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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Summary of Proceedings

A Request pursuant to 37 CFR 1.510 for *ex parte* reexamination of claims 2-16, 18-28 and 30-43 of U.S. Patent 7,943,945 (hereinafter "the '945 patent") was filed May 9, 2014 by Third Party Requester. An Order granting *ex parte* reexamination of claims 2-16, 18-28 and 30-43 of the '945 patent was mailed July 31, 2014.

A non-final Office Action rejecting claims 2-16, 18-28 and 30-43 was mailed on October 21, 2014. On December 22, 2014, Patent Owner filed a response including Remarks, a Terminal Disclaimer and Rule 1.132 Declarations by Dr. George Brandes (hereafter “Brandes Declaration”), Gerald B. Stringfellow, PhD (hereafter “Stringfellow Declaration”), Wayne E. Cranton, PhD (hereafter “Cranton Declaration”), Dr. Shuji Nakamura (hereafter “Nakamura Declaration”), Adam Broome (hereafter “Broome Declaration”), and Malcom Forbes (hereafter “Forbes Declaration”).

Information Disclosure Statement

The single reference crossed out on the IDS forms accompanying the instant Final Rejection is in German and does not have a translation or concise explanation of relevance.

Scope of Claims

In reexamination, patent claims are construed broadly. *In re Yamamoto*, 740 F.2d 1569, 1571,222 USPQ 934,936 (Fed. Cir. 1984) (claims given "their broadest reasonable interpretation consistent with the specification"). This

reexamination proceeding contains claims 2-16, 18-28 and 30-43 directed to a light emission assembly. Claim 42 is representative:

42. A light emission assembly, comprising at least one light emission device including a blue light LED emitting radiation, and a luminophoric medium impinged by radiation emitted from the blue light LED and responsively emitting radiation in a range of wavelengths, which combine to produce a white light output from the light emission device, wherein said luminophoric medium comprises phosphor material, and wherein said light emission device comprises at least one of the characteristics of:

(i) the luminophoric medium being at least one of coated on and dispersed in light-transmissive material enclosing the blue light LED; and

(ii) the luminophoric medium being in contact with an emitting face of the blue light LED.

As stated by Patent Owner on p. 9 of the Response filed 01/21/1999 during prosecution of grandparent application Serial No. 08/621,937, "[a]n LED is a diode, and as such, it is a semiconductor device used chiefly as a rectifier, by restricting current flow chiefly to one direction."

According to col. 7, lines 61-64 of the ‘945 patent, “[a]s used herein, the term ‘luminophoric medium’ refers to a material which in response to radiation emitted by the solid state device emits light in the white visible light spectrum by fluorescence and/or phosphorescence."

Rejection Overcome

The obviousness-type double patenting rejection with respect to the claims of U.S. Patent 7,615,795 has been overcome by the Terminal Disclaimer filed December 22, 2014.

Claim Rejection - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented 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. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 2-9, 13, 14, 18-28, 30-34, 36, 38-40, 42 and 43 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Japanese Utility Model Patent Application No. JP 50-79379 to Tabuchi in combination with Nakamura et al ("Candella-class high-brightness InGaN/AlGaN double-heterostructure blue-light-emitting diodes", Appl. Phys. Lett., Vol. 64(13), 28 March 1994, pp. 1687-1689, hereafter "Nakamura"), U.S. Patent 5,126,214 to Tokailin et al (hereafter "Tokailin") and admissions in the '945 patent specification.

The English translation of Tabuchi accompanying the Request for reexamination is hereafter referred to below. The translation does not provide page numbering. In the discussion below, the page numbering used by the Specialist corresponds to the order of pages appearing in the electronic file. Thus, page 1 is the cover page of Tabuchi

listing the inventor and applicant, while the last page of the translation, i.e., page 6, has Figs. 1 and 2.

Tabuchi's Figs. 1 and 2, which show respective LED apparatus, are reproduced below for convenience:

Figure 1

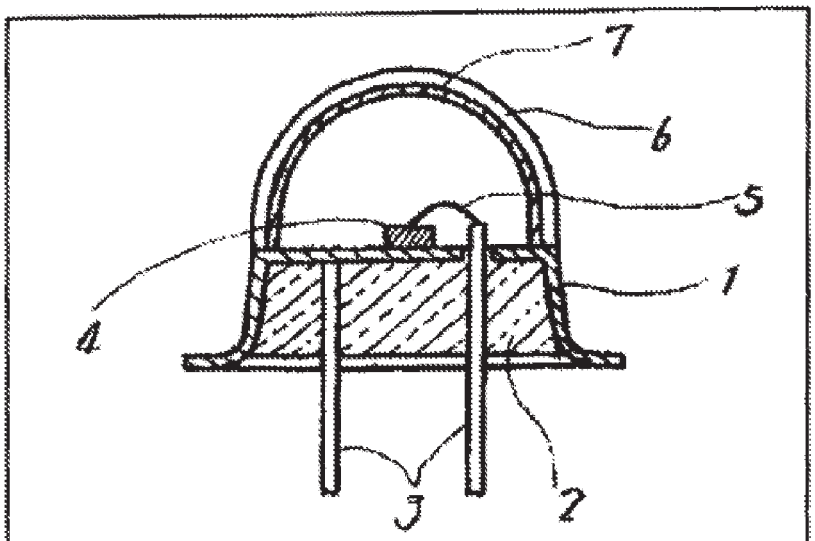

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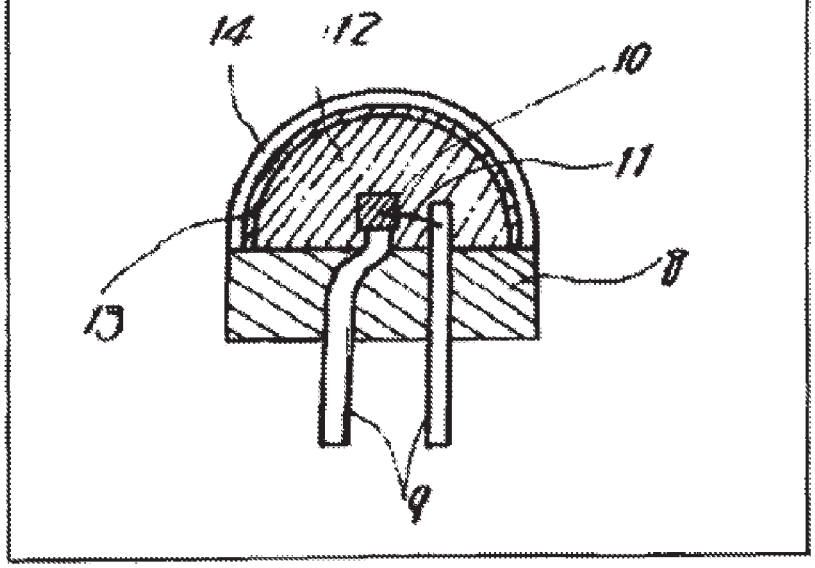
Figure 2



Tabuchi's LED apparatus comprises a light-emitting semiconductor device, i.e., LED (4, 10), sealed by a transparent cover (6, 14) having a phosphor layer (7, 13) which converts radiation from the light-emitting semiconductor device (4, 10) to visible light (see Figs. 1 and 2; and pp. 3-4). The phosphor is dispersed in a binding agent (see p. 3, lines 3-9 and 24-27).

Tabuchi's phosphor layer (7) in Fig. 1 and phosphor layer (13) in Fig. 2 are coated on the surface of respective transparent (i.e., light-transmissive) cover (6, 14) enclosing LED (4, 10) as per instant claims 13, 14, 24, 25 and 31 (see also pp. 3-4). In particular, with respect to claims 25 and 31, phosphor layer (7, 13) is coated on the interior surface of respective transparent cover (6, 14). Alternatively, phosphor layer (13) in Tabuchi's Fig. 2 is coated on the surface of light-transmissive material, i.e., transparent resin (12), enclosing the LED (10) as per instant claims 13, 14, 24, 26 and 32 (see also p. 4, lines 4-23). In particular, with respect to claims 26 and 32, phosphor layer (13) is coated on the exterior surface of transparent resin (12). Alternatively, in Tabuchi's Fig. 2, said phosphor layer (13) is in contact, i.e., indirect contact, with an emitting face of LED (10) since phosphor layer (13) is on the surface of transparent resin (12), which forms a mold around LED (10), as per claim 28 (see p. 4, lines 4-23). Alternatively, in Tabuchi's Fig. 1, phosphor layer (7) encloses the LED device (4) and comprises a binding agent, i.e., light-transmissive material, in which phosphor is dispersed, as per instant claim 27 (see Fig. 1 and p. 3, lines 24-27).

Tabuchi is not limited to any particular LED or phosphor, as evidenced by the sole claim on p. 2 of Tabuchi. As noted above, the phosphor converts radiation from

the LED device to visible light (see p. 3, lines 24-27 and p. 5, lines 1-4). In fact, Tabuchi exemplifies a GaN LED emitting near-UV light for conversion by the phosphor to visible light (see p. 5, lines 1-4). Tabuchi teaches the limitations of the instant claims other than the differences discussed below.

Tabuchi does not teach that its LED is a blue-light LED and that the phosphor is such that white light is produced.

As admitted in the '945 patent specification, the practical advantages of LED displays over those using incandescent bulbs are many (see col. 1, line 53 through col. 2, line 33). Further, there is a desire for white light displays (e.g., commercial bank time and temperature message boards, stadium scoreboards), and "[t]he utility of solid state lamps that offer white light illumination is clear." (See, for example, col. 2, line 34 through col. 3, line 2).

Tokailin teaches using an organic electroluminescent (EL) element emitting blue light which is then converted to longer wavelengths by a fluorescent material (see col. 2, lines 47-60). In particular, the blue EL element, after conversion by fluorescent material, can emit white light (col. 2, lines 49-51). In Example 3 bridging cols. 20-21 an EL element which emits blue color is provided with a dispersion film of Pyridine 1 fluorescent dye to obtain white light. Pyridine 1 down-converts the blue light to give orange to red light (see col. 16, lines 47-55). In said Example 3, Tokailin teaches that "it was found that a complete white light, that is, the mixture of the light transmitted through EL with the fluorescence from the dye, can be easily obtained, if a dispersion film of a certain kind of dye is used and film thickness and concentration of dispersion are

properly selected." (See col. 21, lines 30-35, as well as col. 18, lines 31-36). In other words, like instant claim 21, Tokailin uses the emitted blue light and said down-converted light to produce a white light output. Tokailin's EL element can be used in displays (see col. 18, lines 37-43). Tokailin's Examples 10 and 13 also show production of white light from a blue light source and fluorescent material. Tokailin's fluorescent dyes at col. 16, lines 28-55 are organic phosphors.

In Tokailin's Example 3, the brightness of the blue light emitted by the EL element (before conversion) is 250 cd/m^2 (see col. 21, lines 17-21). The EL element prepared in Example 3 was prepared using the same procedure as in Tokailin's Example 1 (see col. 20, line 64). In the Example 1 procedure, the device surface area used is 25 mm x 75 mm = 1875 mm^2 = 1.875 x 10^{-3} m^2. Thus, the brightness of the blue light in Tokailin's Example 3 is 250 cd/m^2 x 1.875 x 10^{-3} m^2 = 0.47 cd.

