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Paper 7
Date: October 28, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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MOTOROLA MOBILITY LLC,
Petitioner,

v.

LARGAN PRECISION CO., LTD.,
Patent Owner.

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IPR2024-00688
Patent 9,997,660 B2

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Before JON M. JURGOVAN, SHARON FENICK, and JOHN D. HAMANN, *Administrative Patent Judges.*

JURGOVAN, *Administrative Patent Judge*.

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

# I. INTRODUCTION

## *A. Background and Summary*

Motorola Mobility LLC ("Petitioner") filed a Petition (Paper 2, "Pet.") requesting an *inter partes* review of claims 1–22 ("the challenged claims") of U.S. Patent No. 9,997,660 B2 ("the '660 patent," Ex. 1001). Largan Precision Co., Ltd. ("Patent Owner") filed a Preliminary Response (Paper 6, "Prelim. Resp.").

An *inter partes* review may not be instituted "unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a) (2018). Having considered the arguments and evidence presented by Petitioner and Patent Owner, we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing on any of the challenged claims of the '660 patent and we decline to institute *inter partes* review as to the challenged claims of the '660 patent on the grounds of unpatentability set forth in the Petition.

## *B. Related Proceedings*

The parties identify the following pending matters as a related matter to the '660 patent: *Largan Precision Co., Ltd. v. Motorola Mobility India Pvt. Ltd. & Ors.*, C.S. (Comm) No. 795 of 2022, Code 36017.02 (High Court of Delhi, New Dehli, India, filed Nov. 10, 2022) ("the Indian proceeding"). Pet. x (Petitioner's Mandatory Notices); Paper 5, 2 (Patent Owner's Mandatory Notices).

## *C. Real Parties-in-Interest*

Petitioner identifies itself as the sole real party-in-interest. Pet. x. Petitioner states that Motorola Mobility Holdings, LLC owns 100% of its

stock and is indirectly a wholly owned subsidiary of Lenovo Group Limited. Pet. x. Patent Owner identifies itself as the sole real party-in-interest. Paper 5, 2.

*D. The '660 Patent (Ex. 1001)*

The '660 patent is titled "Light Blocking Sheet, Imaging Lens Module and Electronic Apparatus." Ex. 1001, code (54). The '660 patent discloses that "a conventional light blocking sheet is usually made of a composite material" that has a "substrate layer made of a plastic material, such as a polyethylene terephthalate (PET), sandwiched by two outer layers made of a carbon-containing material." *Id.* at 1:33–37.

Figure 1A of the '660 patent is reproduced below.

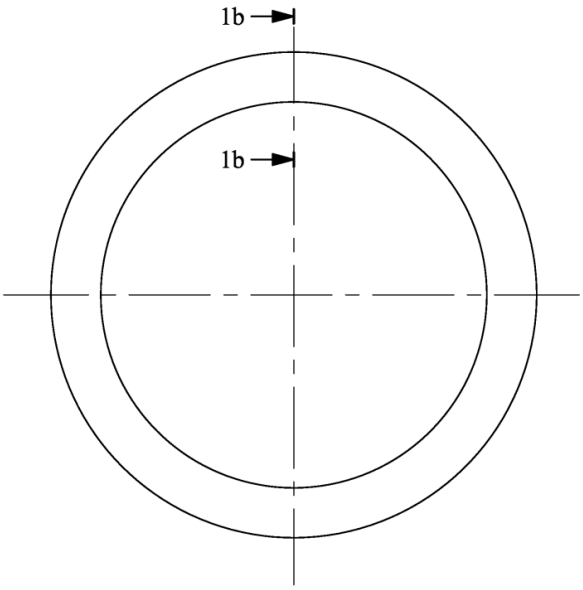



Figure 1A is a front schematic view of a conventional light blocking sheet. As shown in Figure 1A, the light blocking sheet has a ring-like structure.

Figure 1B of the '660 patent is shown below.

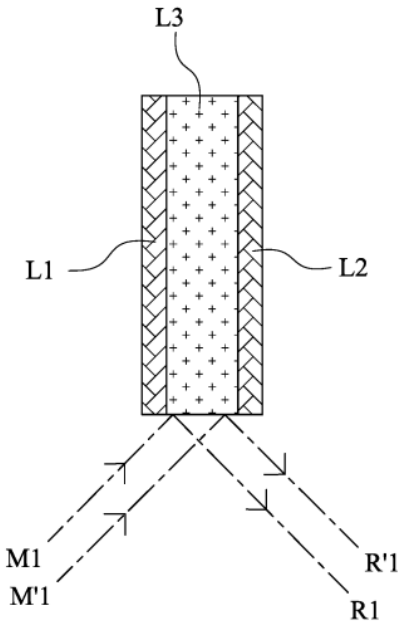



Figure 1B shows a partial cross-sectional view of the conventional light blocking sheet taken along line 1b–1b in Figure 1A. *Id.* at 1:57–59. In Figure 1A and Figure 1B, the "blocking sheet 1 is annular and has a three-layer structure." *Id.* at 1:59–61. "The three layers are an outer layer L1, a substrate layer L3, and an outer layer L2." *Id.* at 1:61–62. The diameters of the circular inner holes of the three layers are equal and aligned. *Id.* at 1:65–2:7. When incident light M1, M'1 strikes the inner surfaces, reflected light R1, R'1 is generated. *Id.* at 2:7–9. The '660 patent states that reflected light R1, R'1 will enter into the imaging lens module and interfere with the image, and consequently the conventional light blocking sheet 1 cannot eliminate stray lights effectively. *Id.* at 2:9–14.

Figure 2C of the '660 patent is reproduced below.

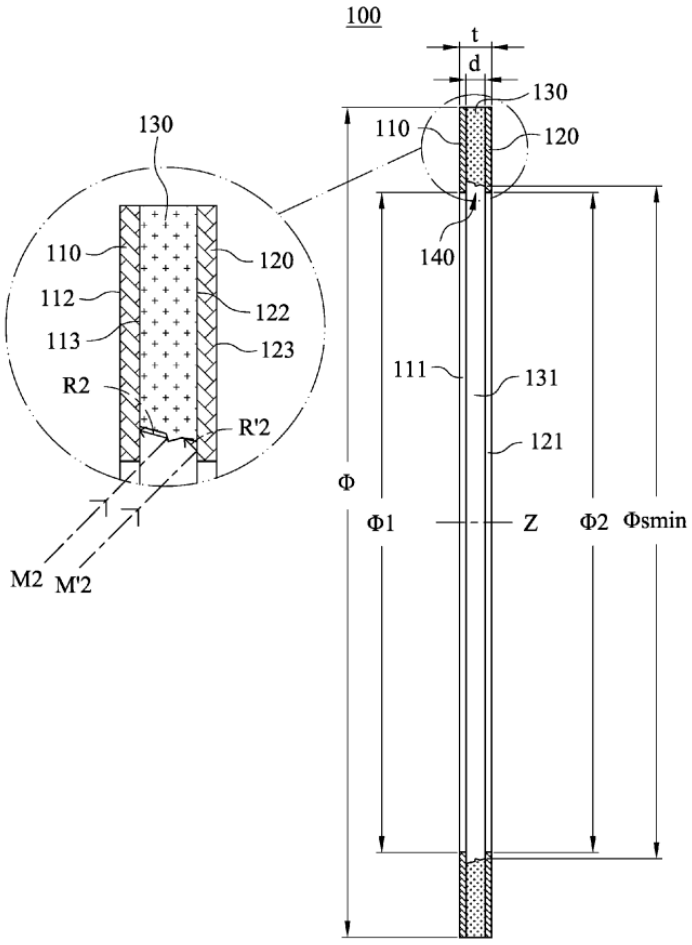



Figure 2C is a cross-sectional view of a light blocking sheet in accordance with an embodiment of the '660 patent's disclosure. *Id.* at 3:27–28. As shown in Figure 2C, light blocking sheet 100 includes first outer layer 110, second outer layer 120, and inner substrate layer 130 arranged about central axis Z. *Id.* at 4:20–30. Layers 110, 120, 130 have respective openings 111, 121, 131. *Id.* at 4:60–62. The minimum diameter ϕsmin of substrate opening 131 is greater than both the diameter ϕ1 of the first opening 111 and the diameter ϕ2 of the second opening 121, i.e., ϕsmin> ϕ1 and ϕsmin> ϕ2. *Id.* at 5:6–9. As shown in Figure 2C, when incident light M2, M'2 strikes a surface of the inner space (air layer 140), i.e., the surface of inner substrate

