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Paper 9
Date Entered: July 6, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIZIO, INC,
Petitioner,

v.

NICHIA CORPORATION,
Patent Owner.

Case IPR2017-00556
Patent 7,855,092 B2

Before BRIAN J. McNAMARA, STACEY G. WHITE, and NABEEL U. KHAN, *Administrative Patent Judges.*

McNAMARA, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

BACKGROUND

Vizio, Inc. ("Petitioner") filed a petition, Paper 2 ("Pet."), to institute an *inter partes* review of claims 1–3, 7–9, 12, and 13 (the "challenged claims") of U.S. Patent No. 7,855,092 ("the '092 Patent"). 35 U.S.C. § 311. Nichia Corporation ("Patent Owner") timely filed a Preliminary Response, Paper 8 ("Prelim. Resp."), contending that the petition should be denied as to all challenged claims. We have jurisdiction under 37 C.F.R. § 42.4(a) and 35 U.S.C. § 314, which provides that 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." Having considered the arguments and the associated evidence presented in the Petition and the Preliminary Response, for the reasons described below, we decline to institute *inter partes* review.

PENDING LITIGATION

The Petition states that Patent Owner has asserted Petitioner infringes the '092 Patent in Case No. 8:16-cv-00545 in the Central District of California ("California Matter"). Pet. 2.

REAL PARTIES-IN-INTEREST

Petitioner identifies itself as the sole real party-in-interest. Pet. 2. Patent Owner contends that Petitioner conspicuously failed to list as a related matter Patent Owner's suit against TCL Multimedia Technology Holdings Ltd. and its subsidiary, TTE Technology, Inc. (together, "TCL") in Delaware (*Nichia Corp. v. TCL Multimedia Tech. Holdings Ltd.*, Case 1:16-cv-00681, filed Aug. 8, 2016) (Ex. 2008), also alleging infringement of the '092 Patent. Prelim. Resp. 7. In that suit, TCL engaged as its litigation

counsel the law firm Petitioner engaged for the California matter and thus, Petitioner and TCL share the same lead trial counsel. *Id*. at 7–8. Noting that in the Delaware case TCL responded to discovery requests concerning preparation and filing of the Petition by asserting the joint defense privilege and common interest doctrine, Patent Owner contends that TCL essentially acknowledges it was communicating with counsel for third parties, likely including Petitioner's counsel concerning the preparation and filing of the Petition. *Id.* at 8 (citing Ex. 2011, Response Request 50).

In this proceeding, Petitioner is represented by a law firm and named counsel that is different from the firm and counsel engaged by Petitioner and TCL in the district court cases. As Patent Owner notes, it is Petitioner's burden to establish it has complied with the statutory requirement to identify all real parties-in-interest. *Amazon.com, Inc.* v. *Appistry, Inc.*, Case IPR2015-00480, slip op. at 6 (PTAB July 13, 2015) (Paper 18). The mere existence of a joint defense agreement between parties represented by the same trial counsel, however, is not enough to establish that a single Petitioner represented by different counsel in an *inter partes* review has failed to name all real parties-in-interest. There is no bright line test for determining the necessary quantity or degree of participation to qualify as a real party in interest, although whether the unnamed party could have exercised control over a party's participation is a common consideration. Office Patent Trial Practice Guide, 77 Fed. Reg. 48756, 58 (Aug. 14, 2012). In this case, Patent Owner has offered no evidence that TCL assisted in preparation or financing of the Petition or exerted any control over its filing or content. TCL's assertion of the joint defense privilege in the district court, in and of itself, does not indicate that TCL participated in this

proceeding in such a manner as to be a real party-in-interest. TCL's response to Patent Owner's discovery request is in the form of an objection and states that subject to its objections, TCL will produce relevant, non-privileged documents responsive to this request that are in TCL's possession, custody, and control that are located after a reasonably diligent search. Ex. 2011, Request Response 50. Patent Owner does not state whether any such documents have been received, whether TCL has refused to produce any such documents, or whether there are any other indications that TCL exercised control over the filing or content of the Petition. We are not persuaded that the circumstances raise sufficient doubt about whether Petitioner has satisfied its obligation to name all real parties in interest.

THE '092 PATENT (EXHIBIT 1001)

The '092 Patent discloses that light emitting diodes (LEDs) are effective light emitting devices for generating individual colors (e.g., red, green, and blue high luminance, high efficiency LEDs), but there was no satisfactory source capable of emitting white light using such light emitting components. Ex. 1001, 1:40–46; 2:3–7. The '092 Patent states that its applicant had "previously developed light emitting diodes which convert the color of light which is emitted by light emitting components" to white and other colors using a fluorescent material. *Id.* at 2:8–16 (citing Japanese Patent Kokai Nos. 5-152609, 7-99345,7-176794 and 8-7614). The '092 Patent states that by "mixing the light of a plurality of sources," the applicants had obtained white light by molding a light emitting component capable of emitting blue light with a resin including a fluorescent material that absorbs light emitted by a blue light emitting component, causing the resin containing the fluorescent material to emit yellowish light. *Id.* at 2:25–

31. The ’092 Patent, however, notes that conventional LEDs caused deterioration of the fluorescent material leading to color tone deviations and reductions in light extracting efficiency. *Id.* at 2:32–35.

The ’092 Patent discloses a white light emitting device in which the light emitting component is a nitride compound semiconductor capable of emitting light of high luminance, preferably a gallium nitride semiconductor including indium (In) as the light emitting layer, and a phosphor that has high resistance against light so that its fluorescent properties change little even when used over a long period of time. *Id.* at 3:37–65. The phosphor preferably contains a yttrium-aluminum-garnet fluorescent material in which yttrium (Y) and Aluminum (Al) enable it to increase the luminance of the light emitting device and part of the Al is substituted by gallium (Ga) and part of the yttrium-aluminum-garnet fluorescent is substituted by gadolinium (Gd). *Id.* at 4:9–12; 4:61–5:6. The light generated by mixing blue light emitted by the light emitting component and the fluorescent light of the fluorescent material is a white light. *Id.* at 5:7–12. A fluorescent material that absorbs light of a short wavelength and emits light of a long wavelength has a higher efficiency than fluorescent material that absorbs long wavelengths and emits short wavelengths. *Id.* at 6:29–33. To improve efficiency and extend life, in the LED of the ’092 Patent, the main emission peak of the light emitting component is set to a relatively short wavelength between 400 nm and 520 nm in the visible light region, and the emission wavelength of the phosphor is set longer than the main emission peak of the light emitting component. *Id.* at 6:36–43. The ’092 Patent describes a first embodiment using a garnet phosphor activated with cerium to emit yellow light when excited by a blue light component that “can emit white light by

blending blue light emitted by the light emitting components 102, 202, and yellow light emitted by phosphor excited by the blue light." *Id*. at 10:3–11.

The embodiment shown in Figure 1 is a lead type light emitting diode in which the light emitting component is installed on a cup of a mount lead and the cup is filled with a coating resin that contains a specified phosphor to cover the light emitting component and is molded in resin. Ex. 1001, 8: 38–44. Part of the light emitted by the light emitting component excites the phosphor in the resin to generate fluorescent light at a wavelength different from that of the light emitted by the LED component. *Id.* at 8:47–52. The part of the LED light that does not contribute to the excitation of the phosphor is output and mixed with the fluorescent light, causing the entire LED device to output a wavelength different from that of the light emitting component. *Id.* at 8:52–57.