Nakamura teaches high-brightness InGaN/AlGaN double-heterostructure blue-light emitting diodes with luminous intensity over 1 cd (see abstract). This value of luminous intensity was the highest ever reported for blue LEDs (see abstract). Nakamura teaches that "[u]sing these high-brightness blue LEDs, high-brightness full-color indicators and flat panel displays will be developed in the near future." (See p. 1689).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Tabuchi's LED apparatus such that Nakamura's high-brightness InGaN/AlGaN double-heterostructure blue-light emitting diode is used for Tabuchi's semiconductor LED with an appropriate phosphor so that white light (as

shown by Tokailin) is produced. The desire for producing white-light emitting solid-state diodes was well known in the art, as per the admissions in the '945 patent specification. Additionally, there is further rationale and a reasonable expectation of success in view of the fact that Tokailin obtained white light from an EL blue light with a brightness of only 0.47 cd, whereas Nakamura's blue LED has a higher brightness of over 1 cd.

With respect to claims 2 and 39, Tabuchi teaches that the LED semiconductor device (4,10) is connected to leads (3, 9), i.e., circuit forming elements, via a lead wire (5, 11) (see Figs. 1 and 2 and pp. 3-4). With respect to claim 2, while Tabuchi does not specifically teach a power supply coupled to the LED semiconductor, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have connected Tabuchi's leads (3,9) to a power supply in order to power the LED semiconductor device (4,10) and turn it on and off.

With respect to claims 3-9, Tabuchi does not specifically teach a multiplicity of its LEDs, such that, for example, each LED constitutes a pixel element of a display and that each LED is selectively illuminated to produce a message or design. Likewise, Tabuchi does not teach circuitry connecting the multiple LEDs and a controller responsive to input to selectively illuminate the LEDs.

However, the '945 patent admits that it has been known to use multiple incandescent bulbs in information displays or signage, and burnout of a bulb leaves a missing pixel in a display (see col. 1, line 53 through col. 2, line 33). Such information displays or signage encompasses messages and designs as per claims 5 and 6. The '945 patent teaches LEDs offer may advantages over incandescent bulbs, including

longer operational lifetime and more robustness (see col. 1, line 33 through col. 2, line 23). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a multiplicity of the white light emitting LEDs of Tabuchi in combination with Nakamura, Tokailin and the admissions in the '945 patent specification as a substitute for the incandescent bulbs used as pixels in a sign board or display so as to take advantage of reduced sign maintenance because LEDs last longer and are more robust than incandescent bulbs, as per the admissions in the '945 patent specification. Sign/display board pixels are conventionally in an array, as per claim 4.

Further, having the LED pixel elements electrically connected, and selectively illuminated and controlled would have been obvious to one of ordinary skill in the art at the time the invention was made in order to provide and operate a sign or display with a particular message or design, such as a time and temperature message board or a display with various designs and information. In fact, the '945 patent admits the desirability of white light displays for commercial bank time and temperature message boards and stadium scoreboards (see col. 2, lines 34-37). The '945 patent also admits displaying a message or design "in a manner well understood in the art." (See col. 11, lines 41-45).

With respect to claim 18 which requires the luminophoric medium emits radiation in at least one of the green spectrum and yellow spectrum, with respect to claim 23 which requires the luminophoric medium emits radiation in at least red, yellow and green spectral regions, and with respect to claim 36 which requires plural phosphors, it

is noted that Tokailin expressly teaches that a plurality of its fluorescing materials can be used (see claim 2 at col. 36). In fact, Tokailin exemplifies dyes that fluoresce in the range of orange to red, which includes yellow (see col. 16, lines 46-55). Pyridine 1 used in Tokailin's Example 3, fluoresces orange to red (see col. 16, lines 46-55). Rhodamine 6G (col. 16, line 55 of Tokailin) fluoresces yellow. Green fluorescers are also taught by Tokailin (see col. 16, lines 42-45). A skilled artisan knows that blue can be combined with other colors, such as red, yellow and/or green to obtain white. Thus, the claimed plural phosphors and radiation emission would have been obvious.

With respect to claims 20 and 22, as noted above, Nakamura's high-brightness blue-light emitting diode is an InGaN/AlGaN double-heterostructure (see abstract). Further with respect to claim 20, Nakamura's blue LED emits blue light having an emission maximum of approximately 450 nm as seen in Fig. 2 on p. 1688.

As an alternative to said indirect contact (with respect to claim 28), as well as a further alternative with respect to claim 27, and also with respect to claim 33, Tabuchi teaches that although it is more costly, the light emission area can be made larger if a binding agent in which phosphor is dispersed is formed into a hemisphere covering a large region of the LED device (see p. 3, lines 3-9). In other words, the phosphor in a binding agent directly contacts and is contiguously arranged about the LED device, e.g., LED device (4,10) in Figs. 1 and 2. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided Tabuchi's phosphor in a binding agent material enclosing the LED device and thus, arranged

about the emitting face of the LED device, in order to make the light emission area larger.

With respect to claim 34, whether Tabuchi's phosphor is in a binding agent in phosphor layer (7,13), or is in said binding agent as discussed in the immediately preceding paragraph, it would have been obvious to use a polymeric matrix for said binding agent because such is conventional in the art. In fact, Tokailin dissolves 4 mg of Pyridine 1 fluorescent dye and 1.2 g of PMMA (polymethylmethacrylate) to prepare PMMA dispersion film of the Pyridine 1 (see col. 21, lines 9-15).

With respect to claim 38, the emitting face of Tabuchi's LED device (4) in Fig. 1 is in a spaced-apart relationship to phosphor layer (7), and there is no intervening structure between LED device (4) and the phosphor layer (7).

With respect to claim 40, Fig. 1 of Tabuchi has a light-transmissive wall (6) bounding an enclosed interior volume in which the LED die (4) is mounted.

With respect to claim 43, said phosphor layer (7,13) in Tabuchi's Figs. 1 and 2 is coated on respective transparent cover (6,14) forming a wall of an enclosure in which LED device (4,10) is disposed. Alternatively, in Tabuchi's Fig. 1, phosphor layer (7) forms a wall of an enclosure for LED device (4), and phosphor layer (7) comprises a binding agent, i.e., light-transmissive material, in which phosphor is dispersed (see p. 3, lines 24-27).

2. Claims 4, 10-12, 15, 16 and 41 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tabuchi in combination with Nakamura, Tokailin and

admissions in the '945 patent specification as applied to claims 2-9, 13, 14, 18-28, 30-34, 36, 38-40, 42 and 43 above, and further in combination with U.S. Patent 5,008,658 to Russay et al (hereafter "Russay").

Tabuchi in combination with Nakamura, Tokailin and admissions in the '945 patent specification is relied upon for the reasons stated above in rejection No. 1. To the extent it can be argued that sign/display board pixels are not conventionally in an array as per claim 4, then an array of LEDs is rendered obvious further in combination with Russay. Further, Tabuchi in combination with Nakamura, Tokailin and admissions in the '945 patent specification does not specifically teach backlighting a liquid crystal display as per claims 10-12, multiple LEDs in a housing as per claim 15, and the multiple housed (enclosed) LEDs are on a conductive substrate in series relationship to one another, as per claim 16.

Russay teaches a liquid crystal display (LCD) with LED backlighting (10) (see col. 1, lines 6-10; col. 2, lines 3-15 and 46-65; and Figs. 1 and 2). Russay's Fig. 1 shows an array of seven LEDs (32). As seen in Russay's Fig. 1 and 2, the LEDs are enclosed in a housing (12), and the substrate (30) upon which the LEDs (32) are mounted and electrically coupled is a printed circuit (PC) board, and thus, is conductive as per instant claim 16 (see also col. 3, line 18 through col. 4, line 10; and col. 4, lines 58-64). Examples of where the LCD with LED backlighting can be used include the selected channel of a television receiver, automatic banking or cash stations, or a periodic display such as current time (see col. 1, lines 12-21).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the white-light emitting LEDs of Tabuchi in combination with Nakamura, Tokailin and admissions in the '945 patent specification for the LEDs in Russay's back-lit LCD display because, as noted above, the '945 patent specification admits there is a desire for white light displays (e.g., commercial bank time and temperature message boards, stadium scoreboards), and "[t]he utility of solid state lamps that offer white light illumination is clear" (see, for example, col. 2, line 34 through col. 3, line 2); and, as also noted above, Russay's LCD with LED backlighting can be used in, for example, automatic banking or cash stations, or a periodic display such as current time.

With respect to claim 41, the transparent cover (6) in Tabuchi's Fig. 1 appears to be hemispherical in shape, whereas claim 41 requires a cylindrical sidewall portion and a hemispherical top portion, such as seen for light-transmissive enclosure (11) in Figs. 1 and 2 of the '945 patent. However, such shape is conventional in the art as evidenced by Russay's LEDs (32) in Figs. 1-3. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared the white-light emitting LEDs of Tabuchi in combination with Nakamura, Tokailin and admissions in the '945 patent specification such that Tabuchi's transparent cover (6) isn't solely hemispherical, but rather, also has cylindrical sidewall portions because such shape is conventional in the art, as shown by the LEDs of Russay, and a reasonable expectation of success.

3. Claim 37 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tabuchi in combination with Nakamura, Tokailin and admissions in the '945 patent specification as applied to claims 2-9, 13, 14, 18-28, 30-34, 36, 38-40, 42 and 43 above, and further in combination with U.S. Patent 3,691,482 to Pinnow et al (hereafter "Pinnow '482").

Tabuchi in combination with Nakamura, Tokailin and admissions in the '945 patent specification as relied upon for the reasons stated above in rejection No. 1, does not specifically teach that the phosphor material has a spectral overlap with the blue light of the semiconductor diode.

Pinnow '482 teaches a laser display system that uses phosphors to create white light from, for example, a blue-emitting laser (see col. 1, lines 5-7 and 42-50; and col. 3, lines 28-34). A skilled artisan knows that blue can be combined with other colors, such as red, yellow and/or green to obtain white. In fact, Pinnow '482's Table I shows dyes that fluoresce red, green, blue or yellow. The dye phosphors taught by Pinnow '482, are of the same type taught by Tokailin (see col. 16, lines 28-68 of Tokailin; and Table I and col. 2, line 40 through col. 4, line 55 of Pinnow '482). Tokailin also teaches that a plurality of fluorescent materials can be used (see claim 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared the white-light emitting LED of Tabuchi in combination with Nakamura, Tokailin and admissions in the '945 patent specification using a mixture of phosphors, including a blue phosphor, because a skilled artisan knows that blue can be combined with other colors, such as red, yellow and/or green to

obtain white light; and blue phosphors, as well as red, green, and yellow phosphors were well-known in the art for light conversion, as per the teachings of Pinnow ‘482 and Tokailin.

4. Claim 35 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tabuchi in combination with Nakamura, Tokailin and admissions in the ‘945 patent specification as applied to claims 2-9, 13, 14, 18-28, 30-34, 36, 38-40, 42 and 43 above, and further in combination with Pinnow ‘482 and U.S. Patent 3,699,478 to Pinnow et al (hereafter “Pinnow ‘478”).