layer 130 facing substrate opening 131, resulting reflected light R2, R'2 tends to reflect again in the inner space. *Id.* at 5:24–31. "Accordingly, the blocking sheet 100 can effectively attenuate [the] intensity of light reflected therefrom." *Id.* at 5:31–34. "When the light blocking sheet 100 is applied to an imaging lens module, the stray light[] can be effectively reduced, and the image quality enhanced." *Id.* at 5:34–36.

### *E. Illustrative Claim*

Of the challenged claims, claims 1 and 15 are independent. Claim 1 is representative and is reproduced below with limitation identifiers in brackets corresponding to claim analysis headings in the Petition. *See, e.g.*, Pet. 35, 41–45.

> 1. [1.1] A light blocking sheet, comprising:
> [1.2] a first outer layer comprising a first opening;
> [1.3] a second outer layer comprising a second opening;
> [1.4] an inner substrate layer disposed between the first outer layer and the second outer layer, wherein the inner substrate layer connects the first outer layer to the second outer layer, and the inner substrate layer comprises a substrate opening; and
> [1.5] a central axis coaxial with the first opening, the second opening and the substrate opening;
> [1.6] wherein a minimum diameter of the substrate opening is Φsmin, a diameter of the first opening is Φ1, a diameter of the second opening is Φ2, and the following conditions are satisfied:
> $2.0\mu m<(\Phi smin-\Phi 1)/2<200\mu m$; and
> $2.0\mu m<(\Phi smin-\Phi 2)/2<200\mu m$.

Ex. 1001, 19:2–19.

*F. Evidence*

The Petition relies on the following references:

| Reference | Exhibit No. |
|---|---|
| CN 104460182 A filed Dec. 26, 2014 and published Mar. 25, 2015 ("CN182"). | 1004 |
| US 2015/0022896 filed Oct. 31, 2013 and published Jan. 22, 2015 ("Cho"). | 1006 |
| US 2015/0103226 filed Oct. 14, 2014 and published Apr. 16, 2015 ("Takahashi"). | 1025 |

Petitioner also relies on the Declaration of Dr. Tom D. Milster. (Ex. 1003) in support of its Petition. Patent Owner does not rely on any declarant. The parties rely on other exhibits as noted below.

*G. Asserted Grounds of Unpatentability*

Petitioner asserts that the challenged claims would have been unpatentable on the following grounds:

| Ground | Claim(s) Challenged | 35 U.S.C. §[1] | Reference(s)/Basis |
|---|---|---|---|
| 1 | 1–9, 15–19 | 103 | CN182 |
| 2 | 5, 7, 10, 14, 19, 20, 22 | 103 | CN182, Cho |
| 3 | 11–13, 21 | 103 | CN182, Cho, Takahashi |

[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103 and became effective March 16, 2013. Because the '660 patent was filed after this date and contains no claim of priority to an application filed before this date, the AIA versions of 35 U.S.C. §§ 102 and 103 apply.

Pet. 3.

## II. ANALYSIS OF ASSERTED GROUNDS

### *A. Principles of Law*

Petitioner bears the burden of persuasion to prove unpatentability of the claims challenged in the Petition, and that burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

A patent claim is unpatentable under 35 U.S.C. § 103(a) 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) any objective evidence of obviousness or non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

### *B. Level of Ordinary Skill in the Art*

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (internal quotation marks and citation omitted).

Petitioner states as follows:

> The person of ordinary skill in the art in November 2016 ("POSITA" or "POSA") would have held a bachelor's degree in physics, optical sciences, or a closely related field, and approximately three years' experience in optical system design, including stray light suppression. More education would compensate for less work experience and vice versa. POSITAs understood the fundamentals of stray light suppression.

Pet. 35–36 (citing Ex. 1008, 587:18–20, 167, 595:32–33, xiii:24–26; Ex. 1003 ¶¶ 31–37). Petitioner further asserts that various texts in the record reflect the knowledge of a POSITA. *Id.* at 36 (citing Exs. 1007–1010). Petitioner alleges that a POSITA could be part of a team that includes a lens designer and a stray light specialist. *Id.* (citing Ex. 1007, 120; Ex. 1003 ¶¶ 33, 36, 38–41).

Patent Owner states that Patent Owner "does not dispute Motorola's articulation of the level of skill in the art in November 2016." Prelim. Resp. 12–13 (citing Pet. 35–36).

For this Decision, we adopt Petitioner's undisputed proposal for the level of ordinary skill in the art as consistent with the evidence of record, including the '660 patent and the prior art references on which Petitioner relies. *Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (the applied prior art may reflect an appropriate level of skill).

### *C. Claim Construction*

We construe the challenged claims under the same standard used by a federal court in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b). This standard is articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) and its progeny, and includes "construing the claim in accordance with the ordinary and customary meaning of such

claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b).

Petitioner proposes that the plain and ordinary meaning of the claim terms applies, and does not propose any specific construction for any claim term. Pet. 36. Patent Owner agrees with Petitioner's statement regarding claim construction, i.e., that the plain and ordinary meaning applies and no express construction is required. Prelim. Resp. 12 (citing Pet. 36–37; Ex. 1003 ¶¶ 82–87).

As Petitioner and Patent Owner do not dispute the meaning of any claim term, we decline to expressly construe any claim term, and instead apply the ordinary and customary meanings consistent with 37 C.F.R. § 42.100(b). *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *see also Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy").

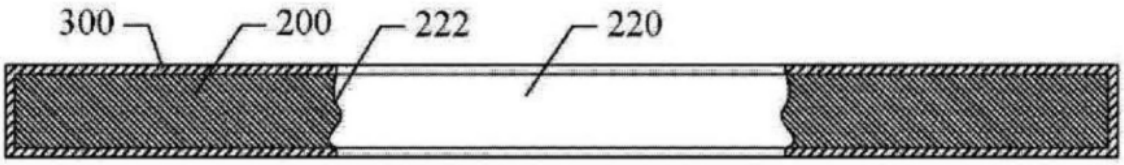
### *D. Ground 1: Obviousness over CN182*

Petitioner argues claims 1–9 and 15–19 would have been obvious over CN182 and the knowledge of a POSITA. Pet. 38–70. In this section, we discuss the disclosure of CN182 and then analyze Petitioner's contentions in light of Patent Owner's arguments. Prelim. Resp. 13–25. We determine that Petitioner has not shown a reasonable likelihood to prevail in showing claims 1–9 and 15–19 would have been obvious over CN182 for the reasons that follow.

