundlach/Rebouillat combination still has the same three gaps—no recyclability, no Voluntary Standard, and no optical density measure in the context of repulping treatment.” EX2020, ¶74.

Under *KSR* and *Kahn*, an obviousness rationale must include “articulated reasoning with some rational underpinning.” Petitioner has not provided any. Instead, the combination is hindsight-driven, inconsistent in purpose, and unsupported by the record.

**E. Conclusion on Ground 3**

Rebouillat does not cure the fatal deficiencies in Gundlach. It discloses breathable Tyvek-based thermal cargo covers, not recyclable packaging subjected to the claimed repulping treatment. It fails to disclose recyclability, the claimed treatment, or OD < 0.09. The proposed combination is hindsight, not evidence-based. On this record, the obviousness ground fails as to claims 1-2 and 4-15, and the Board should deny institution for lack of a reasonable likelihood of prevailing under § 103.

**X. Ground 4 Fails: The Voluntary Standard Reference is AAPA and does not cure the deficiencies of Gundlach.**

In Ground 4, Petitioner asserts that claims 1-2, 4, 6-11, and 13-15 are obvious over Gundlach in view of the Voluntary Standard Reference. This ground fails for two independent reasons.

First, the Voluntary Standard is not a prior art “patent or printed publication” as required by 35 U.S.C. § 311(b) when relied on as *applicant-admitted prior art (AAPA)*. The Federal Circuit has squarely held that AAPA cannot serve as the “basis” of an IPR ground. *Qualcomm Inc. v. Apple Inc.*, 134 F.4th 1355 (Fed. Cir. 2025). As discussed above, Petitioner states: “The Voluntary Standard Reference is *admitted prior art* [.]” (emphasis added) (Petition at 6). Petitioner has thus clearly and unmistakably characterized the Voluntary Standard reference as applicant-admitted prior art (AAPA) and, therefore, cannot serve as the basis of an IPR ground under § 311(b)).

Second, even if treated as a printed publication, the Voluntary Standard is merely a test protocol. It does not disclose any packaging structures, any recyclable paper-aluminum stacks, or the OD <0.09 outcome. EX2020, ¶76.

The Federal Circuit has long held that anticipation and obviousness must be based on disclosure of claim limitations in prior art references, not on protocols that merely test for them. A test method does not disclose the structure required to achieve the tested result. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. See *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999). The Voluntary Standard does not teach how to design packaging that becomes recyclable; it only describes how to measure whether a sample is recyclable. EX2020, ¶38. Moreover, the Voluntary Standard does not disclose aluminum films that oxidize to transparency; it sets forth the measurement, not the material. EX2020, ¶51. It cannot transform Gundlach’s OD 2.0–4.0 films into OD <0.09 recyclables. “[T]he Gundlach/Voluntary Standard combination still omits the recyclability and optical density requirements.” EX2020, ¶74.

**A. No Reasoned Motivation to Combine**

Petitioner also fails to articulate a reasoned rationale for combining Gundlach with the Voluntary Standard. A POSITA would understand that a test protocol is not a blueprint for designing packaging structures. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning”). *KSR*

allows flexibility but still requires a reasoned explanation, not hindsight.

Here, the Petition's logic is circular: Gundlach discloses non-recyclable laminates; the Voluntary Standard describes how to test for recyclability; therefore Gundlach + Voluntary Standard somehow renders the claims obvious. That is legally insufficient. As *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363 (Fed. Cir. 2016) warns, unsupported "common sense" cannot supply a missing limitation. Petitioners' attempt to use the Voluntary Standard to fill the structural gaps in Gundlach is exactly that kind of impermissible hindsight.