Tabuchi in combination with Nakamura, Tokailin and admissions in the ‘945 patent specification is relied upon for the reasons stated above in rejection No. 1. Tabuchi teaches a generic "phosphor" (see for example, p. 3, lines 15 and 24-25), which would encompasses organic and inorganic phosphors, but does not specifically require that the phosphor is an inorganic phosphor.

Pinnow ‘478 teaches a laser display system that uses phosphors to create white light (see col. 1, lines 32-42). For example, a blue argon laser is used, and a small amount of the blue light is combined with a yellowish cast of the phosphor to obtain the white light (see abstract; and col. 1, lines 43-48). Pinnow ‘478 teaches that “[t]he system depends upon the use of a phosphorescent screen of cerium-activated garnet" and that “[i]n a preferred arrangement yttrium aluminum garnet containing cerium is used.” (See col. 1, lines 33-40). Pinnow '478 teaches that the excitation spectrum in the

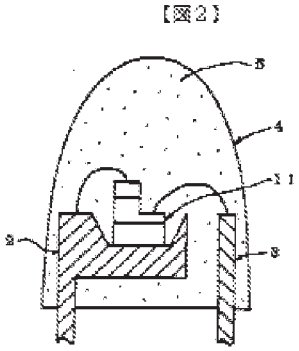
cerium-doped garnet may be shifted to accommodate a particular energizing source (see col. 1, lines 49-67; and col. 3, lines 19-31).

Like Pinnow ‘478, Pinnow ‘482 teaches a laser display system that uses phosphors to create white light (see col. 1, lines 5-7 and 42-50). In fact, Pinnow ‘482 acknowledges the laser display system of U.S. Patent application No. 827,644 filed May 26, 1969 which matured into Pinnow ‘478 (see col. 1, lines 27-30 of Pinnow ‘482), but instead of inorganic phosphor alone, Pinnow ‘482 uses a phosphor composition that is “at least in part, organic.” (See in Pinnow '482 col. 1, lines 27-30 and 40-50). In other words, the phosphor can be completely organic or a mixture of organic and inorganic phosphors (see also, for example, col. 3, lines 35-44). The dye phosphors taught by Pinnow ‘482, are of the same type taught by Tokailin (see col. 16, lines 28-68 of Tokailin; and Table I and col. 2, line 40 through col. 4, line 55 of Pinnow ‘482).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used Pinnow ‘478’s cerium-activated garnet as a phosphor in the LED of Tabuchi in combination with Nakamura, Tokailin and admissions in the ‘945 patent specification because Pinnow ‘478 teaches that cerium-activated garnet can be used to generate white light from blue light, and because cerium-activated garnet and fluorescent dyes/agents are alternatives in the art that can be used alone or in combination, as shown by the teachings of Pinnow '478, Pinnow '482, Tokailin and Tabuchi. Further rationale is that cerium-activated garnet provides the advantage that its excitation spectrum may be shifted to accommodate a particular energizing source, as taught by Pinnow ‘478.

5. Claims 2-9, 13, 14, 18-24, 27, 28, 30, 33, 34, 36 and 39-43 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over JP 5-152609 A to Tadatsu et al (hereafter "Tadatsu") in combination with Nakamura, Tokailin and admissions in the '945 patent specification. The English translation of Tadatsu accompanying the Request is hereafter referred to below.

Tadatsu teaches an LED device as seen in Fig. 2, reproduced below:



LED (11) is energizable to emit radiation and is made from GaN related compound semiconductors (see claim 1 and ¶ 0008) with an emission maximum, for example, in a spectral range of 370 nm to 430 nm, i.e., the blue to ultraviolet spectrum (see ¶¶ 0006 and 0008). Fluorescent dye (5), i.e., phosphor, in resin (4) is impinged by radiation emitted from the LED and emits down-converted radiation, which permits conversion of light into a variety of wavelengths depending on the type of fluorescent dye used (see ¶¶ 0008-0009).

Tadatsu's Fig. 1 shows fluorescent dye (5) dispersed throughout resin (4), and shows that resin (4) with fluorescent dye (5) encloses and overlies LED (11) and is

contiguous with the emitting surface of LED (11), as per instant claims 13, 14, 24, 27, 28, 33 and 34 (see also p. 3, line 19 through p. 4, line 3).

Tadatsu teaches the limitations of the instant claims other than the differences discussed below.

Tadatsu does not require that its semiconductor LED is a blue-light LED and that the phosphor is such that white light is produced.

As admitted in the '945 patent specification, the practical advantages of LED displays over those using incandescent bulbs are many (see col. 1, line 53 through col. 2, line 33). Further, there is a desire for white light displays (e.g., commercial bank time and temperature message boards, stadium scoreboards), and "[t]he utility of solid state lamps that offer white light illumination is clear." (See, for example, col. 2, line 34 through col. 3, line 2).

Tokailin teaches using an organic electroluminescent (EL) element emitting blue light which is then converted to longer wavelengths by a fluorescent material (see col. 2, lines 47-60). In particular, the blue EL element, after conversion by fluorescent material, can emit white light (col. 2, lines 49-51). In Example 3 bridging cols. 20-21 an EL element which emits blue color is provided with a dispersion film of Pyridine 1 fluorescent dye to obtain white light. Pyridine 1 down-converts the blue light to give orange to red light (see col. 16, lines 47-55). In said Example 3, Tokailin teaches that "it was found that a complete white light, that is, the mixture of the light transmitted through EL with the fluorescence from the dye, can be easily obtained, if a dispersion film of a certain kind of dye is used and film thickness and concentration of dispersion are

properly selected." (See col. 21, lines 30-35, as well as col. 18, lines 31-36). In other words, like instant claim 21, Tokailin uses the emitted blue light and said down-converted light to produce a white light output. Tokailin's EL element can be used in displays (see col. 18, lines 37-43). Tokailin's Examples 10 and 13 also show production of white light from a blue light source and fluorescent material. Tokailin's fluorescent dyes at col. 16, lines 28-55 are organic phosphors.

In Tokailin's Example 3, the brightness of the blue light emitted by the EL element (before conversion) is 250 cd/m^2 (see col. 21, lines 17-21). The EL element prepared in Example 3 was prepared using the same procedure as in Tokailin's Example 1 (see col. 20, line 64). In the Example 1 procedure, the device surface area used is 25 mm x 75 mm = 1875 mm^2 = 1.875 x 10^{-3} m^2. Thus, the brightness of the blue light in Tokailin's Example 3 is 250 cd/m^2 x 1.875 x 10^{-3} m^2 = 0.47 cd.

Nakamura teaches high-brightness InGaN/AlGaN double-heterostructure blue-light emitting diodes with luminous intensity over 1 cd (see abstract). This value of luminous intensity was the highest ever reported for blue LEDs (see abstract). Nakamura teaches that "[u]sing these high-brightness blue LEDs, high-brightness full-color indicators and flat panel displays will be developed in the near future." (See p. 1689).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Tadatsu's LED device such that Nakamura's high-brightness InGaN/AlGaN double-heterostructure blue-light emitting diode is used for Tadatsu's GaN-related semiconductor LED with an appropriate phosphor so that

white light (as shown by Tokailin) is produced. The desire for producing white-light emitting solid-state diodes was well known in the art, as per the admissions in the '945 patent specification. Additionally, there is further rationale and a reasonable expectation of success in view of the fact that Tokailin obtained white light from an EL blue light with a brightness of only 0.47 cd, whereas Nakamura's blue LED has a higher brightness of over 1 cd.

With respect to claims 2 and 39, Tadatsu's LED device in Fig. 2 has circuit-forming elements, i.e., wires connected to metal stem and metal post (2,3) (see Figs. 1 and 2 and pp. 3-4). With respect to claim 2, while Tadatsu does not specifically teach a power supply coupled to the LED device, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have connected Tadatsu's LED device to a power supply in order to power the LED device and turn it on and off.

With respect to claims 3-9, Tadatsu does not specifically teach a multiplicity of its LEDs, such that, for example, each LED constitutes a pixel element of a display and that each LED is selectively illuminated to produce a message or design. Likewise, Tadatsu does not teach circuitry connecting the multiple LEDs and a controller responsive to input to selectively illuminate the LEDs.

However, the '945 patent admits that it has been known to use multiple incandescent bulbs in information displays or signage, and burnout of a bulb leaves a missing pixel in a display (see col. 1, line 53 through col. 2, line 33). Such information displays or signage encompasses messages and designs as per claims 5 and 6. The '945 patent teaches LEDs offer may advantages over incandescent bulbs, including

longer operational lifetime and more robustness (see col. 1, line 33 through col. 2, line 23). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a multiplicity of the white light emitting LED devices of Tadatsu in combination with Nakamura, Tokailin and the admissions in the '945 patent specification as a substitute for the incandescent bulbs used as pixels in a sign board or display so as to take advantage of reduced sign maintenance because LEDs last longer and are more robust than incandescent bulbs, as per the admissions in the '945 patent specification. Sign/display board pixels are conventionally in an array, as per claim 4.

Further, having the LED pixel elements electrically connected, and selectively illuminated and controlled would have been obvious to one of ordinary skill in the art at the time the invention was made in order to provide and operate a sign or display with a particular message or design, such as a time and temperature message board or a display with various designs and information. In fact, the '945 patent admits the desirability of white light displays for commercial bank time and temperature message boards and stadium scoreboards (see col. 2, lines 34-37). The '945 patent also admits displaying a message or design "in a manner well understood in the art." (See col. 11, lines 41-45).

With respect to claim 18 which requires the luminophoric medium emits radiation in at least one of the green spectrum and yellow spectrum, with respect to claim 23 which requires the luminophoric medium emits radiation in at least red, yellow and green spectral regions, and with respect to claim 36 which requires plural phosphors, it

is noted that Tokailin expressly teaches that a plurality of its fluorescing materials can be used (see claim 2 at col. 36). In fact, Tokailin exemplifies dyes that fluoresce in the range of orange to red, which includes yellow (see col. 16, lines 46-55). Pyridine 1 used in Tokailin's Example 3, fluoresces orange to red (see col. 16, lines 46-55). Rhodamine 6G (col. 16, line 55 of Tokailin) fluoresces yellow. Green fluorescers are also taught by Tokailin (see col. 16, lines 42-45). A skilled artisan knows that blue can be combined with other colors, such as red, yellow and/or green to obtain white. Thus, the claimed plural phosphors and radiation emission would have been obvious.

With respect to claims 20 and 22, as noted above, Nakamura's high-brightness blue-light emitting diode is an InGaN/AlGaN double-heterostructure (see abstract). Further with respect to claim 20, Nakamura's blue LED emits blue light having an emission maximum of approximately 450 nm as seen in Fig. 2 on p. 1688.

With respect to claims 40, 41 and 43, as noted above, Tadatsu's Fig. 1 shows fluorescent dye (5) dispersed throughout resin (4), and shows that resin (4) with fluorescent dye (5) encloses the LED (11) (see also p. 3, line 19 through p. 4, line 3). The resin (4) with dispersed fluorescent dye (5) corresponds to the claimed wall. In fact, resin (4) with dispersed fluorescent dye (5) has a cylindrical side wall portion and a hemispherical top portion, as seen in Tadatsu's Fig. 2.