*1. CN182 (Ex. 1004)*

CN182 is titled "Shading Ring Processing Method and Shading Ring." Ex. 1004, 1, code (76). CN182 discloses a shading ring formed using polyethylene terephthalate (PET) raw material with antistatic high-shading coating on a surface via direct stamping. *Id.* ¶ 2. CN182 states that "the stamping of the plastic material leaves a shiny cut-off section surface of the inner hole, which cannot be treated for blackening and matt[e] like traditional metals, resulting in obvious glare, halo and flare and other undesirable effects" in imaging products. *Id.* ¶¶ 2, 19. To solve these problems, CN182 purports to disclose a method of forming a matte structure on the hole-wall of the through-hole of a shading ring by etching with an alkaline solution in an ultrasonic generator. *Id.* ¶¶ 3–9.

Figure 3 of CN182 is shown below.




As shown in Figure 3, the shading ring comprises a body 200, an antistatic coating 300 coated on the body 200, and a through-hole 220 formed on the body 200. *Id.* ¶ 36. "[T]he body 200 is made of plastic material, the antistatic coating 300 is a carbon powder layer, the through- hole 220 is formed by stamping, and a matte structure 222 is formed on the hole-wall." *Id.* "[T]he matte structure 222 is formed by alkali solution etching." *Id.* ¶ 37.

*2. Claim 1*

Claim 1 generally recites a [1.1] light blocking sheet comprising [1.2] a first outer layer comprising a first opening; [1.3] a second outer

layer comprising a second opening; [1.4] an inner substrate comprising a substrate opening; and [1.5] a central axis coaxial with the openings. *See* § 1.E, *supra*. Claim 1 further recites the following limitation:

> [1.6] wherein a minimum diameter of the substrate opening is Φsmin, a diameter of the first opening is Φ1, a diameter of the second opening is Φ2, and the following conditions are satisfied:
> $2.0\mu m<(\Phi smin-\Phi 1)/2<200\mu m$; and
> $2.0\mu m<(\Phi smin-\Phi 2)/2<200\mu m$.

Petitioner and Patent Owner dispute whether claim 1's limitation 1.6 is disclosed by CN182 and the knowledge of POSITAs. Pet. 43–62; Prelim. Resp. 13–28. We address Petitioner's and Patent Owner's contentions concerning limitation 1.6 and discuss the reasons why Petitioner has not shown a reasonable likelihood to prevail below.

*a) Petitioner's Contentions*

Petitioner contends that CN182 and the knowledge of POSITAs teaches claim 1's limitation 1.6. Pet. 43–62. Specifically, Petitioner asserts that the conditions of limitation 1.6 "are satisfied by a light trap in which the substrate material is recessed by at least 2μm (and no more than 200μm) with respect to each of the first and second outer layers." Pet. 43 (citing *id.* at § VII). Petitioner acknowledges that "CN182 does not expressly disclose such a light trap" but argues that "it would have been obvious to implement the CN182 shading ring with a light trap having dimensions that satisfied Element 1.6." *Id.* (citing Ex. 1003 ¶ 103).

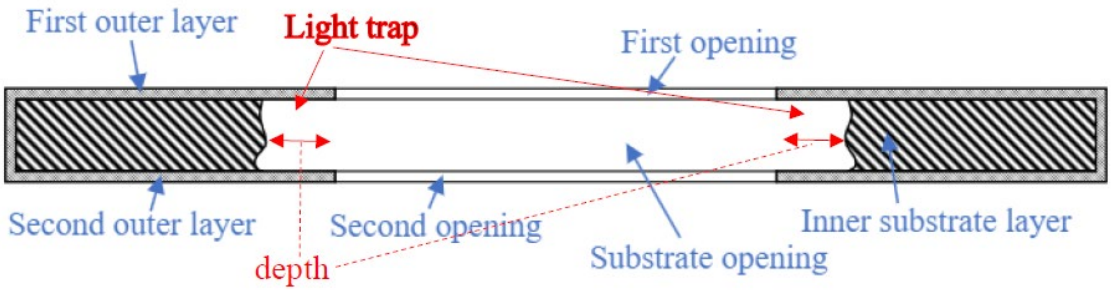
Petitioner contends that

> Given CN182's express goal of avoiding stray light reflections off the inner surface of the through-hole, and knowledge regarding conventional light traps and other stray light suppression techniques, POSITAs would have promptly

> recognized the benefits of using the CN182 etching process to create a conventional "light trap" on the inner surface of CN182's shading ring. POSITAs would have naturally and predictably used CN182's etching process to further erode the inner PET layer relative to the outer carbon layers, to a depth that effectively trapped stray light. While many obvious variants would have dimensions within the claimed range and thus satisfy Element 1.6, exemplary obvious implementations of CN182 include **a light trap from 5.2-9.7µm deep** along the circumference of the inner surface.

Pet. 44.

To explain its contentions, Petitioner provides the following illustration:




Pet. 44 (citing Ex. 1003 ¶ 104). The above illustration is Petitioner's annotated version of CN182's Figure 3, which Petitioner modified to show the inner substrate layer etched relative to the outer layers to form a light trap from 5.2 to 9.7 µm deep in the light-blocking element. *Id.* Petitioner contends that such a light trap satisfies the conditions of limitation 1.6. *Id.*

Petitioner asserts that POSITAs would have been motivated to adapt the CN182 process for etching a PET substrate to create a light trap between two outer carbon layers. Pet. 45–49. Specifically, Petitioner contends that CN182 seeks to minimize reflections off the inner surface of a shading ring to reduce glare, halo, and flare. *Id.* at 45–46 (citing Ex. 1004, code (57),

¶¶ 3, 19; Ex. 1003 ¶ 106). Petitioner asserts that CN182 discloses surface roughening to form a matte surface, which is one of three known techniques for reducing stray light reflections, the other two being baffles or light traps, and altering the shape of the inner reflective surface to direct stray light away from a light sensor. Pet. 46 (citing *id.* at § IV.C; Ex. 1004 ¶¶ 2, 19, 35, 40; Ex. 1007, 120; Ex. 1003 ¶ 107). Petitioner asserts that these techniques were complementary and regularly used together in reducing stray light reflections off the inner surface of light-blocking elements" and that the prior art (Ex. 1007, "Schaub") shows a combination of surface roughening and altering the shape of inner reflective surfaces. *Id.* at 45–47 (citing Ex. 1007, 120–122; Ex. 1003 ¶ 108).

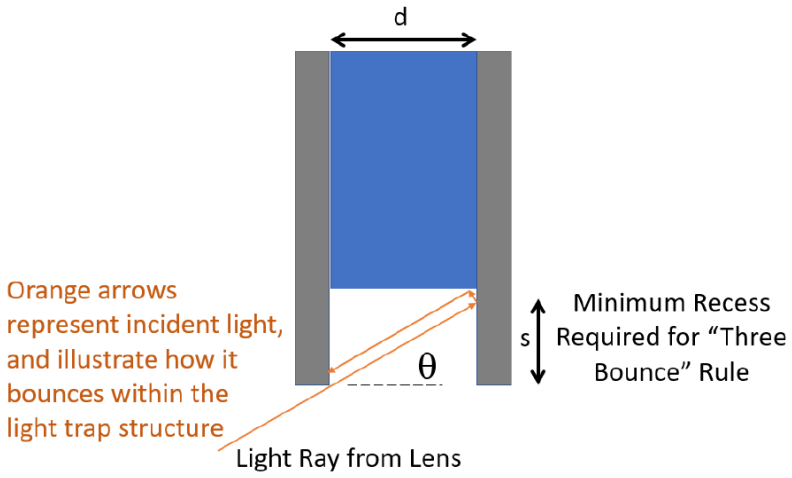
Petitioner asserts that "POSITAs would have recognized that simply extending the CN182 etching process would elegantly create a stray light trap and reduce the inner surface area of the shading ring, thus eliminating stray-light reflections and glare, without additional processing steps." *Id.* at 47. According to Petitioner, "POSITAs knew that prolonging, or otherwise modifying, this etching process would further etch and recess the middle PET layer, beneficially creating a light trap." Pet. 47–48 (citing *id.* at §§ IV.C, IV.D; Ex. 1027 ("Braunecker"), 277–283; Ex. 1008 ("Fischer"), 736–737, 768; Ex. 1003 ¶ 109). Petitioner further argues that "this natural extension of the CN182 etching process employs the other two known anti-reflection methods: baffled light traps and modifying the inner surface of the light-reflecting element." Pet. 48–49 (citing *id.* §§ IV.C.1–2, IV.D; Ex. 1014, 5; Ex. 1003 ¶¶ 110–111).