Figure 2 illustrates a chip type light emitting diode in which the LED chip is installed in a recess of a casing filled with a material containing a specified phosphor to form a coating, such that "fluorescent light emitted by the phosphor and LED light transmitted which is transmitted without being absorbed by the phosphor are mixed" to output light whose wavelength is different from that of the LED light." Ex. 1001, 8:57–9:6.

The '092 Patent also discloses a second embodiment, similar to the first embodiment, with a light emitting component and a fluorescent material including two or more phosphors of different compositions activated with cerium, allowing a desired color tone by controlling the contents of the phosphors. *Id.* at 17:38–57, 18:6–12. The color tone of the light emitting diode can be adjusted between white and incandescent lamp color by mixing the proportion or quantity of the resin in the recess of the casing in

accordance with the wavelength of the light emitted by the gallium nitride emitting component. *Id.* at 10:45–50. Distribution of the phosphor concentration also influences the color blending and durability. *Id*. at 10:51–52.

Patent Owner notes that the use of pulse signals to control the brightness of the white LED to achieve a stable white color is a focus of the '092 Patent. Prelim. Resp. 6. Figure 10 of the '092 Patent, shown below, illustrates LED display unit 601 and drive circuit 610. *Id.* at 20:64–21:1.

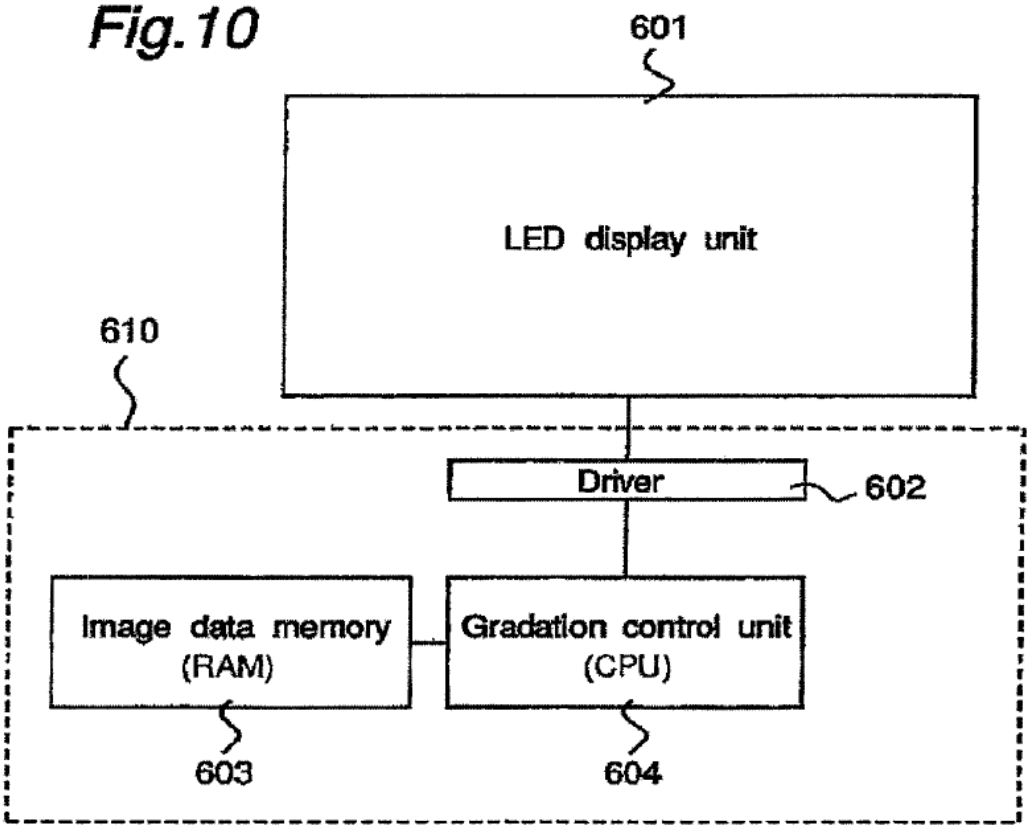


Figure 10 of the '092 Patent

Drive circuit 610 includes driver 602, video data storage means 603 (image data memory (RAM)), and tone control means 604 (gradation control

unit (CPU)). *Id.* at 21:1–3. LED device 601 has white light emitting diodes 501 arranged in a matrix configuration in a casing 504 with integrally formed light blocking material as shown in Figure 11 to form a monochromatic LED display device. *Id*. at 21:3–8. Video data storage means (RAM) 603 stores display data. *Id*. at 21:9–11. Tone control means 604 retrieves data from the RAM and computes and outputs tone signals for controlling the brightness and the duration of the lighting of individual light emitting diodes of the LED display by outputting pulse signals that turn the light emitting diodes on and off. *Id.* at 21:11–21. Tone control means 602 also provides switching signals to driver 602 that drives the LEDs. *Id.* at 21:14–16. Thus, the LED display device can display images according to the pulse signals input from the drive circuit. *Id*. at 21:23–25; 25:60–26:2.

ILLUSTRATIVE CLAIM

1. A device for emitting white-color light comprising:
(i) a light emitting diode including:
an LED chip comprising a gallium nitride compound semiconductor containing indium and being capable of emitting a blue color light, and
a phosphor capable of absorbing a part of the blue color light and emitting a light having longer wavelength than the blue color light,
the blue color light and the light from said phosphor being mixed to make the white-color,
(ii) a control unit for converting an input to pulse signals,
(iii) a driver receiving said pulse signals from said control unit to drive said LED chip,
wherein the brightness of the white-color light from said light emitting diode is controlled by a width of said pulse signals.

ART CITED IN PETITIONER'S CHALLENGES

Petitioner cites the following references in its challenges to patentability:

Reference	Designation	Exhibit No.
U.S. Patent No. 6,600,175 issued July 29, 2003	Baretz	1004
U.S. Patent No. 5,796,376 issued August 18, 1998	Banks	1005
U.S. Patent No. 3,699,478 issued October 17, 1972	Pinnow	1009
U.S. Patent No. 3,816,576 issued June 11, 1974	Auzel	1006
U.S. Patent No. 3,774,021 issued November 20, 1973	Johnson	1007
U.S. Patent No. 5,001,609 issued March 19, 1991	Gardner	1008
Japanese Patent No. H7-99345 published April 11, 1995	Matoba	1010

CHALLENGES ASSERTED IN PETITION

Claims	Statutory Basis	Challenge
1–3, 8, and 13	35 U.S.C. § 103(a)	Obvious over Baretz in view of Banks
12	35 U.S.C. § 103(a)	Obvious over Baretz in view of Banks and further in view of Pinnow

7	35 U.S.C. § 103(a)	Obvious over Baretz in view of Banks and further in view of Auzel
7	35 U.S.C. § 103(a)	Obvious over Baretz in view of Banks and further in view of Johnson
8	35 U.S.C. § 103(a)	Obvious over Baretz in view of Banks and further in view of Gardner
9	35 U.S.C. § 103(a)	Obvious over Baretz in view of Banks and further in view of Matoba