6. Claims 4, 10-12, 15 and 16 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tadatsu in combination with Nakamura, Tokailin and

admissions in the '945 patent specification as applied to claims 2-9, 13, 14, 18-24, 27, 28, 30, 33, 34, 36 and 39-43 above, and further in combination with Russay.

Tadatsu in combination with Nakamura, Tokailin and admissions in the '945 patent specification is relied upon for the reasons stated above in rejection No. 5. To the extent it can be argued that sign/display board pixels are not conventionally in an array as per claim 4, then an array of LEDs is rendered obvious further in combination with Russay. Further, Tadatsu in combination with Nakamura, Tokailin and admissions in the '945 patent specification does not specifically teach backlighting a liquid crystal display as per claims 10-12, multiple LEDs in a housing as per claim 15, and the multiple housed (enclosed) LEDs are on a conductive substrate in series relationship to one another, as per claim 16.

Russay is relied upon for the reasons stated above in rejection No. 2.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the white-light emitting LEDs of Tadatsu in combination with Nakamura, Tokailin and admissions in the '945 patent specification for the LEDs in Russay's back-lit LCD display because, as noted above, the '945 patent specification admits there is a desire for white light displays (e.g., commercial bank time and temperature message boards, stadium scoreboards), and "[t]he utility of solid state lamps that offer white light illumination is clear" (see, for example, col. 2, line 34 through col. 3, line 2); and, as also noted above, Russay's LCD with LED backlighting can be used in, for example, automatic banking or cash stations, or a periodic display such as current time.

7. Claim 37 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tadatsu in combination with Nakamura, Tokailin and admissions in the '945 patent specification as applied to claims 2-9, 13, 14, 18-24, 27, 28, 30, 33, 34, 36 and 39-43 above, and further in combination with Pinnow '482.

Tadatsu in combination with Nakamura, Tokailin and admissions in the '945 patent specification as relied upon for the reasons stated above in rejection No. 5, does not specifically teach that the phosphor material has a spectral overlap with the blue light of the diode.

Pinnow '482 is relied upon for the reasons stated above in rejection No. 3.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared the white-light emitting LED of Tadatsu in combination with Nakamura, Tokailin and admissions in the '945 patent specification using a mixture of phosphors, including a blue phosphor, because a skilled artisan knows that blue can be combined with other colors, such as red, yellow and/or green to obtain white light; and blue phosphors, as well as red, green, and yellow phosphors were well-known in the art for light conversion, as per the teachings of Pinnow '482 and Tokailin.

8. Claim 35 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tadatsu in combination with Nakamura, Tokailin and admissions in the '945

patent specification as applied to claims 2-9, 13, 14, 18-24, 27, 28, 30, 33, 34, 36 and 39-43 above, and further in combination with Pinnow ‘482 and Pinnow ‘478.

Tadatsu in combination with Nakamura, Tokailin and admissions in the ‘945 patent specification, as relied upon for the reasons stated above in rejection No. 5, does not specifically teach an inorganic phosphor.

Pinnow ‘478 teaches a laser display system that uses phosphors to create white light (see col. 1, lines 32-42). For example, a blue argon laser is used, and a small amount of the blue light is combined with a yellowish cast of the phosphor to obtain the white light (see abstract; and col. 1, lines 43-48). Pinnow ‘478 teaches that “[t]he system depends upon the use of a phosphorescent screen of cerium-activated garnet" and that “[i]n a preferred arrangement yttrium aluminum garnet containing cerium is used.” (See col. 1, lines 33-40). Pinnow '478 teaches that the excitation spectrum in the cerium-doped garnet may be shifted to accommodate a particular energizing source (see col. 1, lines 49-67; and col. 3, lines 19-31).

Like Pinnow ‘478, Pinnow ‘482 teaches a laser display system that uses phosphors to create white light (see col. 1, lines 5-7 and 42-50). In fact, Pinnow ‘482 acknowledges the laser display system of U.S. Patent application No. 827,644 filed May 26, 1969 which matured into Pinnow ‘478 (see col. 1, lines 27-30 of Pinnow ‘482), but instead of inorganic phosphor alone, Pinnow ‘482 uses a phosphor composition that is “at least in part, organic.” (See in Pinnow '482 col. 1, lines 27-30 and 40-50). In other words, the phosphor can be completely organic or a mixture of organic and inorganic phosphors (see also, for example, col. 3, lines 35-44). The dye phosphors taught by

Pinnow ‘482, are of the same type taught by Tokailin (see col. 16, lines 28-68 of Tokailin; and Table I and col. 2, line 40 through col. 4, line 55 of Pinnow ‘482).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used Pinnow ‘478’s cerium-activated garnet as a phosphor in the LED of Tadatsu in combination with Nakamura, Tokailin and admissions in the ‘945 patent specification because Pinnow ‘478 teaches that cerium-activated garnet can be used to generate white light from blue light, and because cerium-activated garnet and fluorescent dyes/agents are alternatives in the art that can be used alone or in combination, as shown by the teachings of Pinnow '478, Pinnow '482 and Tokailin. Further, rationale is that cerium-activated garnet provides the advantage that its excitation spectrum may be shifted to accommodate a particular energizing source, as taught by Pinnow ‘478.

Response to Arguments

Patent Owner's arguments filed December 22, 2014 have been fully considered but they are not persuasive.

1. Claims 2-9, 13, 14, 18-28, 30-34, 36, 38-40, 42 and 43 stand rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tabuchi in combination with Nakamura, Tokailin and admissions in the ‘945 patent specification.

2. Claims 4, 10-12, 15, 16 and 41 stand rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tabuchi in combination with Nakamura, Tokailin and

admissions in the '945 patent specification as applied to claims 2-9, 13, 14, 18-28, 30-34, 36, 38-40, 42 and 43 above, and further in combination with Russay.

3. Claim 37 stands rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tabuchi in combination with Nakamura, Tokailin and admissions in the '945 patent specification as applied to claims 2-9, 13, 14, 18-28, 30-34, 36, 38-40, 42 and 43 above, and further in combination with Pinnow '482.

4. Claim 35 stands rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tabuchi in combination with Nakamura, Tokailin and admissions in the '945 patent specification as applied to claims 2-9, 13, 14, 18-28, 30-34, 36, 38-40, 42 and 43 above, and further in combination with Pinnow '482 and Pinnow '478.

5. Claims 2-9, 13, 14, 18-24, 27, 28, 30, 33, 34, 36 and 39-43 stand rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tadatsu in combination with Nakamura, Tokailin and admissions in the '945 patent specification.

6. Claims 4, 10-12, 15 and 16 stand rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tadatsu in combination with Nakamura, Tokailin and admissions in the '945 patent specification as applied to claims 2-9, 13, 14, 18-24, 27, 28, 30, 33, 34, 36 and 39-43 above, and further in combination with Russay.

7. Claim 37 stands rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tadatsu in combination with Nakamura, Tokailin and admissions in the '945 patent specification as applied to claims 2-9, 13, 14, 18-24, 27, 28, 30, 33, 34, 36 and 39-43 above, and further in combination with Pinnow '482.

8. Claim 35 stands rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Tadatsu in combination with Nakamura, Tokailin and admissions in the '945 patent specification as applied to claims 2-9, 13, 14, 18-24, 27, 28, 30, 33, 34, 36 and 39-43 above, and further in combination with Pinnow '482 and Pinnow '478.

Patent Owner relies upon the same arguments for each of the eight rejections (Remarks, pp. 32-34). These arguments are unpersuasive for the reasons set forth below.

Patent Owner provides three main arguments, i.e., that a skilled artisan would have been limited to the triplet approach; that the Examiner used impermissible hindsight; and that there are secondary considerations (Remarks, pp. 14-15). Patent Owner also provides additional arguments with respect to claims 10-12 (Remarks, p. 32). Each of these arguments are unpersuasive for the reasons that follow.

A. Arguments with respect to pursuing the triplet approach:

Col. 8, lines 23-30 of the '945 patent specification state the following:

> The present invention is based on the discovery that a highly efficient white light-emitting device may be simply and economically fabricated utilizing a solid state light emitting device for generating a shorter wavelength radiation which is transmitted to a luminophor (fluorescent and/or phosphorescent solid material) for down conversion by the luminophor of the radiation from the solid state light emitting device, to yield white light.

According to col. 7, lines 51-60 of the '945 patent, the term "solid state device" includes thin film electroluminescent (EL) cells, electroluminescent display panels, semiconductor light emitting diodes (i.e., LEDs), etc.

Patent Owner's alleged discovery was already taught in the prior art by, for example, each of Tokailin, Tabuchi and Tadatsu. Tokailin teaches using an organic EL element emitting blue light which is then converted to longer wavelengths by a fluorescent material (see col. 2, lines 47-60). In particular, the blue EL element, after conversion by fluorescent material, emits white light (col. 2, lines 49-51). Tokailin's EL element can be used in displays (see col. 18, lines 37-43). In Tokailin's Example 3 bridging cols. 20-21, an EL element which emits blue color is provided with a dispersion film of Pyridine 1 fluorescent dye to obtain white light.

Tabuchi down-converts the shorter wavelength of, for example, a near UV light emitting GaN LED to visible light, i.e., in the visible white light spectrum, using phosphor (see p. 3, lines 24-27 and p. 5, lines 1-4).

Likewise, Tadatsu's blue LED (11) is energizable to emit radiation and is made from GaN related compound semiconductors (see claim 1 and ¶ 0008) with an emission maximum in a spectral range of 370 nm to 430 nm, i.e., the blue to ultraviolet spectrum (see ¶¶ 0006 and 0008). Tadatsu teaches that fluorescent dye (5) in resin (4) is impinged by radiation emitted from a blue LED and emits down-converted radiation to a corrected blue color, i.e. in the white light spectrum, with a peak emission near 480 nm (see ¶¶ 0008-0009). Tadatsu further teaches that "different types of fluorescent dye or pigment not only correct color of blue LED's but also convert light into a variety of wavelengths. Further, light with a shorter wavelength is converted to one with a longer wavelength with a good energy efficiency and hence, the amount of a fluorescent dye or

pigment can be small and the invention is very excellent from the view point of reducing the degradation of luminosity factor." (¶ 0009).

Accordingly, down conversion of light of a shorter wavelength, whether it be from a blue EL element or a near UV or blue LED, to longer wavelengths in the visible white spectrum, such as white light, was well known in the art at the time the invention was made.