Next, Petitioner contends that POSITAs would have been motivated to create the light trap with dimensions in the claimed range. Pet. 49–56.

Specifically, Petitioner asserts that a POSITA knew of a "three-bounce rule" which provided guidance on how deep to etch the PET layer to sufficiently "trap" incident stray light. Pet. 49 (citing *id.* at § IV.E; Ex. 1008, 722–725). The "three-bounce rule" essentially provides that stray light loses power when reflected such that its power is negligible after three reflections. *Id.* at § IV.E. Petitioner argues that POSITAs knew that the minimum recess depth d[2] required to satisfy the "three-bounce rule" was determined by the following equation:

$$s=d*\tan(\theta)$$

where d is the thickness of the PET substrate layer and θ is the incoming angle of stray light. *Id.* (citing § IV.C; Ex. 1008, 723–725). To demonstrate its contention, Petitioner provides the following illustration.




Pet. 50. The above illustration shows light incident at an angle θ bounces (i.e., reflects) at least three times. *Id.* at 50 (citing Ex. 1003 ¶¶ 112–113).

According to Petitioner, "[f]ollowing conventional light-blocking sheet design, POSITAs would have been motivated to implement CN182

[2] Petitioner may have meant "s" rather than "d."

with known carbon layer thicknesses of 4-6μm and thus a middle PET layer of 13-17μm for CN182's total thickness of 25μm." *Id.* Petitioner asserts that "[a] POSITA would have known that these thicknesses balanced structural stability of the carbon layers with minimal edge reflections off the inner surfaces of those layers." *Id.* at 49–50 (citing Ex. 1004 ¶¶ 13, 37; Ex. 1007, 125:20–21; Ex. 1018, 1:37–40; Ex. 1003 ¶ 114).

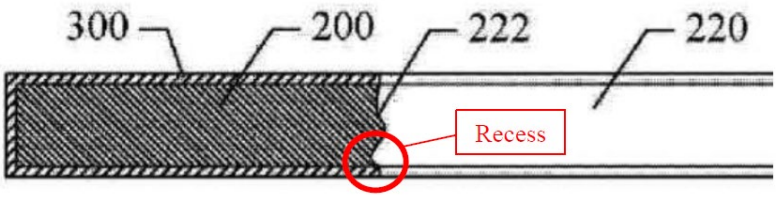
Petitioner further asserts that a "POSITA knew that for shading rings with 25μm thickness, the conventional thickness of each outer layer would typically range from 4-6μm" and that "carbon layers of 4-6μm thickness reduced the light-reflecting surface area and yet would provide structural support for most applications." Pet. 51 (citing Ex. 1006 ¶ 20; Ex. 1031, 3:22–25; Ex. 1034, 3:55–4:31; Ex. 1033 ¶¶ 14, 75; Ex. 1003 ¶ 115). Petitioner argues that a "POSITA would have been motivated with a reasonable expectation of success to select a larger thickness in this range, such as 6μm, for deeper light traps, to minimize edge reflections and maintain structural stability." *Id.* (citing Ex. 1003 ¶ 116). Petitioner asserts that "[t]his is consistent with the 'conventional' light-blocking sheet described and shown in the '660 patent as having carbon layers 6μm thick in sheet of 29.5μm total thickness." *Id.* at 51–52 (citing Ex. 1001, 9:36–55; Fig. 1B, Fig 4; Ex. 1003 ¶ 115). Petitioner states that "[a] POSITA therefore would have been motivated with a reasonable expectation of success to use a shading ring with outer layers that are 4-6μm thick each." *Id.* at 52 (citing Ex. 1003 ¶ 116). "For a total thickness of 25μm, as CN182 discloses, outer layer thicknesses of 4-6μm would provide **a PET layer thickness of 13-17μm**." *Id.*

Petitioner asserts that "POSITAs understood that designing a trap for stray light at a 30-degree angle of incidence would provide satisfactory stray light attenuation for most designs." Pet. 52–54 (citing Ex. 1003 ¶¶ 117–118). Using an incidence angle of 30 degrees, and the end points in CN182's disclosed range of 13–17μm for the substrate thickness, Petitioner asserts that POSITAs would have been motivated to use the CN182 etching process to etch back the substrate layer by 13μm*(tan 30°) = **7.5μm** to 17μm*(tan 30°) = **9.8μm**. *Id.* at 54 (citing Ex. 1003 ¶ 119. Petitioner asserts that "[f]or slightly thicker carbon layers of 8μm, and a resulting substrate thickness of 9μm, the etch depth would be 9μm*(tan 30°) = **5.2μm**." *Id.* (citing Ex. 1003 ¶ 120). Petitioner asserts that the computed depths are confirmed as appropriate under a rule of thumb disclosed Fisher's optical design book (Ex. 1008) to make the trap depth one-half the trap width, which yields comparable depths. Pet. 55 (citing *id.* at § IV.E; Ex. 1008, 718; Ex. 1003 ¶ 121). Petitioner asserts that "[t]hus, using basic optical principles and simple trigonometric math, POSITAs would have been motivated to use the CN182 process to etch back the PET material" to "the specific depths of **5.2-9.8μm**" but adds that "other designs with depths in the claimed range were also obvious." Pet. 55–56 (citing Ex. 1004 ¶¶ 28–34; Ex. 1003 ¶ 122).

Petitioner contends that a POSITA would have expected success in implementing a light trap meeting limitation 1.6 using the known etching processes described in CN182. Pet. 56–58. Petitioner contends that "CN182 already teaches creating a small recess in the PET layer" and asserts that "POSITAs would have immediately recognized that—without additional steps—adaptation of the etching step would further recess that

layer and create a light trap." *Id.* at 56 (citing Ex. 1003 ¶ 123). Petitioner alleges that "[t]his is because the PET layer has a much higher etch rate than the outer carbon powder layers, thereby allowing selective etching of the PET layer." *Id.* (citing Ex. 1004 ¶¶ 6, 28, 38; Ex. 1016, 609, 613; Ex. 1027, 277–279; Ex. 1003 ¶ 123).

To explain its contention, Petitioner provides the following annotated version of part of CN182's Figure 3.



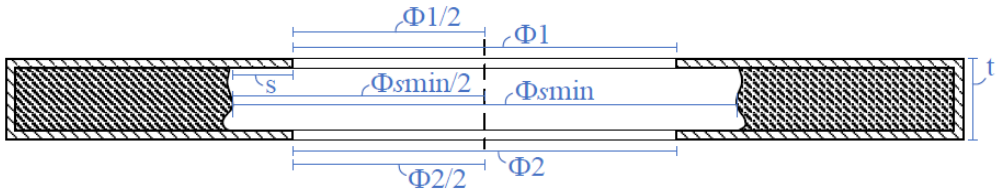

Pet. 57. Referring to the annotated version of Figure 3 above, Petitioner asserts that a "POSITA would have recognized that the wet-etching process taught by CN182 already creates a partial recess within the hole-wall." *Id.* (citing Ex. 1004, Fig. 3; Ex. 1016, 609). Petitioner argues that "CN182 explains what POSITAs knew: that temperature and movement increase etch rate and thus facilitate further etching." *Id.* (citing Ex. 1004 ¶¶ 34, 39; Ex. 1003 ¶ 124).