CLAIM CONSTRUCTION

As stated in our Order entered on April 6, 2017, recognizing that the '092 Patent is likely to expire during this *inter partes* review, we apply a district court-type claim construction in this proceeding. Paper 7, 2–3. Neither Petitioner nor Patent Owner proposes a construction for any claim term. Nevertheless, Patent Owner argues that Petitioner implicitly construes as a "key term applied in its invalidity arguments" the expression "the blue color light and the light from said phosphor being mixed to make the white color" to equate with a "partial conversion" in which "some but not all" light from the LED chip is absorbed and down converted by the phosphor, as contrasted to "full conversion" where "all" of the light from the LED is absorbed and down-converted by the phosphor. Prelim. Resp. 18. According to Patent Owner, Petitioner treats this term as if it meant "any amount of blue light emitted by the LED chip is emitted by the device, without being absorbed by said phosphor, in which the light emitted by the device is a white color." *Id.* at 19. Patent Owner argues that, under Petitioner's view, "any LED that has a blue LED chip and emits white light

would be considered to 'mix' the blue light from the LED chip with that of the phosphor to make white light, if *any light* emitted by the LED chip evades the phosphor and escapes . . . . regardless of whether that light is necessary or contributes in any way to creation of the white color emitted by the LED." *Id.* Patent Owner contends Petitioner's implied construction removes from the claim the limitation that the blue from the LED actually must be used "to make" the white light from light that would not be white otherwise. *Id.* Patent Owner argues that Petitioner's implied construction is not supported by the specification, ignores the context of the claim and the dual roles of the light from the LED chip. *Id.*

As neither Petitioner nor Patent Owner proposes any explicit claim construction and Patent Owner asserts Petitioner implicitly asserts a claim construction in its arguments, we address this issue further in our analysis of parties' arguments below.

ISSUES UNDER 37 U.S.C. § 325(d)

Patent Owner urges us to decline institution of *inter partes* review because Petitioner requests that the panel revisit the same prior art considered by the Examiner. Prelim. Resp. 9. As noted above, each of Petitioner's challenges cites Baretz as a primary reference. With the application that matured into the '092 Patent, the Applicant filed a Petition to Make Special Under Accelerated Examination Program (Ex. 1003 Petition to Make Special) and an Accelerated Examination Support Document ("Accl. Exam Support Doc.") that identified Baretz as one of four "references deemed most closely related to the subject matter of the claims."

Ex. 1003, Accl. Exam. Support Doc., 5.[1,2] The Accelerated Examination Support Document states that Baretz discloses a light emitting diode that employs a different light emitting mechanism from that of the claimed invention. *Id.* at 18 (citing Ex. 1004, 7:19–27, disclosing that "monochromatic blue or UV radiation output from the LED is absorbed and then down converted by the fluorphore or phosphor to yield longer wavelengths to include a broad spectrum of frequencies which appears as white light"). According to Patent Owner, in Baretz, light from the LED die is not used to make white light; instead, white light is obtained from red, green and blue emission centers of Bartez's luminophoric medium. *Id.* at 19 (citing Ex. 1004 8:35–36). Patent Owner concludes, "[t]herefore, in Baretz, light from LED die 13 and the light from the luminophoric medium is *not* mixed to make the white-color." *Id.*

It appears that the application resulted in a first action allowance. The Examiner's Notice of Allowability states:

> The following is an examiner's statement of reasons for allowance:
>
> The prior art found by the examiner Brando et al.[3] disclose the development of highbright white light emitting diode lamps.

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[1] We are unable to provide precise page citations to Ex. 1003, which contains 1,053 pages, because Petitioner failed to number the pages of Exhibit 1003 sequentially.

[2] The other three references are: Japanese Patent Appl. Publ. No. JP 07-306659 ("Nagai"); U.S. Patent No. 5,334,855 ("Moyer"), and Japanese Patent Appl. Publ. No. JP 07-176794 ("JP'794").

[3] The Examiner appears to be referring to the entry on line U of the accompanying Form PTO-892 Notice of References immediately following Notice of Allowability (Ex. 1003) "Branko, et al Development and applications of highbright white LED lamps, November 29, 1996, The 264th

> There was no prior art found by the examiner anticipate or make obvious the claimed;
>
> "an LED chip comprising a gallium nitride compound semiconductor containing indium and being capable of emitting a blue color light, and a phosphor capable of absorbing [a] part of the blue color light and emitting a light having a longer wavelength than the blue color light, the blue color light and the light from said phosphor being mixed to make the white color", as required by Claim1 and dependent Claims thereof.

Ex. 1003, Notice of Allowability, 2.

Cases in which we denied institution under 35 U.S.C. § 325(d) based on consideration of a reference during prosecution of the corresponding patent application often involve extensive substantive discussion of that reference. *See Yotrio Corp. v. Lakesouth Holdings LLC*, Case IPR2017-00298 (PTAB May 15, 2017) (Paper 12) (denying institution where Examiner expressly considered the reference). In this case, Applicant's substantive discussion distinguishing Baretz constitutes about 17 lines of the 1,053 page file history. Ex. 1003, Accel. Exam. Support Doc. 18–19. The Notice of Allowability states only that "no prior art found by the Examiner anticipate[s] or makes obvious" the limitations concerning the LED chip emitting a blue color light, the phosphor capable of absorbing a part of the blue color light and emitting a wavelength longer than the blue color light, and the blue color light and the light from the phosphor being mixed to make the white color. Ex. 1003, Notice of Allowability 2. Although we assume that the Examiner considered Baretz, in the Notice of Allowability the Examiner does not mention Baretz or discuss his reasoning concerning its specific application to the claims. *Id.* A major focus of disagreement

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Proceedings of the Institute of Phosphor Society, pages 4–16 of the translation provided by the Applicant."

between Petitioner and Patent Owner concerns the implications of the disclosure in Baretz to the claims at issue in this proceeding. Prelim. Resp. 11. In view of these circumstances, we decline to exercise our discretion to deny institution under 35 U.S.C. §325(d).

ANALYSIS OF PETITIONER'S PRIOR ART CHALLENGES

Introduction

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 test for obviousness is whether the combination of references, taken as a whole, would have suggested the patentees' invention to a person having ordinary skill in the art. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *KSR v. Teleflex*, 550 U.S. at 417. To reach this conclusion, however, requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed.

Cir. 2011). Obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention. *Id.* However, a precise teaching directed to the specific subject matter of a challenged claim is not necessary to establish obviousness. *KSR v. Teleflex*, 550 U.S. at 418. As the Supreme Court recognized, in many cases a person of ordinary skill "will be able to fit the teachings of multiple patents together like pieces of a puzzle," recognizing that a person of ordinary skill "is also a person of ordinary creativity, not an automaton." *KSR v. Teleflex*, 550 U.S. at 420–21. Against this general background, we consider the references, other evidence, and arguments of the parties.