#### **B. Conclusion on Ground 4**

Petitioner's reliance on the Voluntary Standard fails for two independent reasons. First, when invoked as an "admitted" industry standard in the '148 Patent, it is AAPA. Under § 311(b) and *Qualcomm v. Apple*, AAPA cannot form the basis of an IPR ground. Second, even as a printed publication, the Voluntary Standard is a test protocol, not a disclosure of structural packaging features. It cannot cure Gundlach's absence of recyclability or OD <0.09.

On this record, the obviousness ground fails as to claims 1-2, 4, 6-11, and 13-15, and the Board should deny institution for lack of a reasonable likelihood of prevailing under § 103.

#### **XI. Ground 5 Fails: The combination of Yializis and The Voluntary Standard Reference does not cure the deficiencies of Gundlach.**

In Ground 5, Petitioner asserts that claims 1–15 are obvious over Gundlach in

view of Yializis and the Voluntary Standard. This theory fails because neither Yializis nor the Voluntary Standard supplies the missing claim limitations of Gundlach. The combination is incoherent: Gundlach discloses non-recyclable laminates, Yializis teaches away by protecting aluminum from oxidation, and the Voluntary Standard is only a test protocol, not a disclosure of structure. Even if combined, these references do not disclose recyclable packaging or OD <0.09. EX2020, ¶77. Petitioner has not articulated any reasoned rationale with a rational underpinning for this combination, and the ground fails under § 103.

**A. The Deficiencies of Gundlach are Not Cured by Stacking References**

As shown in Ground 1, Gundlach fails to disclose recyclability, the claimed “treatment”, or OD <0.09. These three fatal gaps remain throughout every ground in the Petition. Yializis, discussed above in Ground 2, does not cure the deficiencies of Gundlach and actually points in the opposite direction. A POSITA would not be motivated to look to Yializis to supply the very oxidation outcome required by the claims. As shown in Ground 4, the Voluntary Standard is AAPA and a test protocol. It describes how to measure recyclability, but does not disclose packaging structures that achieve those outcomes. It cannot supply the structural features missing from Gundlach.

**B. No Reasoned Motivation to Combine**

Petitioner fails to articulate why a POSITA would combine Gundlach’s non-

recyclable food packaging laminates with Yializis's anti-oxidation coatings and the Voluntary Standard's testing steps. The proposed combination is logically inconsistent:

- Gundlach discloses laminates that are *not recyclable*.
- Yializis teaches preserving aluminum by *preventing oxidation*.
- The '148 Patent requires an aluminum layer that *does oxidize away under repulping*.
- The Voluntary Standard is only a test and does not teach how to design a structure to pass.

This is not an obvious modification but a hindsight reconstruction. *KSR* requires “some articulated reasoning with some rational underpinning” (*Kahn*, 441 F.3d at 988), and “conclusory statements” or ipse dixit cannot fill that gap. *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380–81 (Fed. Cir. 2016). Nor may “common sense” supply a major missing limitation. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363 (Fed. Cir. 2016).

On this record, there is no reason a POSITA would reengineer Gundlach using Yializis and the Voluntary Standard to arrive at the claimed recyclable, OD <0.09 structures.

### **C. Conclusion on Ground 5**

Gundlach lacks recyclability, treatment, and OD <0.09. Yializis does not cure

those deficiencies but teaches away by preventing oxidation. The Voluntary Standard is merely a test protocol—and when treated as AAPA, it cannot serve as the basis of an IPR ground under § 311(b). Even if treated as a printed publication, it does not disclose structural features.

The proposed three-reference combination is hindsight-driven, contradictory, and unsupported by any reasoned rationale. On this record, the obviousness ground fails as to claims 1-15, and the Board should deny institution for lack of a reasonable likelihood of prevailing under § 103.