Petitioner asserts that, in the Indian proceeding, Patent Owner's declarant, Dr. Bentley, stated that the process of chemical etching was known and that, for a desired depth, the process parameters can be varied to yield the desired outcome" and "if product details are known or understood, an average skilled or skilled person can work backwards to formulate process parameters to achieve that product." Pet. 57 (citing Ex. 1028 ¶ 42). Petitioner asserts that this is because the chemical etching process is

predictable and "can be controlled with a great degree of precision and accuracy." *Id.* at 57–58 (citing Ex. 1028 ¶¶ 7–8; Ex. 1003 ¶ 125).

Petitioner argues that "POSITAs would have been motivated with a reasonable expectation of success to implement the shading ring of CN182 with a light trap depth within the claimed range." Pet. 58. Petitioner further alleges that "the '660 patent's own lack of description on the process used to create its preferred embodiments confirms that POSITAs knew how to predictably etch the PET layer in conventional Carbon-PET-Carbon light-blocking elements to create a light trap of the desired depth." *Id.* (citing *In re Fox*, 471 F.2d 1405, 1407 (CCPA 1973); Ex. 1003 ¶¶ 125–126).

Petitioner further contends that the light traps that Petitioner describes satisfy limitation 1.6. Pet. 58–59. To explain its contentions, Petitioner provides the following illustration.




Pet. 59 (citing Ex. 1003 ¶ 127). Petitioner's illustration above shows various parameters and how they relate to the light-blocking sheet resulting from Petitioner's computations, including depth s, thickness t, and layer opening diameters Φ1, Φ2, Φ*s*min, Φ1/2, Φ2/2, and Φ*s*min/2.

Petitioner asserts that

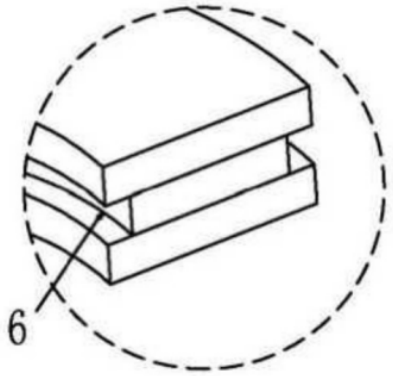
> For a light trap depth of 5.2µm, at any given point the PET layer is etched back at least 5.2µm with respect to each of the first and second carbon outer layers. Thus, because the recited Φ values represent diameters of a cross-section and the PET layer is etched back on either side of that cross-section and because each of the carbon outer layers has the same diameter, each of

> Φ*s*min−Φ1 and Φ*s*min−Φ2 is 10.4μm. Plugging these values into the recited conditions yields:
>
> 2.0μm<(**10.4μm**)/2<200μm
>
> 2.0μm<(**10.4μm**)/2<200μm
>
> Applying the divisor of 2 in the middle portion yields:
>
> 2.0μm<(**5.2μm**)<200μm
>
> 2.0μm<(**5.2μm**)<200μm
>
> A similar process shows that light traps of 7.5μm and 9.8μm also satisfy the claimed conditions. Thus, obvious light-blocking sheets with light traps of depths of at least 5.2-9.8μm satisfy the claimed ranges.

Pet. 59 (citing Ex. 1003 ¶ 128).

Petitioner asserts that contemporaneous independent development further confirms the obviousness of using the CN182 process to form a light trap. Pet. 60–62 (citing *Geo. M. Martin Co. v. All. Mach. Sys. Int'l LLC*, 618 F.3d 1294, 1305 (Fed. Cir. 2010); *Regents of Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1295 (Fed. Cir. 2018) (discussing "simultaneous invention"). Pet. 60. Petitioner alleges that the motivation to combine and reasonable expectation of success are confirmed by Chinese Patent Application Publication No. CN 107045249B (Ex. 1015, "CN249") filed shortly after the '660 patent. *Id.* Petitioner contends that CN182's shading ring "can reduce the reflection or diffusion of stray light to a certain extent," but observes that "there is still an obvious phenomenon of stray light." Pet. 60–61 (citing Ex. 1015 ¶¶ 4–5; Ex. 1003 ¶¶ 129–130). According to Petitioner, "[t]o further reduce this stray light, CN249 teaches using the same approach of CN182, namely wet etching a light-shielding sheet comprising a base material made of PET and coated with carbon layers with

a light hole 'made by a [punching] process.'" *Id.* at 61 (citing Ex. 1015 ¶¶ 30–37). Petitioner asserts that "CN249 further discloses etching the base material to form a depression 6, thereby 'suppress[ing] the stray light in an optical lens from diffusing or reflecting to an imaging surface.'" *Id.* (citing Ex. 1015 ¶ 32). Petitioner provides CN249's Figure 3 as shown below.




Pet. 61. CN249's Figure 3 above shows depression 6. *Id.* Petitioner states that CN249 further discloses the "depth of the depression 6 of the [base material] 4 is equal to a thickness of the [base material] 4." *Id.* (citing Ex. 1015 ¶ 38). Petitioner asserts that this light trap design "would create three bounces for light incident at 45 degrees," and "would satisfy the '660 patent's claimed conditions, as they would yield depths of 13-17μm." Pet. 61–62 (citing *id.* at § VIII.B.4.b).

Petitioner contends that the "disclosure in CN249 corresponds precisely to how POSITAs would have applied CN182's teachings on stray light reduction to create a light trap and achieve additional reductions in glare." Pet. 62 (citing *id.* at §§ VIII.B.4.a–d). According to Petitioner, "[t]his further confirms that POSITAs would have been motivated, with a reasonable expectation of success, to implement CN182 with an inner layer

etched back to a desired depth as discussed above." *Id.* (citing Ex. 1003 ¶ 131).

*b) Patent Owner's Contentions*

Patent Owner asserts that "[t]he Petition's scant evidence regarding etching is inadequate to show a POSA would have read CN182 as teaching a direct or predictable relationship between duration of the process and the amount of material removed." Prelim. Resp. 15–19. First, Patent Owner contends that "the POSA's skill set, as Dr. Milster defines it, does not include any knowledge, experience, or training in chemistry or materials science" and does not include "the chemistry or materials science knowledge needed to draw the conclusions from CN182's etching disclosure that he says a POSA would have drawn." *Id.* at 15 (citing Ex. 1003 ¶¶ 31–37).

Patent Owner further contends that "Dr. Milster points to three documents as proof that a POSA "would have immediately recognized that further etching of the shading ring [in CN182] would lead to the PET layer being etched deeper across the opening" but "he was unable to find a standard lens design or stray light suppression reference that speaks to the alleged commonality of etching, its chemistry, rates, solvents, or substrates." *Id.* at 15–16 (citing Ex. 1003 ¶ 124). Patent Owner asserts that this "suggests that etching was not something typical in either stray light suppression or lens design, at least not before CN182" which "is the only alleged prior art filed with the Petition that employs etching at all." *Id.* at 16. Patent Owner further asserts that if "3 to 5 hours" is required to achieve "a matte structure" as CN182 discloses, "there is nothing to suggest a POSA would have found acceptable the weeks or months that would be required to

get from "matte structure" on a surface to removal of a full 2.0 μm of the plastic beneath that surface." *Id.*

Patent Owner further argues that Dr. Milster's reliance on reactive ion etch (RIE) transfer process used in micro-optics is misplaced. Prelim. Resp. 16–17 (citing Ex. 1027 ("Braunecker"); Ex. 1003 ¶ 123). Specifically, Patent Owner asserts that Dr. Milster does not explain "the relevance of the RIE transfer process to the plastic etching disclosed by CN182." *Id.* According to Patent Owner, "there is nothing to support the bare assumption that 'prolonging' the etching time in CN182 automatically prolongs the reaction and hence removal of plastic material." *Id.* Patent Owner states that Petitioner further relies on a book about semiconductor technology, but asserts that "again, nothing connects that discussion with anything in CN182, other than the word 'etching.'" *Id.* at 17 (citing Ex. 1016 ("Plummer"); Ex. 1003 ¶¶ 123–124).