Level of Ordinary Skill

Petitioner cites the testimony of its declarant, Dr. Paul R. Prucnal, that a person of ordinary skill in the art of the '092 Patent would have had a minimum of a bachelor's degree in electrical engineering, chemistry, physics, or a related field and approximately two years of professional experience in optoelectronics or other relevant field. Pet. 32 (citing Ex. 1002, Dec. of Dr. Paul Prucnal ("Prucnal Decl.") ¶ 37). Dr. Prucnal further stated that additional graduate education could substitute for professional experience or significant experience in the field could substitute for formal education. *Id.* (citing Ex. 1002, Prucnal Decl. ¶¶36–37). Noting that a person of ordinary skill in the art is a hypothetical construct, but should be tethered to reality, Patent Owner critiques Petitioner's description of such a person as inadequate because it fails to define optoelectronics, is overbroad and too flexible, and attempts to sweep non-analogous art into the

obviousness analysis. Prelim. Resp. 14–16. Patent Owner, however, does not propose an alternative description of a person of ordinary skill.

The subject matter of white light LED devices in the '092 Patent concerns aspects of electrical engineering (e.g., the control circuitry), physics (e.g., wavelengths of the spectrum to generate white light), and chemistry (e.g., the composition of phosphors to absorb various wavelengths and to cause fluorescence). Thus, persons of ordinary skill in this field are likely to have different technical backgrounds and professional experience. We are persuaded that Petitioner's description of a person of ordinary skill in the art recognizes the wide range of backgrounds of persons working in the field and is adequate for purposes of this proceeding.

Claims 1–3, 8, and 13 As Obvious Over Baretz In View Of Banks

Claim 1

With respect to claim 1, Petitioner demonstrates that Baretz discloses a device for emitting white-color light, as recited in the preamble (Pet. 33–35), comprising a "light emitting diode," designated element 1.A (Pet. 36), "an LED chip comprising a gallium nitride compound semiconductor containing indium and being capable of emitting a blue color light," (designated element 1.A.1)(*id* at 36–38), and "a phosphor capable of absorbing a part of the blue color light and emitting a light having longer wavelength than the blue color light." (*id*. at 37–40).

In its Accelerated Examination Support Document, Patent Owner acknowledges that Baretz discloses the preamble and the elements Petitioner designates as 1.A, 1.A.1, 1.A.2, as well as a controller, stating:

> With respect to claim 1, Baretz discloses:
> a device for emitting white-color light comprising (col. 11 lines 33-42, display 30 illustrated in Fig. 4):

> a light emitting diode assembly (light emitting diode assembly 10 in Fig. 1, col. 8 lines 58-61) including:
> an LED chip (LED die 13 in Fig. 1, col. 8 lines 66-67) comprising a gallium nitride compound semiconductor containing indium (LED 13 is described as including indium gallium nitride at col. 10 lines 24-26) and being capable of emitting a blue color light (col. 10 lines 24- 25), and
> a phosphor capable of absorbing a part of the blue color light and emitting a light having longer wavelength than the blue color light (down-converting material 20 in fig. 1, described at col. 9 lines 3-9, where phosphorescent centers can emit blue, red, green light, col. 8 lines 26-36); and
> a controller (controller 31 in fig. 4, col. 11lines 43-52).

Ex. 1003, Accl. Exam. Support Doc. 18.[4]

In view of the parties' general agreement that Baretz discloses the preamble and elements 1.A, 1.A.1, and 1.A.2, of claim 1 of the '092 Patent, we turn our attention to the claim element designated 1.A.3 by Petitioner, which recites "the blue color light and the light from said phosphor being mixed to make the white-color." Pet. 40. The question of whether Baretz discloses this limitation is a main disagreement between Petitioner and Patent Owner. Prelim. Resp. 11. According to Patent Owner, Petitioner has tried to write out of this limitation the requirement that the blue from the LED chip must be used to make the white light from light that would not otherwise be white. *Id*. at 19. As noted above, although neither party seeks a construction of the meaning of "a phosphor capable of absorbing a part of the blue color light" in limitation 1.A.2, Patent Owner argues that Petitioner implies a construction that unreasonably broadens claim limitation 1.A.3,

[4] At page 19 of the Accelerated Examination Support Document, Applicant reproduced the entirely of claim 1, including these limitations, stating that it was not disclosed by Baretz.

which recites mixing the blue light and the light from the phosphor to make the white light. Prelim. Resp. 17–20. The issue arises in the context of what it means for a part of the blue light to mix with the longer wavelength emitted by the phosphor as claimed in the '092 Patent.

A phosphor capable of absorbing a part of the blue color light

In patent law, "the name of the game is the claim." *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998). Section 112 of the 1952 Patent Act requires that the claims themselves set forth the limits of the patent grant. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc). Thus, we consider the limitation "the blue color light and the light from said phosphor being mixed to make the white color" in the context of the antecedent claim language.

Claim 1 recites that the LED chip is "capable of" emitting a blue color light and that the phosphor is "capable of absorbing a part of the blue color light and emitting a light having longer wavelength than the blue color light." This language does not exclude the possibility that the LED chip and the phosphor are "capable of" other performance. We further note that the "part" of the blue color light that the phosphor is "capable of" absorbing is not defined in the claim. The Specification does not discuss what part of the blue light emitted by the LED chip is absorbed by the phosphor nor do the parties identify any other discussion in the '092 Patent Specification of what constitutes a "part" of the blue color light as recited in claim 1. The '092 Patent's discussion of the spectrum emitted by the phosphor is in the context of the wavelength of the light emitted by the phosphor, but does not speak to what "part" of the blue light is absorbed.

In this case, we do not apply the broadest reasonable construction, but instead employ a *Philips* type construction. The recitation that the phosphor emits "a light having a longer wavelength than the blue color light" does not specify any particular range of wavelengths. During prosecution, Applicant identified several paragraphs of the Application as disclosing the claimed "phosphor capable of absorbing a part of the blue color light and emitting a light having a longer wavelength than the blue color light." Ex. 1003, Accl. Exam Support Doc. 33 (identifying Application paragraph 17 (which corresponds to Ex. 1001, 3:37–41), Application paragraph 29 (which corresponds to Ex. 1001, 4:55–66), Application paragraph 47 (which corresponds to Ex. 1001, 6:29–54), and Application paragraph 147 (which corresponds to 19:56–20:5). Beginning with the word "[t]hus," the subject matter of Application paragraph 17 follows from the disclosure preceding it in Application paragraph 16 (which corresponds to Ex. 1001, 3:31–36). Here the '092 Patent discloses that:

> With regard to the relationship with the light emitting component, the fluorescent material must be capable of absorbing with high efficiency the light of high monochromaticity emitted by the light emitting component and emitting light of a wavelength different from that of the light emitted by the light emitting component.

Id. at 3:31–36. Other than the reference to the absorption of the monochromatic light from the light emitting component by the fluorescent material being of "high efficiency" the '092 Patent does not discuss what "part of light emitted by the light emitting component" is absorbed by the fluorescent material. Application paragraph 29 discloses that the preferable emission range of the light emitting component is between 400 and 530 nm, and the "main emission wavelength of the phosphor is set to be longer than

the main emission peak of the light emitting component. This makes it possible to efficiently emit white light." Ex. 1003, Application as filed ("Appl. as filed ") ¶ 29, Ex. 1001, 4:55–66. It is not clear from this part of the '092 Patent Application whether the phosphor fluoresces to emit white light or emits other wavelengths longer than blue, e.g., red, or green, to achieve the appearance of white light. Application paragraph 47 repeats this preferred range of emission of the light emitting component (400 nm to 530 nm in the visible light region, as opposed to ultraviolet light) and the longer main emission wavelength of the phosphor. Ex. 1003, Appl. as filed ¶ 47, Ex. 1001, 6:28–42. This portion of the '092 Patent application disclosure further sates that because of its longer wavelength, light converted by the fluorescent material will not be absorbed by the light emitting component (the LED chip with gallium nitride) even when the light emitting component is irradiated by light reflected and converted by the fluorescent material because the energy of the converted light is less that the band gap energy. Ex. 1003, Appl. as filed ¶ 47, Ex. 1001, 6:43–51. Paragraph 147 of the Application as filed repeats this principle, stating that because the energy of the converted light is less than the band gap of the nitride semiconductor, light emitted by the fluorescent material never is absorbed by the LED element, so that the efficiency of the light emitting diode is not decreased. Ex. 1003, Appl. as filed ¶ 147, Ex. 1001, 19:56–20:5. None of this disclosure addresses the issue of what part of the blue light from the light emitting component is absorbed by the phosphor recited in claim 1 of the '092 Patent.