**XII. Ground 6 Fails: The combination of Rebouillat and The Voluntary Standard Reference does not cure the deficiencies of Gundlach.**

In Ground 6, Petitioner asserts that claims 1-2, and 4-15 are obvious over Gundlach in view of Rebouillat and the Voluntary Standard Reference. This ground fails because neither Rebouillat nor the Voluntary Standard supplies the missing claim limitations of Gundlach. The combination is incoherent: Gundlach discloses non-recyclable laminates, Rebouillat is directed to Tyvek®-based breathable cargo covers and bubble mailers that are not repulpable, and the Voluntary Standard is AAPA and only a test protocol, not a disclosure of structure. Even if combined, these references do not disclose recyclable packaging or OD <0.09. EX2020 at ¶78. Petitioner has not articulated any reasoned rationale with a rational underpinning for this combination, and the ground fails under § 103.

**A. No Reasoned Motivation to Combine**

Petitioner also fails to articulate why a POSITA would combine Gundlach's non-recyclable laminates with Rebouillat's Tyvek®-based cargo covers and then apply the Voluntary Standard's testing steps. The proposed combination is logically inconsistent:

- Gundlach discloses laminates that are not recyclable.
- Rebouillat teaches Tyvek®-based thermal covers and bubble mailers, which are plastics, not recyclable paper.
- The '148 Patent requires recyclable paper packaging in which aluminum oxidizes away under repulping, leaving OD <0.09.
- The Voluntary Standard is only a test and does not teach how to design a structure to pass.

This is not an obvious modification but a hindsight reconstruction. *KSR* requires “some articulated reasoning with some rational underpinning” (*Kahn*, 441 F.3d at 988), and “conclusory statements” or ipse dixit cannot fill that gap. *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380–81 (Fed. Cir. 2016). Nor may “common sense” supply a major missing limitation. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363 (Fed. Cir. 2016).

On this record, there is no reason a POSITA would reengineer Gundlach using Rebouillat's Tyvek® laminates and the Voluntary Standard's testing protocol to

arrive at the claimed recyclable, OD <0.09 structures.

**B. Conclusion on Ground 6**

Gundlach lacks recyclability, treatment, and OD <0.09. Rebouillat does not cure those deficiencies, because it discloses Tyvek®-based cargo covers and bubble mailers that do not repulp and are not repulpable under the claimed treatment. The Voluntary Standard is merely a test protocol—and when treated as AAPA, it cannot serve as the basis of an IPR ground under § 311(b). Even if treated as a printed publication, it does not disclose structural features.

The proposed three-reference combination is hindsight-driven, contradictory, and unsupported by any reasoned rationale. On this record, the obviousness ground fails as to claims 1-2, and 4-15, and the Board should deny institution for lack of a reasonable likelihood of prevailing under § 103.

**XIII. CONCLUSION**

The Petition should be denied on every ground and as to every challenged claim. Under *Phillips* and plain and ordinary meaning, Petitioner never identifies a single reference that teaches each and every claim element, nor a combination of references that, combined, provides a teaching or reasoned rationale that would lead a person of ordinary skill to the inventions claimed in the '148 Patent.

Petitioner has failed to carry its burden of proof under 35 U.S.C. § 316(e) and, therefore, the Board should deny institution as to all challenged claims and all

grounds.

This 2<sup>nd</sup> day of October, 2025.

Respectfully submitted,

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**CERTIFICATION UNDER 37 CFR § 42.24(d)**

Pursuant to 37 C.F.R. §§ 42.24(d), Patent Owner hereby certifies, in reliance on the word count of the word-processing system (Microsoft Word 365) used to prepare this preliminary response, that the number of words in this paper is 9,805. This word count excludes the tables of contents, tables of authorities, certificate of word count, certificate of service, and table of exhibits.

Dated: October 2, 2025

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**CERTIFICATE OF SERVICE**

Pursuant to 37 C.F.R. §§ 42.6 (e), the undersigned certifies that the foregoing Patent Owner's Preliminary Response and supporting materials are being served on counsel of record by filing the document through the Patent Trial and Appeal Case Tracking System (P-TACTS), with a copy served via electronic mail to the following email address, as authorized in Petitioner's Mandatory Notices:

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