Patent Owner cites various portions of the '945 patent specification and argues that the introduction of bright-blue LEDs allowed white LED systems to be realized using "triplets", i.e., separate red, green and blue LEDs packed together in the same device and simultaneously energized to create white light (Remarks, pp. 10-11). Patent Owner cites the Stringfellow and Nakamura Declarations and argues that the contemplated use of blue LEDs would be in "triplet" combination (Remarks, p. 10-11). Patent Owner cites ¶¶ 19, 22 and 32-35 of the Stringfellow Declaration and ¶¶ 11-14 of the Brandes Declaration and argues "[t]here are multiple pieces of evidence showing that a down-converted blue LED (sometimes referred to as a single white LED) was considered as 'impossible', 'unfeasible', 'pioneering', worthy of science prizes, the source of extreme commercial success, and the topic of wide spread licensing by competitors." (Remarks, p. 15). Patent Owner further cites the Stringfellow and Nakamura Declarations and argues that weak blue LEDs were known since the early 1970's and commercialized in the mid-1980s, but no suggestions were found to down-convert a blue LED to create white light "nor was there any sense that there was a

serious detriment to triplets that would motivate the pursuit of a substantially different approach to create white LEDs, especially for backlighting LCDs." (Remarks, pp. 16-17). Likewise, Patent Owner cites the Nakamura Declaration and Exhibit 1 of the Remarks, i.e., an article by Vollmer, and argues the following on pp. 17-18 of the Remarks:

> Indeed, Dr. Nakamura, this year's Nobel Prize winner for his work on bright blue LEDs, testifies in this matter and confirms this understanding. He explains that he and co-inventor Yoshiaki Tadatsu (of the Tadatsu patent) down-converted a violet LED, seeking to achieve a useful blue LED to be employed in triplets.[11] Nakamura Decl. ¶ 10. He likewise recounts his work on bright blue LEDs and again states that they were to be utilized in triplets. Nakamura Decl. ¶ 11. In particular, he explains that he and others at Nichia "considered blue LEDs to be useful for direct emission of blue light and useful in combination with previously developed red and green LEDs in primary color LED assemblies for white light production. Nakamura Decl. ¶ 12.
>
> Here, the objective evidence also firmly demonstrates that, shortly after the recited combination was first publicly reported, the industry treated it as a significant, non-obvious achievement. Consequently, there is no need to speculate as to how the invention was perceived by a POSITA. For example, Alfred Vollmer, writing for Nikkei Electronics Asia in 1997, confirms that the triplet approach was thought to be the only possible approach to create white light.
>
> > Single white light-emitting diodes (LEDs) were not feasible to date as LEDs emit monochromatic light only. *The mixture of colors making up white light was up to now only possible by combining three different diodes*. Typical examples for this are the triplets from Siemens AG of Germany and US companies Ledtronics Inc and Lumex Opto/Components Inc, which are offered on the market for about US$2-3.
>
> Vollmer, A., *White LED Developed Using Luminescence Conversion*, Nikkei Electronics Asia, July 1997 (emphasis added) (Ex. 1).[12]

Footnote 12 of the Remarks is research news from Fraunhofer, i.e., the research institute that employed Vollmer.

These arguments are unpersuasive. While it is true that using triplets was an approach for generating white light, there was another approach taught in the prior art, i.e., conversion of blue or near UV light to white light by down-conversion using phosphors, as shown by Tokailin, Tabuchi and Tadatsu.

Dr. Nakamura is a co-inventor of the Tadatsu reference. The Examiner can find no teaching in Tadatsu, or for that matter Tabuchi, that limits the reference to a triplet approach. As noted above, Tabuchi expressly teaches that the light of a near UV GaN LED can be converted to visible light using phosphors (see p. 3, lines 24-27 and p. 5, lines 1-4), and Tadatsu expressly teaches conversion of the blue color of **blue** LED (11) by down conversion using fluorescent dye or pigment to a "variety of wavelengths" (see ¶¶ 0008-0009).

In fact, as noted in the rejections, the brightness of the blue light in Tokailin's Example 3 is only 0.47 cd. The Nakamura reference teaches high-brightness InGaN/AlGaN double-heterostructure blue-light emitting diodes with luminous intensity over 1 cd (see abstract), i.e., more than double that of Tokailin. Accordingly, contrary to Patent Owner's argument of impossibility or unfeasibility, there was a reasonable expectation of success at the time the invention was made of obtaining white light using the bright-blue LED of Nakamura and the down-conversion approach of Tokailin, Tabuchi and Tadatsu. In fact, as discussed later, down-conversion of blue light to white light from a more powerful blue laser was also already done using the same type of phosphors as Tokailin.

While it is true that blue LEDs of the 1970s and 1980s were weak, the Patent Trial and Appeal Board (hereafter “Board”) on p. 31 of the Decision mailed 01/16/2015 in related reexamination Control No. 90/010,940, noted that “[o]nce the high-power, high-brightness blue LEDs developed by Nakamura became available in late 1993 (two years before Appellant’s invention), the disadvantages of the 'down-conversion' process using phosphors dissipated and such a process became available as a preferred solution to high-power, high-brightness blue LEDs to create white light." Likewise, as noted by the Board on p. 28 of said Decision:

> In our view, Appellant's invention is nothing more than a new application of a high-power, high-brightness blue LED developed by Dr. Nakamura in late 1993 on a single die, and that application is predictable according to the blue LED's inherent functions, particularly, in view of: (1) the state of the art in LEDs, (2) the market demand for white light and design trends to create white light, (3) a finite number of identified, predictable solutions available to convert light from LEDs into white light (i.e., direct-emission "triplet" approach vs. "down-conversion" approach), (4) advantages and/or disadvantages of utilizing (i) the direct-emission "triplet" approach and (ii) the "down-conversion" approach to create white light, and (5) the sensibility of picking and choosing the "down-conversion" approach over the direct-emission "triplet" approach because light emitted from a single-die blue LED could now be down-converted directly into white light without the need of multiple "RGB" LEDs positioned on the same single die, via direct emission "triplet" approach.

The desire for white light is cited above in the rejections as part of the admitted prior art in the ‘945 patent specification. In particular, as admitted in the ‘945 patent specification, there is a desire for white light displays (e.g., commercial bank time and temperature message boards, stadium scoreboards), and “[t]he utility of solid state lamps that offer white light illumination is clear.” (See, for example, col. 2, line 34 through col. 3, line 2). Further, the disadvantages of the triplet approach were also well-

known as noted at col. 3, lines 11-36 in the Background of the Invention section of the '945 patent.

The Specialist finds no convincing evidence of impossibility or unfeasibility in ¶¶ 19, 22 and 32-35 of the Stringfellow Declaration and ¶¶ 11-14 of the Brandes Declaration. ¶ 33 of the Stringfellow Declaration cites the following paragraph from "The Blue Laser Diode", i.e., Exhibit 8 of the Stringfellow Declaration:

> S. Nakamura and G. Fasol, "The Blue Laser Diode," Springer-Verlag Berlin Heidelberg, New York, 1997, page 216: ..... it has been impossible to obtain white LEDs until recently due to the lack of highly efficient blue and green LEDs. Now, however, InGaN-based highly efficient blue and green LEDs have become commercially available. Using these LEDs, it is possible to fabricate white LEDs by mixing light from LEDs of the three primary colors... In this case we need at least three LEDs ... Therefore, white LEDs are much more expensive than single color LEDs. We can also fabricate white LEDs by exciting phosphors using blue LEDs with sufficiently high excitation energy. In this case, only one blue LED chip is required ... Here we describe a white LED which was fabricated using a blue LED and a phosphor [K Bando, Y.Noguchi, K. Sililcano, and Y. Shimizu, Tech. Digest. Phosphor Res. Soc., 264th Meeting, November 29 (1996) (in Japanese) ("It is almost the same as that of a blue SQW LED, except for the phosphor layer on top of the blue LED chip ... The mixture of the blue light from the blue LED chip and the yellow from the phosphor results in a white emission").

However as noted on pp. 33-34 of the Board Decision, Dr. Nakamura's book, i.e. said Exhibit 8, while not prior art, has been relied upon by Patent Owner to show non-obviousness, and can also be relied upon to show predictability of Nakamura's blue LED chip if down-converted via phosphors consistent with the knowledge and level of skill in the art. In particular, as noted on pp. 33-34 of the Decision:

> If anything, Dr. Nakamura actually suggests that fabricating white LEDs using blue LEDs in combination with "down-conversion" phosphors, shown, for example, in Fig. 10.14 of Dr. Nakamura's book [i.e., said Exhibit 8], would have been expected from those skilled in the art as a predictable use of a blue LED chip.[17] Fig. 10.14 [from p. 216] of Dr. Nakamura's book is reproduced below:

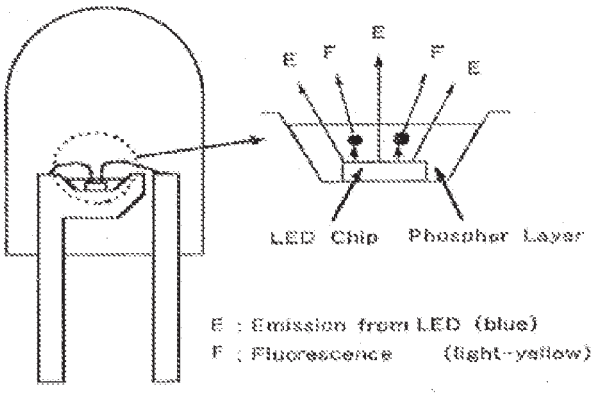


Fig. 10.14. Structure of white LEDs

> Likewise, the Alfred Vollmer article [i.e., the article cited above in Patent Owner's argument] reinforces the teachings of Chapter 10.4 of Dr. Nakamura's book that scientists at the Fraunhofer Institute for Applied Solid State Physics of Freiburg, Germany, developed white LEDs based on Dr. Nakamura's blue LEDs. …

Patent Owner argues the following on p. 18 of the Remarks:

> Again, Dr. Nakamura testifies in this case and confirms this understanding. He explains that he and his colleagues at Nichia were aware of developments in other light production fields, such as electroluminescent panels and lasers and were aware of phosphor technology (given that their employer, Nichia, was a well-known manufacturer of phosphor materials). Nakamura Decl. ¶ 12. He states that, though he and Yoshiaki Tadatsu "utilized fluorescent dye to correct the color of violet LEDs to produce blue light as described in [Tadatsu], [*they*] *did not believe that it was possible to produce white light in a similar manner.*" Nakamura Decl. ¶ 12 (emphasis added).

This argument is unpersuasive. Dr. Nakamura's allegation is unsupported by factual evidence. Dr. Nakamura does not explain, with factual evidence, why he did not believe it was possible to produce white light using the high-brightness blue LED in the Nakamura reference in a similar manner as Tokailin did using a less bright blue electroluminescent device, or explain with factual evidence why it was not possible to follow the teachings of Tabuchi and Tadatsu and down-convert the blue light of the

high-brightness blue LED in the Nakamura reference to obtain visible light as taught by Tabuchi and obtain "a variety of wavelengths" as taught by Tadatsu. In fact, Dr. Nakamura's colleagues at Nichia stated the following at col. 1, line 57 through col. 2, line 14 of U.S. Patent 5,998,925 (already of record in the instant reexamination proceeding and assigned to Nichia) with respect to the Tadatsu reference (bold emphasis added):

> … the present applicant [i.e., Nichia] previously developed light emitting diodes which convert the color of light, which is emitted by light emitting components, by means of a fluorescent material disclosed in Japanese Patent Kokai Nos. **5-152609** [i.e., Tadatsu], 7-99345, 7-176794 and 8-8614. The light emitting diodes disclosed in these publications are such that, by using light emitting components of one kind, are capable of generating light of **white and other colors**, and are constituted as follows.
>
> **The light emitting diode disclosed in the above gazettes** are made by mounting a light emitting component, having a large energy band gap of light emitting layer, in a cup provided at the tip of a lead frame, and **having a fluorescent material that absorbs light emitted by the light emitting component and emits light of a wavelength different from that of the absorbed light (wavelength conversion)**, contained in a resin mold which covers the light emitting component.
>
> **The light emitting diode disclosed as described above capable of emitting white light** by mixing the light of a plurality of sources can be made by using a light emitting component capable of emitting blue light and molding the light emitting component with a resin including a fluorescent material that absorbs the light emitted by the blue light emitting diode and emits yellowish light.