The Specification identifies certain "requirements" of "[a] phosphor to be used in combination with the nitride compound semiconductor light

emitting component" as including "capability to emit light from green to red regions for the purpose of mixing with blue light to generate white light" and "capability to continuously change the color tone in terms of the proportion of composition or ratio of mixing a plurality of fluorescent materials." Ex. 1001, 9:57–58, 63–65.[5] In the context of the first embodiment, the Specification states "the light emitting diode of the first embodiment can emit white light by blending blue light emitted by the light emitting components 102, 202 and yellow light emitted by the phosphor excited by the blue light." *Id.* at 10:8–11. Referencing the spectral diagrams in Figures 3A and 3B, the Specification further describes the effect of increasing the concentration of Gd in the phosphor as shifting the emission peak wavelength and the entire emission spectrum toward longer wavelengths where the emission of more reddish light is required. *Id.* at 11:16–23.

Based on the disclosure in the '092 Patent Specification and the arguments of the parties, for purposes of this Decision, we understand that in claim 1 the "light from said phosphor" refers to the phosphor emitting light having a longer wavelength than the blue color light and that "the blue color light" in this limitation is that part of the blue color light that was not absorbed by the phosphor, such that the these light components mix to make the white color light. For purposes of the Decision, we also understand the limitation "a light having a longer wavelength than the blue color light" and the description in the '092 Patent Specification that the composition of the

[5] The specification also states another requirement of the phosphor is "2. Capability to efficiently emit light in blue region for the excitation by means of the light emitting components 102, 202. When mixing of colors is used, should be capable of emitting blue light, not ultraviolet ray, with a high efficiency."

phosphor can be modified to shift the phosphor's emission peak to mean that light emitted from the phosphor "having longer wavelength than the blue color light" is emitted primarily at a single wavelength.

Petitioner contends that a person of ordinary skill in the art would understand that Baretz teaches mixing blue light from the LED chip and light from one or more phosphors to make white light. Pet. 41. Petitioner argues that Patent Owner's expert, Dr. E. Fred Schubert, before a jury in *Everlight Electronics Co., v. Nichia Corp.*, Case 12-cv-11758 (E.D. Mich., Apr. 17, 2015), testified that Baretz discloses "partial conversion" of light from the blue LED in which "some but not all light from the semiconductor layer sequence is absorbed is and converted by the phosphor." *Id.* (quoting Ex. 1023, 122:4–6). Dr. Schubert attempted to qualify his testimony, however, stating:

> I would say that if we look carefully at the examples in the claims of the Baretz patent and what Baretz teaches, then it's clear that it's full conversion. But if we look at the entirety of the Baretz specification and take into account that Bartez really discloses -- really makes a statement in which he says there is essentially an infinite number of amount of configurations, then these infinite number of configurations would include partial conversion.

Ex. 1023, 117:11–19; *see* Prelim. Resp. 32–34.

Patent Owner contends that Professor Schubert's statements are inadmissible hearsay and not attributable to Patent Owner as an admission. Prelim. Resp. 35 (citing Fed. R. Evid. 810 (d)(2)(C)(D) (sic), *Kirk v. Raymark Indus. Inc.*, 61 F. 3d 147, 164 (3d Cir. 1995)). Under Fed. Rule of Evid. 801(2)(C), an opposing party's statement is not hearsay if it was made by a person whom the party authorized to make a statement on a subject.

Under Fed. Rule of Evid. 801(2)(D) an opposing party's statement is not hearsay if it was made by the party's agent or employee within the scope of that relationship and while it existed. In contrast to subsection (D), Subsection (C) of the rule does not require an agency relationship. To the extent that *Kirk* infuses a requirement of a showing of agency in subsection (C), it is not persuasive. *Long v. Fairbanks Farms, Inc.*, No. 1:09-CV-592-GZS, 2011 WL 2516378, *10 n. 18 (D. Me., May 31, 2011) (also noting that nothing in Rule 801(2)(C) forbids the use of admissions for purposes of summary judgment and that no exception is made for expert testimony that has not been withdrawn). Similarly, in the context of the preliminary nature of this proceeding, and absent evidence that Prof. Schubert's testimony has been withdrawn, we may consider it for purposes of deciding institution.

Nevertheless, we need not rely on Prof. Shubert's testimony, because the Applicant for the '092 Patent acknowledged that Baretz discloses an LED chip capable of emitting a blue color light and "a phosphor capable of absorbing a part of the blue color light." Ex. 1003, Accl. Exam Support Doc. 18. In the Accelerated Examination Support Document, Applicant acknowledged that Baretz discloses the claimed feature of "a phosphor capable of absorbing a part of the blue color light and emitting a light having a longer wavelength than the blue color light." Ex. 1003, Accl. Exam. Support Doc. 18.

Petitioner argues Baretz discloses that a typical concentration range for a phosphor in the down converting medium is such that the majority of the medium does not contain any phosphor and not all of the blue light emitted by the LED chip will be absorbed. Pet. 41–44. According to Petitioner's expert, Dr. Pruncal, "[t]his unabsorbed light will pass through

the medium without being down-converted by any phosphors and mix with the light that has been emitted by the phosphor to emit white light." Ex. 1002, Declaration of Dr. Paul R. Pruncal ("Pruncal Decl.") ¶ 138. Petitioner further notes that Baretz's disclosure of using one or more phosphors in the down converting medium encompasses a single phosphor implementation (*id*. at 44–45,citing Baretz's reference to "fluorescers(s) and phosphor(s)," Ex. 1004, 9:5–7, 39–50; 11:2–5; Ex. 1002 Pruncal Decl. ¶ 142) and that Maxwell's triangle teaches that a person of ordinary skill would recognize that white light results from mixing blue light from the LED chip with yellow light from the phosphor (*id*. at 45, citing Ex. 1016, 153–154, Fig. 66). Patent Owner disputes Petitioner's interpretation that Baretz discloses any implementation that does not employ a luminophoric medium in which light from the LED chip is down converted and reemitted as red, blue, and green light. Prelim. Resp. 42–44. Patent Owner further contends that Petitioner has not established that Baretz discloses any fluorescer or phosphor that actually emits yellow light, and that Dr. Pruncal contradicts his own testimony by identifying a phosphor that emits a green-yellow light with a large peak in the green range and a smaller peak in the yellow range. Prelim. Resp. 45–47.