Patent Owner further contends that the testimony that Petitioner's declarant, Dr. Bentley, gave in the Indian proceeding were made in relation to the present day, not about lens design or stray light suppression before 2016, or the adequacy of the disclosure of CN182. *Id.* at 17–18 (citing Ex. 1028 ¶ 42; Ex. 1003 ¶ 125).

Patent Owner further argues that "there is no evidence about the chemistry of the presumed reaction in CN182, nor any about the materials science of the physical and chemical properties of the plastic material being removed or the "antistatic coating … carbon powder layer" that would allegedly survive the removal." Prelim. Resp. 18. Patent Owner asserts that "[s]uch evidence is required to show what a POSA would have understood and expected." *Id.* "Without it, Dr. Milster's testimony about what a POSA

would have done with the etching technology of CN182 is not an opinion; it's just an assumption." *Id.* Patent Owner contends that "[a]ll indications are that Dr. Milster does not independently possess the education or experience to put himself in the position of a POSA having the requisite understanding of the science involved in the CN182 etching process." *Id.* (citing Ex. 1003 ¶¶ 4–14, Appx. A). Patent Owner alleges that Dr. Milster's testimony is unsupported by record evidence and "is entitled to little or no weight" under 37 C.F.R. § 42.65(a) and thus Petitioner has failed to carry its burden to show a reasonable likelihood to prevail under § 314(a). *Id.* at 18–19.

Patent Owner next contends that "[t]here is no evidence to support Dr. Milster's assumption that a POSA would have been motivated to create a light trap between two carbon powder layers in CN182 by 'prolonging' the etching process." Prelim. Resp. 19–21. Patent Owner argues that CN182 discloses a light blocking sheet covered with an "antistatic coating" which is a "carbon powder layer." *Id.* at 19 (citing Ex. 1004 ¶ 26). Patent Owner asserts that "[a]fter the 'carbon powder layer' is applied, CN182's 'through-hole is formed on the body by stamping,' which 'leaves a shiny cut-off section surface of the inner hole' that has no 'carbon powder layer.'" *Id.* (citing Ex. 1004 ¶ 2, 28). According to Patent Owner, "CN182 proposes a solution that involves etching that surface with an 'alkali solution' to achieve a 'matte' surface to scatter beams of stray light that come into contact with it." *Id.*

Patent Owner argues that "[t]he '660 patent, in contrast, claims a three-layered light blocking sheet in which the reflective inner surface of the middle layer is removed (not just roughened) by recessing the inner substrate

layer by more than 2 microns (while generally maintaining the two outer layers) to ***trap*** the incident stray light." *Id.* Patent Owner asserts that "[t]his is very different from ***scattering*** the incident light due to a matte surface as proposed by CN182." *Id.* at 19–20. Therefore, Patent Owner contends, "CN182's solution to the stray light problem is not suggestive of the '660 patent's solution." *Id.* at 20.

Patent Owner further argues that "it is [Petitioner's] unsupported assumption that extending the duration of CN182's disclosed etching process—which prolonging is neither taught nor suggested by CN182—would result in the light blocking sheet claimed in '660 patent." Patent Owner asserts that "this is pure hindsight" and that "CN182 says nothing of prolonging the disclosed 3- to 5-hour etching process, nor is there any evidence that the rates of etching between the plastic body and its carbon powder coating are so dramatically different that a POSA would have readily envisioned a 'light trap' as being the 'natural[] and predictabl[e]' result of prolonging the etching session beyond the disclosed time period.'" *Id.* at 20. Patent Owner states that "CN182 says that 'the carbon powder layer, … is ***less sensitive to alkali solution***,' not that it is ***impervious***.'" *Id.* (citing Ex. 1004 ¶¶ 28, 38). Patent Owner argues that "[t]here is no evidence filed with the Petition that carbon is imparting the resistive properties, nor any about what else other than carbon might be required to impart the requisite amount of diminished sensitivity" and "[s]o neither CN182 nor any other evidence filed with the Petition would have informed a POSA what a 'carbon powder layer' needs to make it less sensitive to alkali solution." *Id.*

In any case, Patent Owner contends that "the point CN182 makes is that the carbon powder layer 'basically'—not absolutely—'will not be etched with the alkali solution,' and that this, in turn, 'ensur[es] the feasibility of the method.'" Prelim. Resp. 20–21 (citing Ex. 1004 ¶¶ 28, 38). Patent Owner further asserts that CN182's method places the entire shading ring in an alkaline solution, which avoids the labor-intensive step of isolating the exposed "hole-wall" of the "through-hole" for application of the alkali solution, and "the protection offered by the carbon powder layer relieves the need to avoid contact between the alkali solution and the rest of the sheet's outer surface." *Id.* at 21. Patent Owner states that "[t]he entire shading ring is thus submerged in the alkali solution just long enough, i.e., 'from 3 to 5 hours,' *id.* [Ex. 1004 ¶ 34], '***to form a matte structure*** on the hole-wall of the through-hole of the shading ring,' *id.* [Ex. 1004 ¶ 35], because the 'hole-wall of the through-hole' is not coated with the carbon powder layer." *Id.*

Patent Owner argues that

> Nothing about this statement (or any other in CN182) suggests leaving the shading ring in the alkali solution any longer than is necessary "to form a matte structure on the hole-wall," and nothing suggests that doing so results in a hole-wall that is recessed from the carbon powder coated outer layers in any way. Notably, neither [Petitioner] nor [Petitioner's declarant] Dr. Milster has conducted any experiment or provided any evidence (e.g., an image of the CN182 shading ring after such proposed prolonged etching) to back up their speculation.

*Id.*

Patent Owner further argues that "[t]here is no evidence that a POSA would have regarded CN182 as teaching a three-layer light blocking sheet, absent some indication that an 'antistatic coating' 'carbon powder layer'

could serve as light trap wall." Prelim. Resp. 22–24. Specifically, Patent Owner asserts that "[t]he Petition includes no evidence that a 'carbon powder layer' that serves as an 'antistatic coating' could stand on its own, without its substrate, such that a POSA would have viewed it as forming a distinct layer capable of serving as a baffle (wall) of a light trap." *Id.* at 22. Patent Owner asserts that "[t]here is no evidence about 'antistatic coating' 'carbon powder layers' generally, nor any evidence that POSAs knew these terms and associated certain characteristics with them, nor is there any detail about the 'antistatic coating' 'carbon powder layer' that CN182 specifically discloses." *Id.* Patent Owner thus asserts that [n]othing supports Petitioner's supposition "that a POSA would have regarded CN182 as teaching a three-layer light blocking sheet." *Id.*

Patent Owner argues that "[t]hickness would be one way to infer fitness for service as a light trap wall." Patent Owner asserts, however, that CN182 teaches that the thickness of the "shading ring" is 0.025 mm but is silent as to the thickness of the "antistatic coating" and "nothing in CN182 would have caused a POSA in November 2016 to infer that the 'antistatic coating' 'carbon powder layer' was any more thick than necessary to serve its 'antistatic' purpose." *Id.* Patent Owner contends that a 1956 patent taught that "coatings [] only a few molecules thick" could provide sufficient glare stop functionality (Ex. 1013, 2:11), "so a POSA would have had no reason to assume, some 60 years later, that the mere mention of a 'coating' or a 'layer' implied a thickness of more than 'a few molecules.'" *Id.* at 22–23.