Patent Owner argues the following on pp. 18-19 of the Remarks:

> In addition, Nichia chose to license the patent family of U.S. Patent No. 6,600,175, including the '945 patent at issue in this re-examination. See LEDs Magazine, Industry News, "Cree and Nichia announces white LED cross-licensing," Feb. 2005 (Ex. 3) [sic, Ex. 2 of the Brandes Decl.]; Brandes Decl. ¶

> 11-14; Broome Decl. ¶¶ 4-5. In that context, Nichia's Executive Vice President, Mr. Tazaki, praised the Cree's patents (along with his own company's) as "pioneering", using language clearly inconsistent with the notion that the idea was old or obvious. See LEDs Magazine, Industry News, "Cree and Nichia announces white LED cross-licensing," Feb. 2005 (Ex. 3) [sic, Ex. 2 of the Brandes Decl.]; *see also Rambus*, 731 F.3d at 1257; Broome Decl. ¶¶ 6-7. ...

These arguments are unpersuasive for the same reasons given in said Board Decision. In particular, as noted on p. 34 of the Decision:

> Mr. Tazaki, describing Appellant's invention as "pioneering" is misleading. That article refers to a patent cross-license agreement between Cree and Nichia designed to prevent future litigation and to allow Cree access to Nichia's patents relating to LED technology for solid-state white lighting (Exhibit 2). The word "pioneering" was not specifically used to describe Appellant's invention, but was used in reference to a larger patent portfolio.

Patent Owner cites the Stringfellow Declaration and argues that "there is absolutely no evidence in any way indicating that a POSITA was considering or contemplating down converting a blue LED to create white, and no evidence that identifies a significant problem or disadvantage of the established triplet solution which would motivate a POSITA to pursue a substantially different approach from triplets to create white light." (Remarks, pp. 19-20).

This argument is unpersuasive. ¶ 32 of the Stringfellow Declaration shows that Dr. Stringfellow could not find an anticipatory reference with respect to blue LED down-conversion to white light. That does not make such down-conversion unobvious. For the reasons discussed above, the teachings of Tokailin, Tabuchi, Tadatsu, the Nakamura reference and the admitted prior art render obvious blue LED down-conversion to white light. In fact, as further admitted in the Background of the Invention section of the '945 patent, "[t]he recent introduction of a bright blue LED, however,

allows white light LED systems to be realized and thus has the potential to open the display market to LEDs by providing a practical means to achieve both full color and white light illumination." (See col. 1, lines 48-52). Once the Nakamura reference's bright blue LED was known, white light LED systems could be realized.

The well-known disadvantages of the triplet approach are noted at col. 3, lines 11-36 in the Background of the Invention section of the '945 patent. In any event, a skilled artisan was aware of the fact that there was another approach for creating white light, i.e., down conversion of emitted blue or near UV light to white light, as shown by Tokailin, Tabuchi and Tadatsu.

Patent Owner cites the Stringfellow Declaration and argues that the commercial use of triplets dates back to at least 1990, and that "the present inventors ignored the accepted wisdom and pursued a substantially different down-conversion approach that ran contrary to the primary purpose of creating white light, power." (Remarks, p. 20).

This argument is unpersuasive because there was another well-known approach in the art for creating white light, i.e., down-conversion of blue or near UV light, as shown by Tokailin, Tabuchi and Tadatsu.

B. Arguments with respect to rationale:

Patent Owner argues the following on p. 21 of the Remarks:

> As explained below, Tokailin concerns EL displays, which have fundamentally different purposes than the invention. A POSITA would appreciate that, due to issues of power loss and color gamut, Tokailin's teachings are misplaced in the context of white LEDs. While Tokailin's teachings purportedly

> work for EL displays, there is no reason to assume that the same success would be expected in the context of down converted LEDs due to fundamental differences between LEDs and EL displays, Forbes Decl. ¶¶ 12, 22; Stringfellow Decl. ¶¶ 69-70; Cranton Decl. ¶¶ 29-33.

These arguments are unpersuasive and there is a reasonable expectation of success in substituting a blue LED for a blue EL in a method for down-conversion to produce white light. Down-conversion of near UV light from a GaN LED to visible light with phosphor is already taught by Tabuchi (see p. 3, lines 24-27 and p. 5, lines 1-4). Down-conversion with good efficiency of blue light from a blue LED to a variety of wavelengths with fluorescent dye or pigment is already taught by Tadatsu (¶¶ 0008-0009). Likewise, as noted above, Tokailin teaches an EL solid state device emitting blue light (0.47 cd) less than half as bright Nakamura's blue LED (1.2 cd) and teaches "it was found that a complete white light, that is, the mixture of the light transmitted through EL with the fluorescence from the dye, can be easily obtained, if a dispersion film of a certain kind of dye is used and film thickness and concentration of dispersion are properly selected." (See col. 21, lines 30-35, as well as col. 18, lines 31-36). In other words, Tokailin uses the emitted blue light and said down-converted light to produce a white light output. Tokailin's Examples 10 and 13 also show production of white light from a blue light source and fluorescent material. Tokailin also more generally teaches a range of UV to blue light can be down-converted (see col. 2, line 45 through col. 3, line 8).

In fact, even the Pinnow references relied upon in rejections above and cited in ¶¶ 57-64 of the Stringfellow Declaration teach a laser display system that uses phosphors to create white light from, for example, a blue-emitting laser (see col. 1, lines

5-7 and 42-50 and col. 3, lines 28-34 of Pinnow '482; and see col. 1, lines 32-67 and col. 3, lines 19-31 of Pinnow '478). Pinnow '482's Table I shows dyes that fluoresce red, green, blue or yellow. The dye phosphors taught by Pinnow '482, are of the same type taught by Tokailin (see col. 16, lines 28-68 of Tokailin; and Table I and col. 2, line 40 through col. 4, line 55 of Pinnow '482).

Patent Owner cites the Cranton Declaration and argues that, with respect to EL displays, if the image it too bright, it would cause visual discomfort and degrade viewing quality (Remarks, pp. 21-22). In particular, citing the Cranton Declaration, the following is argued on pp. 22-23 of the Remarks:

> [H]e [i.e., Dr. Cranton] explains it was quite well known in the display art that brighter images were not necessarily good and could be bad, and that one did not pursue more brightness for its own sake. Cranton Decl. ¶ 15. Instead, displays required a controlled, uniform, satisfactory amount of brightness. Cranton Decl. ¶¶ 15, 24. He further notes that the actual amount of desired brightness depended on the intended use of the display. Cranton Decl. ¶ 15. For example, a small display is generally intended to be viewed at a close distance and generally indoors and would require a lower amount of brightness than other applications. Cranton Decl. ¶ 14. In this regard, he notes that the Tokailin patent was clearly intended for use as a display, as evinced by its characterizing the device with cd/m^2, and that the display was small (25 x75 mm) and that the final output of 100 cd/m^2 of Example 3 (as well as the similar luminances of the other examples relied on in the office action) is completely in line with expectations for an EL display of that size. Cranton Decl. ¶ 15.

These arguments are unpersuasive. The specification and claims of the '945 patent are silent with respect to size and brightness of the alleged inventive device. Again, Nakamura's blue LED is more than twice as bright as Tokailin's blue EL device, and Tokailin was able to down-convert the blue light to white light. Tabuchi and

Tadatsu were able to down-convert near UV and blue light from LEDs to a variety of longer wavelengths in the visible light spectrum. In fact, as noted above, Pinnow '482 down-converted a much more powerful and brighter blue light of an argon-ion laser to white light using the same type of dye phosphors as Tokailin. Thus, there is a reasonable expectation of success in down-converting the blue light of Nakamura's LED to white light.

Patent Owner cites the Cranton and Stringfellow Declarations and argues "that Tokailin itself exhibited more than a 60% loss in output"; and that "[a] POSITA faced with Tokailin would not have seen the benefit of, or good reason for, down converting a blue LED to produce white light from the low power blue LEDs at the time." (Remarks, pp. 23-24).

These arguments are unpersuasive. While Tokailin exhibited a more than 60% loss in output i.e., a brightness of 250 cd/m^2 (0.47 cd) for the blue EL element changed to a brightness 100 cd/m^2 (0.19 cd) for white light, Nakamura's blue LED (1.2 cd) is more than 100% brighter that Tokailin's blue EL element (see Rejection No. 1 above, Examples 1 and 3 of Tokailin and p. 1688 of Nakamura). Further, Tabuchi teaches that its semiconductor apparatus can produce emission with uniform intensity over a large area using a relatively small amount of phosphor (see p. 3, line 25 through p. 4, line 23). Further, Tadatsu adds a fluorescent dye or pigment to a resin mold surrounding the blue LED and teaches that "light with a shorter wavelength is converted to one with a longer wavelength with a **good efficiency** and hence, the amount of fluorescent dye or

pigment can be small and the invention is very excellent from the viewpoint of reducing the degradation of luminosity factor." (¶ 0009, emphasis added).

Patent Owner argues the following on pp. 24-25 of the Remarks:

> In addition, Dr. Stringfellow explains that a POSITA would appreciate other detriments to down conversion, if that approach were considered. For example, whereas color mixing to achieve white light (of any variation) was viewed as fairly straightforward with the triplet approach, the claimed down conversion process would not be. Stringfellow Decl. ¶¶ 15, 30; *see also* Forbes Decl. ¶¶ 23-49. The relative power contribution of each LED in the triplet could be easily adjusted to attain the desired shade of white. Stringfellow Decl. ¶ 15. In contrast, down conversion would require emissions from the blue LED and/or from the phosphor to combine to produce a white light output. Stringfellow Decl. ¶ 30. A POSITA would appreciate that the relative amount of phosphor emission power is not easily adjusted, certainly not so post manufacture as the phosphor is relatively fixed in characteristics by its chemistry and non-ideal effects occur that vary with the amount of phosphor employed. Stringfellow Decl. ¶ 30; Forbes Decl. ¶ 14.
>
> Dr. Forbes notes that, due to the fundamental differences in the light sources of EL displays and LEDs, there is no reason to assume that the success of the down-conversion technique in Tokailin would transfer to the context of an LED. Forbes Decl. ¶¶ 44-47. In particular, Dr. Forbes notes that the significant differences in heat and photon production between EL displays and LEDs would lead to significant differences in the character of the light emitted by the phosphor, meaning that the color mixing would not necessarily produce white light. Forbes Decl. ¶¶ 28, 36-38. Dr. Forbes also rejects the notion that “a photon is a photon", noting that the photons emitted from different excitation sources exhibit different properties, and that phosphors behave differently given those different properties. Forbes Decl. ¶¶ 18-21.