Patent Owner contends that Dr. Pruncal's discussion of the typical concentrations of dyes and/or fluorescers does not explain why the range of concentrations would be applicable to the fluorescers or phosphors taught in Baretz and "ignores the Baretz teachings focusing on deriving the white light solely from the emission of luminophoric medium." Prelim. Resp. 37. Emphasizing that Dr. Pruncal does not discuss his assumptions concerning the types of phosphors, their sizes, shapes and absorption/conversion

capacity, their distribution within the medium and the dimensions of the medium, Patent Owner argues that Dr. Pruncal fails to support his conclusion that not all of the blue light is absorbed in Baretz. *Id.* at 40–41.

Although Patent Owner contends that Petitioner's declarant, Dr. Pruncal, does not explain the purpose of his analysis (Prelim. Resp. 36), Petitioner points out that Dr. Pruncal cites concentration ranges for a phosphor in the down converting medium disclosed by Baretz and clearly states that in Baretz, unabsorbed light will pass through the medium and mix with light emitted by the phosphor to emit white light. Pet. 42 (citing Ex. 1004 10:66–11:21, Ex. 1002, Pruncal Decl. ¶ 138). To the extent Patent Owner's arguments are based on its contention that Bartez and the examples therein teach full conversion in which all the blue light is absorbed by the luminophoric medium, Patent Owner contradicts its representation to the Examiner that Baretz discloses a phosphor capable of absorbing a part of the blue color light. Ex. 1003, Accl. Exam Support Doc. 18. As discussed above, the '092 Patent does not discuss the meaning of the limitation "a part of the blue color light" in any detail. Thus, the '092 Patent suffers from the same infirmity that Patent Owner contends afflicts Dr. Pruncal's analysis of Baretz. Consistent with an understanding of "part" as less than a whole and in view of the Applicant's statements to the Examiner, Patent Owner has acknowledged that in Baretz part of the blue light is not absorbed. Thus, for purposes of the Decision, we consider Baretz to disclose a phosphor capable of absorbing a part, i.e., less than the whole, of the blue color light.

Patent Owner also represented to the Examiner that Bartez discloses a phosphor capable of "emitting a light having [a] longer wavelength than the blue color light (down-converting material 20 in fig. 1, described at col. 9,

lines 3–9, where phosphorescent centers can emit blue, red, green light, col. 8, lines 26–36)." Ex. 1003 Accl. Exam. Support Doc. 18.

Being mixed to make the white color

Based on the analysis above, the remaining issue is whether Petitioner has established Baretz discloses the blue color light being mixed with light from the phosphor to make a white color light. As discussed above, we understand claim 1 of the '092 Patent to mean that to make the white color light, blue light from the LED not absorbed by the phosphor mixes with a longer than blue wavelength emitted by the phosphor.

Patent Owner argues that in the '092 Patent, the LED chip plays a dual role, i.e., providing light suitable for exciting the phosphor to emit in a desired range of wavelengths, and light suitable for blending with that phosphor emission to make white light. Prelim. Resp. 21–22. According to Patent Owner, although Baretz uses a single LED, Baretz maintained the conventional red-green-blue approach to making white light, using "light from a blue or UV LED chip and a combination of fluorescers, phosphors, and/or luminescent dyes that absorb and down-convert the blue or UV light from the LED chip and emit red, green, and blue light that then mixes to create white light." *Id.* at 20–21.

Baretz describes an enclosure filled with a down converting material "which functions to down convert the light output from the face 18 of LED 13 to white light." Ex. 1004 :4–8. Bartez describes a mechanism of generating white light with a luminophoric material that

> comprises a down-converting material which may include suitable luminescent dyes which absorb the radiation emitted by the LED or other solid state device generating the primary

> radiation, to thereby transfer the radiation energy to the fluorescer(s) and/or phosphor(s) for emission of white light. Alternatively, the luminophoric medium may comprise simply the fuorescer(s) and/or phosphor(s), without any associated mediating material such as intermediate luminescent dyes, if the fluorescer(s) and/or phosphor(s) are directly *excitable to emit the desired white light*.

Ex. 1004, 9:40–50 (emphasis added). We agree with Patent Owner that the embodiment in Figure 2 of Baretz differs from that of Figure 1 only in the placement of the fluorescer in the wall of the housing structure and/or coated as an interior or exterior film, but does not involve different light generating mechanism. Prelim Resp. 43–44, Ex. 1004 9:51–10:2. In further describing the structure of the assembly, Bartez states that a wide variety of structures may be used:

> it being necessary only that the solid state device functioning as the source of the primary shorter wavelength radiation be in transmitting relationship to the recipient luminophoric medium, so that the latter functions in use to down-convert the transmitted radiation from the solid state device and responsively thereto emit *white* light.

Id. at 10:9–19 (emphasis added). Baretz discloses making white LED devices by:

> the method of the present invention, utilizing a down conversion process whereby the primary photon generated in the active region of the diode is down converted with primary blue emission and/or secondary blue fluorescent or phosphorescent centers, as well as green and red fluorescent or phosphorescent centers. Such an LED device is able to down convert the relatively monochromatic light, typical of all heretofore colored LED dies and lamps, to a broader emission that provides white light from red, green, and blue emission centers. Such a device for white light emission, based on down-conversion, requires the primary light to be either blue or

> ultraviolet emission . . . both inorganic or organic fluorescent or phosphorescent material can be utilized to down-convert the primary ultraviolet or blue light emission to a mixture of blue, green and red luminescent emissions. A significant advantage of organic luminescent materials is their relatively broad emission bandwidth which offers the maximal overlap of photon wavelengths to most readily generate a white illumination.

Id. at 8:26–47. Thus, Baretz discloses a light generating mechanism that operates based on transferring radiation energy to fluorescers that emit white light in response. Baretz does not disclose explicitly mixing the blue light with the light from the fluorescers as a light generating mechanism, nor does Baretz explicitly disclose mixing unabsorbed blue light with a fluorescer that emits yellow light, as suggested by Petitioner. Pet. 45–46. Instead, Baretz discloses selecting suitable down converting fluorescers from blue luminescent compositions, green-yellow compositions, and red-orange compositions, stating:

> The amount of dyes or fluorescers specifically formulated into the luminophoric medium, which may for example include a polymeric matrix or other matrix material in which the dyes and/or fluorescers are soluble or dispersible, is not specifically limited, and suitable amount(s) of suitable material(s) for such purpose can be readily determined without undue experimentation, to provide *good white light emissions* (of virtually any time or hue), as well as a virtually infinite series of chromaticity for all visible hues.

Ex. 1004, 10:45–11:7 (emphasis added). Here Baretz explicitly discloses selecting the fluorescers to provide good white emissions. Baretz further states that the concentrations of the fluorescers may be determined based on

their luminescent quantum yields[6] and spectral distribution to define a particular color by its respective chromaticity coordinates, as well as, in the case of radiative energy, the absorption extinction coefficients[7] of the associated fluorescers. *Id.* at 11:8–14.

The disclosure in Baretz is summarized in its discussion of Figure 6 where Baretz states that luminophoric medium 90, when impinged by radiation 94 of a shorter wavelength, is excited to responsively emit radiation 96 "in a range of wavelengths which combine to produce light perceived as white." Ex. 1004 12:53–58. More explicitly, Baretz states:

> It will be apparent from the foregoing that the light emitting assembly of the present invention may be variously configured with a number of solid state light-emitting devices, which emit shorter wavelength radiation, and transmit such radiation to a luminophoric medium which down converts the applied radiation to yield a *white light emission from the luminophoric medium*.