Patent Owner further argues that CN182 does not disclose a three-layer structure. Prelim. Resp. 23. Referring to CN182's Figure 3 (*see*

§ II.D.1), Petitioner notes that the antistatic coating 300 is shown as wrapping around the outermost edge of the ring such that a POSA would have regarded it as a single layer, not two separate layers. *Id.* Patent Owner further asserts that CN182 does not state that Figure 3 "is to scale, so it would not have told POSAs anything about the thickness of the coating/layer 300, or about any other measure of substantiality they could expect from it." *Id.* at 23–24 (citing *Hockerson-Halberstadt, Inc. v. Avia Grp. Int'l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000)).

Patent Owner asserts that "[t]he Petition thus includes no evidence that would reasonably have caused a POSA to see a three-layer light blocking sheet or a coating/layer having the substantiality, once removed from its substrate, needed to serve as a wall of a light trap" and that "Dr. Milster sees a wall only because he is looking for one." *Id.*

Patent Owner next asserts that "[t]here is no evidence to suggest 'prolonging' the CN182 etching process would result in a 2 μm deep light trap, given enough time." Prelim. Resp. 24–25. Specifically, Petitioner alleges that "[t]here is no evidence that a '5% to 35% … 35 to 55°C' 'sodium bicarbonate solution' disclosed as an etching solution that requires '3 to 5 hours' just to accomplish 'a matte structure' would consume or disintegrate an amount of a 'polyethylene terephthalate' plastic material more than 2 μm deep if left in contact for a 'prolonged' period." *Id.* at 24. Patent Owner continues that "[t]here is likewise no meaningful evidence of the role played by the ultrasonic generator of the CN182 etching process, or the effects of varying the temperature or the concentration levels of the sodium bicarbonate solution." *Id.* at 24–25. "CN182 provides only pablum: '[t]he ultrasonic generator emits ultrasonic waves to cause vibrations in the

sodium bicarbonate solution placed in the ultrasonic generator, thereby ensuring the etching effect,' and '[h]eating and stirring further guarantee the etching effect; at the same time, the etching time is shortened and the processing efficiency is improved.'" *Id.* at 25 (citing Ex. 1004 ¶¶ 32, 34).

Patent Owner argues that "[t]here is likewise no evidence of the stoichiometry of the reaction that allegedly produces the etching to achieve the matte structure, or that the reaction continues indefinitely without reaching equilibrium in which no more depth would be consumed, or that the surface oxidation on the plastic is not a key component of the reaction, as either catalyst or reactant, such that the reaction would cease once the surface oxygen is depleted." *Id.*

Patent Owner argues that "[t]here is, consequently, no evidence that a POSA would have envisioned the 'prolonged etching' as an option, let alone would have pursued it with any expectation of success." *Id.* Patent Owner concludes that "Dr. Milster's opinion that the POSA 'naturally and predictably' would have done so is simply not supported." *Id.*

*c) Analysis*

As explained in §§ I.D–I.E, claim 1 recites a light blocking sheet comprising two outer layers and an inner substrate layer. Ex. 1001, 19:2–19. Claim 1's limitation 1.6 recites that the minimum diameter of the substrate opening is Φsmin, the diameter of the first opening is Φ1, the diameter of the second opening is Φ2, and the following conditions are satisfied:

$2.0\mu m<(\Phi smin-\Phi 1)/2<200\mu m$; and

$2.0\mu m<(\Phi smin-\Phi 2)/2<200\mu m$.

Petitioner acknowledges that limitation 1.6 is not expressly disclosed by CN182. Pet. 43. Petitioner argues, however, that limitation 1.6 would

have been obvious over CN182 in light of the general knowledge of a POSITA. Pet. 43–62. Specifically, Petitioner asserts that "prolonging" the etching with the alkali solution beyond CN182's disclosed range of "3 to 5 hours" would result in structure satisfying limitation 1.6.

The Court of Appeals for the Federal Circuit has held that the Board is permitted to rely on general knowledge to supply a missing claim limitation in an *inter partes* review, such as when "the missing limitation in question [is] *unusually simple* and the technology *particularly straightforward*." *Koninklijke Philips v. Google LLC*, 948 F.3d 1330, 1337–38 (quoting *Arendi SARL v, Apple Inc.*, 832 F.3d 1355, 1361–1362 (Fed. Cir. 2016)) (emphasis added).

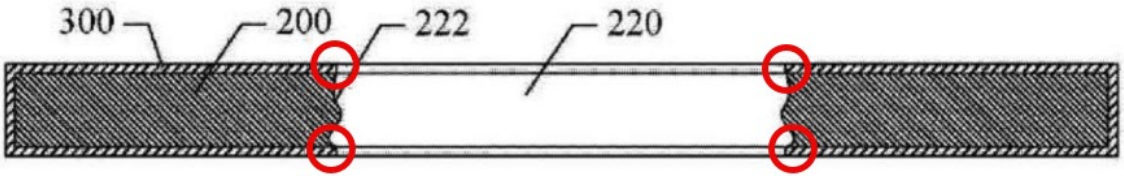
We determine, on the record before us, that Petitioner does not have a likelihood of success of showing that the "prolonged" etching process that Petitioner proposes to arrive at the structure of limitation 1.6 to be "unusually simple" nor is "the technology particularly straightforward." CN182's etching process uses an alkali (sodium bicarbonate) solution with a concentration from 5% to 35% at a temperature of 35 to 55°C stirred for a period of 3 to 5 hours in an ultrasonic generator with power of 300 to 500 watts. Ex. 1004 ¶¶ 7–12. This is done in CN182 to create a matte structure on the inner surface of the body composed of plastic material (polyethylene terephthalate (PET)) between two antistatic coatings comprised of carbon powder layers. *See, e.g.*, Ex. 1004 ¶¶ 5–6.

Petitioner does not indicate how much time beyond CN182's stated range of 3 to 5 hours would be required for the "prolonged" etching process it proposes to achieve a minimum depth of 2.0 μm relative to the outer carbon powder layer, nor whether a POSITA would have considered the

prolonged time to be practically viable. Petitioner also does not explain what the reaction is, what its etch rate is, whether its effect would be diminished or exhausted as reactants are consumed or affected by other substances present, or whether other variables, such as the alkali concentration, temperature, or power and frequency of the ultrasonic generator, would need to be changed and how much over the course of the "prolonged" etching process.

Nor does Petitioner explain what the reaction's effect would be on the outer carbon powder layers as the substrate underneath them is consumed. The term "carbon *powder* layer" suggests that the outer layers of CN182 lack the structural integrity to stand on their own without the support of the underlying body of plastic material substrate. By its plain and ordinary meaning, a "powder" is understood to be fine particles of a solid substance, which would lack the physical structure necessary to be self-supporting.

Further evidence is shown in our annotated version of CN182's Figure 3 below.




We added red circles to CN182's Figure 3 to show that the carbon powder layer is even with body 200 (the plastic material) where they touch, suggesting that the carbon powder layer is supported by the body 200. Petitioner does not address whether the carbon powder layer has the structural integrity to stand alone, which would be required in order to form a light trap.

In contrast, the '660 patent states that "when the first outer layer 110 and the second outer layer 120 are made of black *carbon fibers*, *the strength and the ability for eliminating lights can be enhanced simultaneously*." Ex. 1001, 5:64–67. In other words, the carbon fibers in the '660 patent provide strength to the outer layers so that they have the structural integrity to form a light trap. On this record, a POSITA would not have looked to a carbon powder layer to form the walls or baffles of a light trap.