These arguments are unpersuasive. The well-known disadvantages of the triplet approach are noted at col. 3, lines 11-36 in the Background of the Invention section of the '945 patent. In any event, as discussed above, at the time the invention was made there was another approach for generating white light, i.e., the down-conversion approach, as shown by Tokailin, Tabuchi, Tadatsu, Pinnow ‘482 and Pinnow ‘478.

Selection of appropriate phosphors for well-known down-conversion of blue light to white light would have been obvious. Tokailin (col. 16, lines 28-55), the '945 patent (col. 10, lines 44-67) and even Pinnow '482 (Table 1) use conventional phosphors in the art. In fact, the dye phosphors taught by Pinnow '482 are of the same type taught by Tokailin (see col. 16, lines 28-68 of Tokailin; and Table I and col. 2, line 40 through col. 4, line 55 of Pinnow '482) despite the fact that Pinnow '482 down-converts the blue light of a more powerful and brighter argon-ion blue laser (col. 3, lines 24-34).

Tokailin further teaches that "by varying the film thickness of the fluorescent material part and the concentration of the fluorescent material dispersed, the light after transmitting EL is mixed with the fluorescence, to obtain a white light. Accordingly, said element can be utilized as an element for emitting white light." (See col. 18, lines 31-36). Tabuchi uses a relatively small amount of phosphor (see ¶ bridging pages 3-4). Tadatsu teaches "[t]herefore, different types of a fluorescent dye or pigment can not only correct color of blue LED's but also convert light into a variety of wavelengths. Further, light with a shorter wavelength is converted to one with a longer wavelength with a good energy efficiency and hence, the amount of a fluorescent dye or pigment can be small and the invention is very excellent from the viewpoint of reducing the degradation of luminosity factor." (See ¶ 0009). Likewise, the '945 patent teaches that the amount of dyes or fluorescers "can be readily determined without undue experimentation" (see col. 11, lines 1-9).

Again, the reasonable likelihood of success stems from the fact that Tokailin obtained white light from an EL blue light with a brightness of only 0.47 cd, whereas

Nakamura's blue LED has a higher brightness of over 1 cd; and the fact that it was known from Tabuchi and Tadatsu that near UV and blue LED's made from GaN-related compounds can be down-converted with phosphor to generate light with a variety of wavelengths.

Patent Owner cites the Stringfellow Declaration and argues that blue LEDs were commercially available and predate the present invention by at least a decade; and that there is no evidence that anyone sought to use blue LEDs to make white light other than via triplets; and that Patent Owner's experts have explained that there would not have been motivation to down-convert blue LEDs to make white light. (Remarks, pp 25-26).

These arguments are unpersuasive for all the reasons discussed in detail above.

C. Arguments with respect to claims 10-12:

Patent Owner argues the following on p. 32 of the Remarks:

> Patent Owner further submits that claims 10-12 are patentable for the additional reasons set forth in the response to office action filed Dec. 17, 2014, in related Reexamination Control No. 90/013,225. In short, claims 10-12 are directed to a multiplicity of light emitting devices of the present invention, assembled into a backlighting assembly for a display, specifically an LCD. As described in the related reexamination, such a backlighting assembly would not have been obvious over the cited art because LCDs are extremely lossy devices with substantial power requirements, and because triplet solutions would have had significantly better performance (e.g. color gamut and uniformity of white light backlighting).

These arguments are unpersuasive for similar reasons given in Reexamination Control No. 90/013,225. In particular, as noted above, there was another approach

taught in the prior art, i.e., conversion of blue light to white light by down-conversion using phosphors, as shown, for example, by Tokailin, Tabuchi and Tadatsu. In fact, as also noted above, while Tokailin exhibited a more than 60% loss in output, Nakamura's blue LED is more than 100% brighter than Tokailin's blue EL device. In any event, Tadatsu adds a fluorescent dye or pigment to a resin mold surrounding the blue LED and teaches that "light with a shorter wavelength is converted to one with a longer wavelength with a **good efficiency** and hence, the amount of fluorescent dye or pigment can be small and the invention is very excellent from the viewpoint of reducing the degradation of luminosity factor." (¶ 0009, emphasis added). Additionally, Tabuchi teaches that its semiconductor apparatus can produce emission with uniform intensity over a large area using a relatively small amount of phosphor (see p. 3, line 25 through p. 4, line 23). Even further, it was already known in the art that LEDs can be used to backlight an LCD, as shown by Russay.

D. Arguments with respect to secondary considerations:

Patent Owner cites the Brandes Declaration for the proposition of commercial success (Remarks, pp. 26-30). In particular, Patent Owner points to Fig. 1, i.e., "White LED Market Size", on p. 9 of the Brandes Declaration as evidence of commercial success of white LEDs using a blue LED and phosphor, and points to Fig. 6, i.e., "Liquid Crystal Flat Panel Display Shipments", on p. 16 of the Brandes Declaration as evidence of commercial success in displacing traditional cold cathode fluorescent (CCFL) solutions in Liquid Crystal Flat panels (Remarks, pp. 26-30).

The "White LED Market Size" data in Fig. 1 and the accompany data in Figs. 2-5 on pp. 10-11 of the Brandes Declaration are unpersuasive for several reasons. As seen in Fig. 1, the main increase in market size is from 2009 to 2010. From 2002 to 2009 there is only a small, gradual increase which is not indicative of commercial success. The increase in market size from 2009 to 2010 and the further increases from 2010 to the estimate for 2014 can be explained by reasons other than the claimed invention, such as the fact that in September 2009 the European Union started the phase out of incandescent light bulbs. In fact, the European Union banned the sale of incandescent light bulbs by the end of 2012. Australia also started the phase out of incandescent bulbs in 2009. In 2012, the U.S. and China started phasing out incandescent bulbs. Additionally, local utilities and governments in the U.S. have provided steep subsidies for LED bulbs.

As noted in MPEP 716.03(a), in considering evidence of commercial success, care should be taken to determine that the commercial success alleged is directly derived from the invention claimed, in a marketplace where the consumer is free to choose on the basis of objective principles, and that such success is not the result of heavy promotion or advertising, shift in advertising, consumption by purchasers normally tied to applicant or assignee, or other business events extraneous to the merits of the claimed invention, etc. *In re Mageli*, 470 F.2d 1380, 176 USPQ 305 (CCPA 1973) (conclusory statements or opinions that increased sales were due to the merits of the invention are entitled to little weight); *In re Noznick*, 478 F.2d 1260, 178 USPQ 43 (CCPA 1973).

Furthermore, commercial success must be attributed to the material difference between the claimed invention and the closest prior art. *Asyst Techs., Inc. v. Emtrak, Inc.*, 544 F.3d 1310, 1316 (Fed. Cir. 2008) ("While the evidence shows that the overall system drew praise as a solution to a felt need, there was no evidence that the success of the commercial embodiment ... was attributable to the … only material difference between [the prior art] and the patented invention."). ¶ 26 of the Brandes Declaration argues that "[a] person would appreciate that the customer purchases these white LEDs for white illumination." ¶ 34 of the Brandes Declaration alleges that "[t]he primary success of the invention is due to the combination of a blue LED with phosphor to create white light, as described above." However, solid state white light illumination using phosphors in combination with blue light already existed in the prior art in the form of Tokailin's white EL assembly. The only difference between Tokailin's white EL assembly and the claimed light emission assembly is that the instant claims call for a blue light LED whereas Tokailin uses a blue EL element. There is no factual evidence linking the alleged commercial success to the use of a blue LED instead of a blue EL element. Rather, the Brandes Declaration unpersuasively points to the disadvantages of incandescent and fluorescent bulbs and the disadvantages of the triplet approach (¶¶ 27-33).

Alternatively, "if the feature that creates the commercial success was known in the prior art, the success is not pertinent." *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d at 1311-12; see also *J.T. Eaton*, 106 F.3d at 1571 ("[T]he asserted commercial success of the product must be due to the merits of the claimed invention beyond what was readily

available in the prior art"). The feature that created Patent Owner's alleged commercial success is Nakamura's bright blue LED, which was known in the art, and thus, the alleged success is not pertinent.

Further reasons why the data in Figs. 1-5 is unpersuasive are provided below with the discussion of Figs. 6 and 7 in the Brandes Declaration.

Fig. 6 of the Brandes Declaration is directed to "Liquid Crystal Flat Panel Display Shipments." However, the data in Fig. 6 is unpersuasive of commercial success for several reasons. None of the instant claims are commensurate in scope with flat panel LCD displays. Claim 12 recites a liquid crystal display but is not commensurate in scope with a flat panel liquid crystal display. Flat panel liquid crystal displays are one of many types of liquid crystal displays. Objective evidence of nonobviousness including commercial success must be commensurate in scope with the claims. *In re Tiffin*, 448 F.2d 791, 171 USPQ 294 (CCPA 1971) (evidence showing commercial success of thermoplastic foam "cups" used in vending machines was not commensurate in scope with claims directed to thermoplastic foam "containers" broadly).

Further, the data in Figs. 1-5, as well as Fig. 6, is derived from market research data (see ¶¶ 23 and 40 of the Brandes Declaration). Such is not actual sales data, but instead, is potential sales data. Even further, as discussed on p. 46 of said Board Decision:

> Even if market research data were sale data, such sale data is hardly indicative of the commercial success of the subject matter disclosed in the '175 patent [and in this case the '945 patent]. As correctly recognized by the Examiner, market research data or even sale data does not, in and of itself, establish a nexus between the claimed invention and commercial success. For such a nexus to exist there must be evidence that it was the claimed invention that caused the

> increased sale. Ans. 181. Dr. Brandes' Declaration does not show a correlation between the claimed invention and the sales numbers, much less that the licensing of the '175 patent [or the '945 patent] had anything at all to do with commercial success. *Id.*

In particular, with respect to licensing, ¶ 40 of the Brandes Declaration states that "a confidential '795 [not the '945] patent licensee is a domestic LCD flat panel manufacturer with a commercial LCD product that utilizes LED back lighting and practices the '795 patent." However, it is unknown what percent of the data in Fig. 6 is attributed to the licensee or exactly what the licensee produces and sells. More importantly, ¶ 40 of the Brandes Declaration alleges that [s]ubstantially all of those liquid crystal displays utilize an LED backlight including a blue LED and phosphor assembly to produce white light, as claimed in the '795 patent." It is not clear what is meant by "substantially all" and it is unclear exactly what is encompassed by "as claimed in the '795 patent" and how such data can be attributed to the claims of the '945 patent which are presumably of a different scope.

For example, in order to achieve the market size data in Figs. 1-5, as well as the shipment data in Fig. 6, the generated white light in the shipped products may be a result of a combination of the radiation in dependent claim 21 along with the use of a plurality or array of LEDs as per dependent claims 3 and 4, the structural features in claims 24-28, and/or some other feature in another dependent claim. In other words, there are no claims commensurate in scope with the showing.