Id. at 12:59–65 (emphasis added).

Here Baretz explicitly states that the luminophoric medium down converts the applied radiation and emits white light. Thus, although we consider Baretz to disclose a phosphor capable of absorbing a part of the blue light, we agree with Patent Owner that Baretz discloses a luminophoric medium that itself emits a broad spectrum of radiation to yield white light, but does not disclose or render obvious to a person of ordinary skill the use of a phosphor capable of emitting a wavelength that that mixes with the blue light to make white light.

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[6] The quantum yield is the ratio of the number of photons emitted to the number of photons absorbed.

[7] The extinction coefficient is a measure of how strongly a substance absorbs light at a given wavelength.

Remaining claims 2–3, 8, and 13 that are the subject of this challenge depend from claim 1 and thus, recite this limitation, which we find is not disclosed in Baretz. Claim 13 differs somewhat because it recites that the phosphor comprises two or more kinds of phosphors of different emission wavelengths. The '092 Patent Accelerated Examination Support document cites several Application paragraphs as disclosing this limitation. Ex. 1003, Accl. Exam. Support Doc. 33. Application paragraph 122 (corresponding to Ex. 1001, 13:30–36) is read in the context of several preceding paragraphs (*see*, Ex. 1001, 12:60–13:36, disclosing the effect on the color temperature and relative emission luminance resulting from including in the phosphor different proportions of various components and using two or more phosphors having different components to increase the RGB components and enable the application for a full color liquid crystal display using a color filter). Application paragraph 137 (corresponding to Ex. 1001, 17:38–57 discloses a fluorescent material with two or more different composition phosphors responsive to variations in LED chip blue light wavelength emission, such that the device nonetheless constantly produces a desired color tone. Application paragraph 139 (corresponding to Ex. 1001, 18:6–12) discloses that in the second embodiment using two or more phosphors of different compositions employs the method of using the fluorescent material is the same as that of the first embodiment. Application paragraph 46 (corresponding to Ex. 1001, 6:22–29) discloses a first fluorescent material and a second fluorescent material may be used to different degrees of substitution to as the phosphor "in order to control the emitted light to *a desired wavelength*." (emphasis added).

Petitioner contends that Baretz discloses that white light LED devices may be made utilizing a down conversion process where the primary photon generated in the active region of the diode is down converted with primary blue emission and/or secondary blue fluorescent or phosphor centers, as well as green and red fluorescent centers. Pet. 68 (citing Ex. 1004, 8:26–39; Ex. 1002, Pruncal Decl. ¶ 250). This disclosure in Baretz does not alter the fact that Baretz discloses the phosphor or fluorescer emitting white light, as opposed to the disclosures in the '092 Patent cited above indicating that different phosphors of different compositions respond to the emitted blue light by emitting a single desired wavelength to mix with the blue light in a device that illuminates to the desired white color. Thus, we are not persuaded that Petitioner has shown a person of ordinary skill would have understood Bartez to disclose this limitation of claim 1 of the '092 Patent.

Petitioner cites Banks as disclosing a control unit for an LED display that converts an input to pulse signals (Pet. 48), but does not identify any disclosure in Banks that would suggest to a person of ordinary skill a mechanism in which the blue light mixes with a longer wavelength to make the white light, as discussed above. For the reasons discussed above, we are not persuaded that Petitioner has demonstrated there is a reasonable likelihood of success in its challenge to claims 1–3, 8 and 13 based on the combination of Baretz and Banks.

Petitioner's Challenges to Claims 7, 8, 9 and 12

Claim 12

We begin with claim 12 because it is related most closely to our discussion of claim 1. Claim 12 depends from claim 1 and recites that the phosphor has a garnet structure and is activated with cerium. Petitioner

contends that a person of ordinary skill would have recognized that emitting white light using a single phosphor with a blue LED chip requires yellow light and that Baretz discloses a phosphor that emits yellow light. Pet. 70. As discussed above, we are not persuaded that Petitioner has demonstrated Baretz discloses a phosphor that emits yellow light for the purpose of mixing with blue light to make white light. Instead, for the reasons discussed above, we agree with Patent Owner that Baretz discloses to one of ordinary skill phosphors that are excited by blue light to emit white light.

Petitioner notes that Baretz does not specify the phosphor has a garnet structure and is activated with cerium. *Id.* Petitioner cites Pinnow as disclosing converting blue light from a monochromatic light source with a cerium-doped yttrium aluminum Garnet phosphor to make a black and white display. *Id.* (citing Ex. 1009 Abstract, 1:38–43; Ex. 1002, Pruncal Decl. ¶ 230). According to Petitioner, similar to Baretz, Pinnow teaches that yellow light emitted by the phosphor mixes with the blue light from the blue light source to make white light. *Id.* at 71–72 (citing Ex. 1009, Abstract; Ex. 1002, Pruncal Decl. ¶ 232). Petitioner contends that a person of ordinary skill would have been motivated to combine the disclosure in Bartez with that of Pinnow because they are in the same field and use a phosphor to convert blue light from monochromatic sources to white light, because the emission peak for Bartez's LED matches closely the excitation peak of Pinnow's YAG:Ce, and because Pinnow discloses that an emission spectrum for the YAG:Ce phosphor is quite broad, offering a maximal overlap of photon wavelengths to most readily generate a white illumination, as disclosed by Baretz. Pet. 73–74.

Patent Owner contends that Pinnow describes a gas ion laser projection display system that is non-analogous to the LED light source described and claimed in the '092 Patent. Prelim. Resp. 49. According to Patent Owner, Pinnow is non-analogous because it is neither in the same field of endeavor as the claimed invention or reasonably pertinent to the particular problem with which the inventor is involved. *Id.* at 50 (citing *In re Klein*, 647 F. 3d 1343, 1348 (Fed. Cir. 2011). Patent Owner notes that Pinnow concerns projection display systems, primarily those producing black and white images, in which a laser beam from a gas ion laser is modulated and deflected to project images onto a screen coated with phosphor. *Id.* Patent Owner also notes that Pinnow is not concerned with mixing the blue and yellow light to make white light, but instead offers alternatives in which reflecting blue light is unnecessary. *Id.* at 54. Patent Owner argues that in some embodiments the screen reflects some of the blue laser light not absorbed by the phosphor back toward the viewer to compensate for the yellowish cast from the phosphor, while in other embodiments the composition of the phosphor is adjusted to provide the desired shade of white with little or no reflection by the blue laser. Prelim. Resp. 52. Noting that Pinnow's inventors were concerned with how light forms an image in a projection system and not with building a light source, Patent Owner argues that Pinnow's inventors did not confront any of the challenges addressed by the invention in the '092 Patent, i.e., creating a small efficient bright white light source. *Id.* at 52–53, 55.

Pinnow discloses an argon-ion laser emitting at 4880 A energizing a screen coated a cerium-doped yttrium aluminum garnet phosphor to emit a broad range of frequencies centering at about 5500 A. Ex. 1009, 1:43–48.