Petitioner relies extensively on extrinsic evidence to support its contention that a POSITA would have known that carbon-containing materials can be used to form the walls of a light trap. Pet. 51 (citing Ex. 1006 ¶ 20; Ex. 1031, 3:22–25; Ex. 1033 ¶¶ 14, 75; Ex. 1034, 3:55–4:31; Ex. 1003 ¶ 115). This evidence relates to documents disclosing various materials such as carbon leather (Ex. 1006); a light-shielding coat with binder resin, black fine particles, and a matting agent (Ex. 1031); an optical laminate (Ex. 1033); and light shield coating with epoxy, diallylphthalate, acrylic, urethane, vinyl chloride or vinyl acetate, and carbon black as a dried film (Ex. 1034). Even if a POSITA would have recognized that these materials would have been useful for the walls of a light trap, Petitioner has not shown that a POSITA would have understood these materials as the same or comparable to CN182's carbon powder layer, or would have been suitable substitutes for it.

As evidence for its contention that a POSITA would have been able to create a "prolonged" etching process from CN182's disclosure, Petitioner points to testimony given by Patent Owner's declarant, Dr. Bentley, in the Indian proceeding. Pet. 57–58 (citing Ex. 1028 ¶ 42). There, Dr. Bentley opined on the sufficiency of the description of an Indian patent related to the

'660 patent, in essence stating that the process for chemical etching was known, and if the product details (such as dimensions, assembly, material etc.) are known or understood, then an average skilled person can work backwards to formulate process parameters to achieve the product. Ex. 1028 ¶ 42.

Petitioner's reliance on Dr. Bentley's testimony in this case is misplaced. Dr. Bentley's testimony relates to the sufficiency of the description in the Indian patent, not whether a POSITA would have modified CN182 as Petitioner proposes using a "prolonged" etching process to create a light trap. As CN182 does not disclose a light trap, neither does it disclose any product details concerning one. Instead, Petitioner conjures product details with dimensions derived from assumptions it makes about how a light trap would be configured using an undisclosed "prolonged" CN182 etching process. *See, e.g.*, Pet. 49–56. This is impermissible hindsight.

Patent Owner correctly argues that the evidence does not show that Petitioner's declarant, Dr. Milster, has expertise in etching of plastic materials such as PET which CN182 discloses for use as the inner substrate layer. Prelim. Resp. 15 (citing Ex. 1003 ¶¶ 31–37). Dr. Milster states that he has "education, knowledge, skills, and experience in the fields of optics and lens design." Ex. 1003 ¶ 29. This statement does not provide any evidence of expertise in etching plastic materials. Nor does he indicate that he has any expertise in this field in his *curriculum vitae*. Ex. 1003, Appendix A. Consequently, on this record, Dr. Milster's testimony on the subject of etching plastic materials is entitled to little or no weight.

Some of the extrinsic evidence that Petitioner relies on appears far

afield from the light-blocking sheet of the '660 patent. For example, any relationship that Braunecker's micro-lenses and microlens arrays or reactive ion etching may have to the CN182 or the '660 patent is not sufficiently explained. Pet. 47–48 (citing Ex. 1027, 277–283); Prelim. Resp. 16–17 (citing Ex. 1027; Ex. 1003 ¶ 123). And although Fischer (Ex. 1008) mentions to avoid stray light using the three-bounce rule, baffles, field stops, blackening, and anti-reflective coatings, it does not explain how these techniques would have related to CN182 or the '660 patent.

Petitioner further asserts that CN249 is evidence of contemporaneous independent development that further confirms the obviousness of using the CN182 process to form a light trap. Pet. 60–62 (citing Ex. 1015). However, CN249 discloses that "black coating 3 and 5 can be a carbon material or other materials with shading and matting functions." Ex. 1015 ¶ 30. Petitioner has not demonstrated CN249's black coating to be equivalent to the CN182's carbon powder layer. Furthermore, CN249 has an application date of March 6, 2017, and '660 patent's priority date is November 14, 2016, about four months before CN249. CN249 is thus not prior art to the '660 patent. *Inter partes* review can be sought "only on the basis of *prior art* consisting of patents or printed publications." 35 U.S.C. § 311(b).

The purpose of CN182's etching process is to achieve a matte structure on the hole-wall of the through-hole of a shading ring, which scatters stray light to diminish its deleterious effects in light imaging systems used in cameras and other electronic devices. Ex. 1004 ¶ 6. In contrast, the '660 patent creates a light trap which captures and absorbs stray light. Petitioner proposes to exceed CN182's express teaching of etching for "3 to 5 hours" to create a structure, a light trap, which is not the matte structure

that CN182 seeks to achieve. On this record, Petitioner is using the '660 patent, not the prior art, to modify how a POSITA would have perceived CN182's teachings. Petitioner's contentions are thus based on impermissible hindsight.

Accordingly, on this record, we determine that Petitioner has not presented a reasonable likelihood to prevail in demonstrating unpatentability of claim 1 as obvious over CN182 and the general knowledge of a POSITA. As the foregoing issues with CN182 are sufficiently weighty to deny institution, we do not reach Patent Owner's objective evidence of non-obviousness. *See* Prelim. Resp. 25–28.

*3. Claims 2–9 and 15–19*

Claims 2–9 depend from claim 1 and thus include its limitations, including limitation 1.6. Claim 15 is an independent claim which recites a similar limitation as recited in limitation 1.6, and claims 14–19 depend from claim 15. Thus, for the reasons explained for claim 1, Petitioner has not demonstrated a reasonable likelihood to prevail in showing that claims 2–9 and 15–19 would have been obvious over CN182 and the general knowledge of a POSITA.

*E. Ground 2: Obviousness over CN182 and Cho*

Petitioner asserts that claims 5, 7, 10, 14, 19, 20, and 22 would have been obvious over CN182 and Cho. Pet. 70–81. Petitioner relies on Cho to disclose an "imaging lens module" with spacers which Petitioner proposes to substitute with the "improved CN182 shading ring" resulting from its "prolonged" etching process. Pet. 70–74.

As these claims all include the same or similar limitation as claim 1's limitation 1.6, and Petitioner has not shown that Cho overcomes the

deficiencies of CN182 noted above in ground 1, we likewise determine that Petitioner has not shown a reasonable likelihood to prevail in demonstrating that claims 5, 7, 10, 14, 19, 20, and 22 would have been obvious over the combination of CN182 and Cho.

*F. Ground 3: Obviousness over CN182, Cho, and Takahashi*

Petitioner contends that claims 11–13 and 21 would have been obvious over the combination of CN182, Cho, and Takahashi. Pet. 81–87. Petitioner relies on Takahashi to disclose an anti-reflective layer.

As claims 11–13 and 21 include, by dependency from claim 1 or claim 15, the same or similar limitation as claim 1's limitation 1.6, and Petitioner has not shown that Takahashi overcomes the deficiencies of CN182 and Cho noted above in grounds 1 and 2, we likewise determine that Petitioner has not shown a reasonable likelihood to prevail in demonstrating that claims 11–13 and 21 would have been obvious over the combination of CN182, Cho, and Takahashi.

## III. CONCLUSION

In light of the foregoing, based on the record presented, we are not persuaded that Petitioner has demonstrated a reasonable likelihood to prevail in its assertions that claims 1–22 of the '660 patent would have been obvious under 35 U.S.C. § 103 based on the grounds set forth in the Petition.

## IV. ORDER

For the foregoing reasons, it is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–22 of the '660 patent is not instituted with respect to all grounds of unpatentability set forth in the Petition.

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