Alternatively, the growth in sales data in Fig. 6, as well as Figs. 1-5, could be due to other factors such as government subsidization in Asia or the U.S to bring down the

price of white LEDs, or a breakthrough with respect to white LED structure/material that enabled the price of white LEDs to drop.

Even if the shipment data in Fig. 6 is indicative of commercial success, then as noted above, none of the claims are commensurate in scope with flat panel liquid crystal displays. For example, Fig. 7 of the Brandes Declaration shows another use for liquid crystal displays, i.e., in full color mobile phones. However, the data in Fig. 7 is unconvincing.

Like Fig. 6, the data in Fig. 7 is market data, not sales data. In any event, there is no evidence supporting the allegation in ¶ 42 of the Brandes Declaration that "[t]he growth in color display systems for mobile handsets would not have developed or, at best, would have been severely slowed if not for the advantages of the color LCD display system with a backlight including a blue LED and phosphor assembly to produce white light." Rather, the growth in full color cell phones and the decline of monochrome phones seen in Fig. 7 was also due largely to, among other factors, consumer preference for millions of cell phone apps, the faster chips and/or better batteries used in the phones, the cheap price or free phone with a contract, advertising, etc. Likewise, as discussed with respect to Figs. 1-6, even if there was commercial success, the data in Fig. 7 could also be due to features in dependent claims, subsidies, etc.

Finally, the Cranton Declaration (¶ 34) and the Brandes Declaration (¶¶ 45-46) tout the advantages of LED backlights over CCFL backlights for LCD, such as slimmer display profiles, improved energy efficiency, longer life, less power, more durable, etc.

However, this is unpersuasive because LCD with LED backlight was already taught by the prior art, as evidenced by Russay. Further, none of the features argued by Patent owner are in the instant claims.

With respect to “praise by the industry", Patent Owner argues the following on pp. 30-31 of the Remarks:

> Likewise, when discussing a licensing transaction with Cree (then owner of the patented subject matter), Nichia's Executive Vice President, Mr. Tazaki, praised the [sic] Cree's patents (along with his own company's) as "pioneering," using language clearly inconsistent with the notion that the idea was old or obvious. See Broome Decl. ¶ 6. As Mr. Broome explains based on his experience during the licensing negotiations with Nichia, Mr. Tazaki's statement reflects Nichia's believe [sic] that Cree's white light LED patents, including the application that ultimately issued as the '945 patent and was expressly included in Schedule I of the license, were pioneering technology. *See id*. at 6-8.
>
> Further, the 1997 Fraunhofer Prize was later awarded to German scientists for developing the same subject (i.e., a blue LED and phosphors to create white light). The prize is highly recognized and included a monetary award of DM 10,000. Fraunhofer at *3. This achievement was praised as a "Dramatic breakthrough" Fraunhofer at *2. Fraunhofer's described their discovery as follows:
>
> > By combining red, green, and blue emitting diodes, the generation of white light became possible. However, the emission of white light by a single chip LED was still impossible. This problem was solved by a research team at the Fraunhofer Institut fur Angewandte Festkorperphysik IAF in Freiberg (Germany) and, at the same time, by their colleagues at Nichia Chemical Industries in Japan. Their innovative idea was to generate white light by luminescence conversion. They combined a blue emitting GaN LED with an organic dye or an inorganic phosphor, emitting at longer wavelengths, to synthesize white light by additive colour mixing … For the invention of the single chip white emitting LED the research team at the IAF was awarded the 1997 Fraunhofer Prize.
> >
> > This simple but innovative and lowcost process, developed in close cooperation with Siemens AG, will enable mass production of white

> emitting LEDs. Siemens plans to start up production of white single chip LEDs in 1998.

Fraunhofer at *5 (emphasis added).

These arguments are unpersuasive. As noted above, Mr. Tazaki, describing Appellant's invention as "pioneering", is misleading. That article refers to a patent cross-license agreement between Cree and Nichia designed to prevent future litigation and to allow Cree access to Nichia's patents relating to LED technology for solid-state white lighting (Exhibit 2). Further, as noted in said Board Decision on p. 43:

> [T]hese praises and acknowledgements are directed to the invention of others, i.e., Nichia and Siemens AG, and not Appellant's invention. Ans. 176. To the extent Appellant intends to argue these belated praises and press releases are directed to Appellant's invention filed in the PTO two (2) years earlier, we see these press releases and praises as strong evidence of obviousness, rather than non-obviousness - in view of blue LEDs available from Dr. Nakamura - the entire industry was adopting the known "down-conversion" process via phosphors to create white light.

With respect to licensing, Patent Owner argues the following on pp. 31-32 of the Remarks:

> The '945 patent was the subject of a license with a European company. Brandes Decl. ¶ 15. The patent was important so that the licensee could make and sell packaged white light LEDs that practice the '945 patent. Brandes Decl. ¶¶ 15-16. The licensee currently has a commercial packaged white LED product on the market. *Id.* Dr. Brandes further explains several additional licenses that cover the '945 patent. *Id.* at ¶¶ 10-21.
>
> Additionally, dependent claims 10-12 recite displays. The '945 patent was also the subject of a license to allow the use of down-converted white LEDs as claimed as backlights in LCD displays. Brandes Decl. ¶¶ 10. The '945 patent was also covered by a license with a domestic LED and LCD flat panel manufacturer. Brandes Decl. ¶ 8. Dr. Brandes personally participated in the licensing negotiations, and he explained that the deal was important so that the licensee could make an LCD display that uses a blue LED and a phosphor

> assembly to create white light backlight. *Id*. The licensee currently has a commercial LCD product. Brandes Deal. ¶ 9.

These arguments are unpersuasive. As noted on pp. 43-44 of said Board Decision:

> Licensing alone is insufficient for purposes of commercial success. See *EWP Corp. v. Reliance Universal, Inc*., 755 F.2d 898 (Fed. Cir. 1985) (evidence of licensing is a secondary consideration which must be carefully appraised as to its evidentiary value because *licensing programs may succeed for reasons unrelated to the unobviousness of the product or process*, e.g., license is mutually beneficial or less expensive than defending infringement suits) (emphasis added). When a license of a patent is presented as evidence of the success of a patent, the patentee must provide additional evidence of the importance of the claimed invention within the license. *Id*. Without a showing of nexus, "the mere existence of... licenses is insufficient to overcome the conclusion of obviousness" when there is a strong prima facie case. *SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp*., 225 F.3d 1349, 1358 (Fed. Cir. 2000). Moreover, evidence of license agreements can also be disregarded if the terms of the licenses or the circumstances under which they were granted are not disclosed. See *Iron Grip Barbell Co., Inc. v. USA Sports*, Inc., 392 F.3d 1317, 1324 (Fed. Cir. 2004).

As also noted on p. 45 of the Board Decision, in the absence of the specific terms of the licenses or the circumstances under which they were granted, it is not seen how the licenses are probative of non-obviousness of the claims at issue.

Conclusion

THIS ACTION IS MADE FINAL.

A shortened statutory period for response to this action is set to expire 2 months from the mailing date of this action.

Extensions of time under 37 CFR 1.136(a) do not apply in reexamination proceedings. The provisions of 37 CFR 1.136 apply only to “an applicant” and not to

parties in a reexamination proceeding. Further, in 35 U.S.C. 305 and in 37 CFR 1.550(a), it is required that reexamination proceedings "will be conducted with special dispatch within the Office."

Extensions of time in reexamination proceedings are provided for in 37 CFR 1.550(c). A request for extension of time must specify the requested period of extension and it must be accompanied by the petition fee set forth in 37 CFR 1.17(g). Any request for an extension in a third party requested ex parte reexamination must be filed on or before the day on which action by the patent owner is due, and the mere filing of a request will not effect any extension of time. A request for an extension of time in a third party requested ex parte reexamination will be granted only for sufficient cause, and for a reasonable time specified. Any request for extension in a patent owner requested *ex parte* reexamination (including reexamination ordered under 35 U.S.C. 257) for up to two months from the time period set in the Office action must be filed no later than two months from the expiration of the time period set in the Office action. A request for an extension in a patent owner requested *ex parte* reexamination for more than two months from the time period set in the Office action must be filed on or before the day on which action by the patent owner is due, and the mere filing of a request for an extension for more than two months will not effect the extension. The time for taking action in a patent owner requested *ex parte* reexamination will not be extended for more than two months from the time period set in the Office action in the absence of sufficient cause or for more than a reasonable time.

The filing of a timely first response to this final rejection will be construed as including a request to extend the shortened statutory period for an additional two months. In no event, however, will the statutory period for response expire later than SIX MONTHS from the mailing date of the final action. See MPEP § 2265.

Duty to Disclose

The patent owner is reminded of the continuing responsibility under 37 CFR 1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, involving Patent No. 7,943,945 throughout the course of this reexamination proceeding. The third party requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§ 2207, 2282 and 2286.

Correspondence

Any inquiry concerning this communication or earlier communications from the specialist should be directed to Alan Diamond whose telephone number is (571)272-1338. The specialist can normally be reached on Monday through Friday from 5:30 a.m. to 2:00 p.m.

If attempts to reach the specialist by telephone are unsuccessful, the specialist's supervisor, Stephen Stein can be reached on 571-272-1544.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

All correspondence relating to this ex parte reexamination proceeding should be directed:

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Office Action in Ex Parte Reexamination	Control No. 90/013,226	Patent Under Reexamination 7943945	
	Examiner Alan Diamond	Art Unit 3991	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

a. ☒ Responsive to the communication(s) filed on *12/22/2014* .
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

b. ☒ This action is made FINAL.

c. ☐ A statement under 37 CFR 1.530 has not been received from the patent owner.

A shortened statutory period for response to this action is set to expire *2* month(s) from the mailing date of this letter. Failure to respond within the period for response will result in termination of the proceeding and issuance of an *ex parte* reexamination certificate in accordance with this action. 37 CFR 1.550(d). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).** If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☐ Notice of References Cited by Examiner, PTO-892.
2. ☒ Information Disclosure Statement, PTO/SB/08.
3. ☐ Interview Summary, PTO-474.
4. ☐ _____.

Part II SUMMARY OF ACTION

1a. ☒ Claims *2-16,18-28 and 30-43* are subject to reexamination.
1b. ☐ Claims _____ are not subject to reexamination.
2. ☐ Claims _____ have been canceled in the present reexamination proceeding.
3. ☐ Claims _____ are patentable and/or confirmed.
4. ☒ Claims *2-16,18-28 and 30-43* are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ The drawings, filed on _____ are acceptable.
7. ☐ The proposed drawing correction, filed on _____ has been (7a) ☐ approved (7b) ☐ disapproved.
8. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the certified copies have
   1 ☐ been received.
   2 ☐ not been received.
   3 ☐ been filed in Application No. _____ .
   4 ☐ been filed in reexamination Control No. _____.
   5 ☐ been received by the International Bureau in PCT application No. _____.
   * See the attached detailed Office action for a list of the certified copies not received.
9. ☐ Since the proceeding appears to be in condition for issuance of an *ex parte* reexamination certificate except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte* Quayle, 1935 C.D. 11, 453 O.G. 213.
10. ☐ Other: _____

cc: Requester (if third party requester)