The characteristic yellowish cast of this phosphor output is compensated by a small amount of reflected blue argon light, so that as seen by the eye the phosphor appears more nearly white. *Id*. at 1:33–42, Abstract. Pinnow discloses that the absorption peak of the phosphor may be shifted to match a particular energizing source and that a shift in absorption generally produces a corresponding shift in emission in the same direction, so that color can be adjusted, for example, to produce a white image by reflecting a portion of the laser beam. Ex. 1009, 1:55–67. Pinnow further discloses in Figure 1 that a shift in the excitation spectrum resulting from energy converted usefully by absorption produces an accompanying shift in the emission spectrum and that to produce a white or near-white images the emission peak should not be at a wavelength less than 0.52 micron, corresponding with an excitation peak of 0.43 μm. *Id.* at 3:13–18, 33–55.

Pinnow states that "only the absorbed energy which is converted to visible emission as discussed, is of consequence for the purposes of the invention." *Id.* at 3:12–15. Pinnow further discloses that the significant aspect of its invention is concerned with white or near-white images, that in an unmodified system using an argon or cadmium laser, white images may result by compensation of a secondary yellow cast emission by some reflection of the shorter wavelength emission, and that by modifying the system within the compositional range described by partial substitution of gallium aluminum, the phosphor layer is designed to result in essentially complete absorption and little or no reflection. *Id.* at 4:37–45. Thus, Pinnow discloses deliberate reflection of unconverted laser emission is useful and may even be enhanced to compensate for the yellowish cast of emission from a phosphor to appear more nearly white (*id*. at 1:39–42; 4:61–

64), as well as designing the phosphor to improve absorption, so as to require little or no compensating reflection.

The Petition cites Maxwell's triangle as evidence that there is nothing new about combining blue and yellow light to achieve a white light effect. Pet. 45–46. Pinnow emphasizes that the appropriate composition of phosphor can reduce or essentially eliminate the need for reflecting blue light to obtain the appearance of white light. Ex. 1004, 4:37–45. Unlike Baretz, Pinnow discusses what part of the argon beam energy is absorbed by the phosphor in an experimental arrangement and how the image can be intensified using thinner coatings and mirrors. Ex. 1009, 4:46–65. As discussed above, Pinnow discloses that reflecting blue light from an image created on a phosphor that emits a yellow cast compensates for the yellow cast resulting in an image that appears white. Petitioner's discussion of the overlap between the emission spectrum in Baretz and that in Figure 1 of Pinnow demonstrates that these scientific principles of obtaining white light from a phosphor that absorbs a part of the radiation from a blue laser were known. Pet. 71.

However, unlike Pinnow, claim 12 of the '092 Patent is not concerned with generating an image on a screen. Instead, claim 12, like claim 1, recites a device in which blue color light and light from a phosphor are mixed to make the white color (in the case of claim 12, the phosphor is one having a garnet structure and activated with cerium). Petitioner asserts that Baretz and Pinnow are in the same field of the art (Pet. 73), but Petitioner discusses only the similarities of scientific principles and does not explain why a person of ordinary skill would have looked to combine the teachings of Baretz and Pinnow to arrive at the device recited in claims 1 or 12. We

agree with Patent Owner that Petitioner does not explain how the gas ion laser projection system disclosed in Pinnow is in the same field of endeavor as a solid state LED light source. Prelim. Resp. 55–56.

We also agree with Patent Owner that, unlike Baretz, Pinnow's white image display provides little insight into building a small LED white light source and that Pinnow is not reasonably pertinent to Baretz because the problems addressed by Baretz and the '092 Patent are quite different from those addressed by Pinnow. Prelim. Resp. 57–59. As discussed above, Pinnow teaches both reflecting blue light on a phosphor with a yellow cast to compensate for the yellow generating a white appearance and adjusting the phosphor to absorb more of the radiation to emit white light, thereby minimizing the reflection. To the extent that a person of ordinary skill considered the teaching of Baretz in the context of the earlier teachings of Pinnow, Baretz could have led a person of ordinary skill to adjust the composition of the phosphor so that it emits white light in a white light generating LED device. Indeed, as discussed above, a white light emitting phosphor is what Baretz discloses as useful in an LED device. Petitioner has not explained sufficiently what would have led a person of ordinary skill to employ a phosphor that absorbs a part of the blue light and mixes with the unabsorbed blue light in a white light generating LED based on Baretz and Pinnow. Thus, we are not persuaded that Petitioner has demonstrated that the combination of Baretz, Banks and Pinnow discloses the limitations recited in claim 12.

Claim 7

Claim 7 depends from claim 1 and recites that the light-emitting diode is sealed with silicone. Petitioner challenges claim 7 as obvious over Baretz

in view of Banks and in further view of Auzel. Petitioner cites Auzel as disclosing that the interior of the device that can include crystalline powder in suspension to act as an optical converter or contain a suitable die permitting it to act as an optical filter. Pet. 81. As discussed above, Petitioner does not demonstrate that Baretz in view of Banks discloses a mechanism in which the blue light mixes with a longer wavelength to make white light. Petitioner does not demonstrate that this feature is disclosed in Auzel. Thus, Petitioner has not demonstrated a reasonable likelihood that it will succeed in its challenge to claim 7 based on the combination of Baretz, Banks and Auzel.

Petitioner also challenges claim 7 as obvious over Baretz in view of Banks and further in view of Johnson. Petitioner cites Johnson as disclosing that silicone resin is a conventional optical transparent material used to encapsulate an LED. Pet. 83. Petitioner, however, does not demonstrate that Johnson discloses a mechanism in which the blue light mixes with a longer wavelength to make white light, as discussed above. Thus, Petitioner has not demonstrated a reasonable likelihood that it will succeed in its challenge to claim 7 based on the combination of Baretz, Banks and Johnson.

Claim 8

Claim 8 depends from claim 1 and recites that the device comprises a dispersive member for disbursing light from said light-emitting diode. Petitioner challenges claim 8 as obvious over the combination of Baretz in view of Banks and further in view of Gardner. Petitioner cites Gardner as disclosing an LED lamp with high luminous efficiency in which uniform dispersal of light is achieved by roughening the light-emitting surface of the

LED lamp made from epoxy. Pet. 86. Petitioner, however, does not demonstrate that Gardner discloses a mechanism in which the blue light mixes with a longer wavelength to make white light, as discussed above. Thus, Petitioner has not demonstrated a reasonable likelihood that it will succeed in its challenge to claim 8 based on the combination of Baretz, Banks, and Gardner.

Claim 9

Claim 9 depends from claim 1 and recites that the device comprises a reflective member for reflecting light from said light-emitting diode. Petitioner cites Matoba as disclosing a conventional LED with an LED chip disposed in a reflective cup disposed for the purpose of reflecting light emitted from the light-emitting chip onto a luminescence observation surface. Pet. 90. Petitioner, however, does not demonstrate that Matoba discloses a mechanism in which light mixes with a longer wavelength to make white light, as discussed above. Thus, Petitioner has not demonstrated a reasonable likelihood it will succeed and its challenge to claim 9 based on the combination of Baretz, Banks, and Matoba.

SUMMARY

For the reasons discussed above, we are not persuaded that Petitioner has demonstrated a reasonable likelihood that it will succeed on its challenges to patentability of claims 1–3, 7–9, 12, and 13 of the ’092 Patent.

ORDER

In consideration of the above, we decline to institute *inter partes* review.

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