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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 2-6 and 8-18 of U.S. Patent 7,615,795 (hereinafter "the '795 patent") was filed May 9, 2014 by Third Party Requester. An Order granting *ex parte* reexamination of claims 2-6 and 8-18 of the '795 patent was mailed July 30, 2014.

A non-final Office Action rejecting claims 2-8 and 8-18 was mailed October 3, 2014.

On December 17, 2014, Patent Owner filed a response including Remarks 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 2-6 and 8-18 directed to a liquid crystal display. Claim 17 is representative:

17. A liquid crystal display comprising a back light structure including at least one LED and phosphor assembly in which the LED is a blue LED and is energizable to emit radiation and the phosphor is arranged to be impinged by radiation from the blue LED so that the LED and phosphor assembly produces white light back light illumination for the liquid crystal display.

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."

It is noted that claims 9 and 17, despite a slight difference in wording, are of the same scope.

### ***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 negated by the manner in which the invention was made.

**1. Claims 2-6 and 8-18 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,008,658 to Russay et al (hereafter "Russay") in**

**combination with JP 5-152609 A to Tadatsu et al (hereafter "Tadatsu"), Nakamura et al ("Candella-class high-brightness InGaN/AlGaIn 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 '795 patent specification.** The English translation of Tadatsu accompanying the Request for reexamination is hereinafter referred to below.

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 per instant claims 2-6 and 16. 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).

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

Russay does not teach that its LEDs are blue-light LEDs used in combination with phosphor to produce white light.

As admitted in the '795 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, lines 26-62).

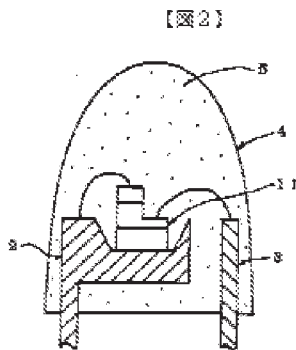
Tokailin teaches using an organic electroluminescent (EL) element emitting blue light which is then converted to longer wavelengths by a fluorescent material (see col. 2, lines 47-60). In particular, the blue EL element, after conversion by fluorescent material, can emit white light (col. 2, lines 49-51). 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 10, 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  $250 \text{ cd/m}^2$  (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  $25 \text{ mm} \times 75 \text{ mm} = 1875 \text{ mm}^2 = 1.875 \times 10^{-3} \text{ m}^2$ . Thus, the brightness of the blue light in Tokailin's Example 3 is  $250 \text{ cd/m}^2 \times 1.875 \times 10^{-3} \text{ m}^2 = 0.47 \text{ cd}$ .

Nakamura teaches high-brightness InGaN/AlGaIn 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).

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 in a spectral range of 370 nm to 430 nm, i.e., the blue to ultraviolet spectrum (see ¶¶ 0006 and 0008). Fluorescent dye (5) 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).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Russay's backlighting LEDs using Nakamura's high-brightness InGaN/AlGaIn double-heterostructure blue-light emitting diodes with an appropriate phosphor so that the LEDs produce white light by mixing the emitted blue

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light with down-converted light emitted by the fluorescent material, as per the teachings of Tokailin. The desire for producing white-light emitting solid-state diodes was well known in the art, as per the admissions in the '795 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; and the fact that it was known from Tadatsu that LED's made from GaN-related compounds can be used with fluorescent dye to generate light with a variety of wavelengths.

With respect to claims 5 and 6, the embodiment in Fig. 1 of Russay is a video display for a TV station channel, i.e., "CH 14" (see col. 1, lines 12-16 and col. 2, lines 26-29). In general, the devices taught by Russay are user-interactive devices (see col. 1, lines 12-16). Clearly, when the channel is selected by the user, each of the seven LEDs in the array is illuminated so as to light up the channel selection. A PC board (16) includes the necessary circuitry (22) for driving the LEDs and for the various segments of alphanumeric characters of the LCD display (14) (see col. 2, lines 46-52). While Russay does not specifically teach a controller that controls the LEDs in response to the user input, such would have been obvious to one of ordinary skill in the art at the time the invention was made in order to turn on or off the display in response to the user input.

Russay does not specifically teach that the individual LEDs in the regular pattern array are selectively illuminable, as per instant claim 4. However, Russay teaches that the display can be periodic, such as current time (see col. 1, lines 18-21). It would have

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been obvious to one of ordinary skill in the art at the time the invention was made to have made Russay's LEDs selectively illuminable in order to illuminate a changing display, such as a time and temperature message board or a display with a particular design. In fact, as noted above, the '795 patent admits the desirability of white light displays for commercial bank time and temperature message boards (see col. 2, lines 26-29).

With respect to claims 8, 14 and 15, 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 green, red or yellow phosphors would have been obvious.

With respect to claim 11, as noted above, Nakamura's high-brightness blue-light emitting diode is an InGaN/AlGaN double-heterostructure (see abstract).

With respect to claim 12, as noted above, Russay teaches a PC board (16) includes the necessary circuitry (22) for driving the LEDs and for the various segments of alphanumeric characters of the LCD display (14) (see col. 2, lines 46-52).

With respect to claim 13, Russay teaches the advantage of LEDs is that they require less power than conventional incandescent bulbs (col. 1, lines 33-35), and thus, there is a power supply electrically coupled to Russay's circuitry and LEDs.



With respect to claim 18, as seen in Tadatsu's Fig. 2, resin (4) containing fluorescent dye (5), e.g., said phosphor, contacts the emitting face of the LED. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Russay's device such that phosphor (and resin) contact the emitting face of each LED because such structure is conventional in the art, as shown by Tadatsu, and accordingly, the reasonable expectation of success.

**2. Claims 2-6 and 8-18 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,278,545 to Streck in combination with Tadatsu, Nakamura, Tokailin and admissions in the '795 patent specification.**

Streck teaches an apparatus for backlighting liquid crystal display screens used in, for example, display panels, digitizing tablets and sensible display panels (see col. 1, lines 7-13). In particular, Streck's backlighting panel for the LCD has a regular pattern array of LEDs (48, 48'), as per instant claims 2-6 and 16 (see Figs. 9-16; and col. 6, line 18 through col. 7, line 47). There is electrical circuitry connecting the LEDs, as per instant claim 12 (see col. 6, line 62 through col. 7, line 21). There is also a power supply, as per instant claim 13 (see, for example, col. 2, lines 37-47; and col. 6, lines 9-12).

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

Streck does not teach that its LEDs are blue-light LEDs used in combination with phosphor to produce white light.

As admitted in the '795 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, lines 26-62).

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 10, 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.

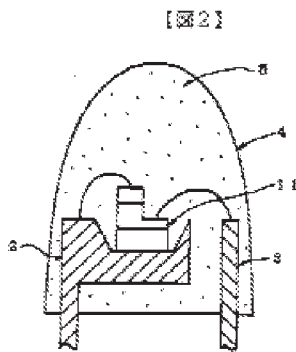
In Tokailin's Example 3, the brightness of the blue light emitted by the EL element (before conversion) is 250 cd/m<sup>2</sup> (see col. 21, lines 17-21). The EL element

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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  $25 \text{ mm} \times 75 \text{ mm} = 1875 \text{ mm}^2 = 1.875 \times 10^{-3} \text{ m}^2$ . Thus, the brightness of the blue light in Tokailin's Example 3 is  $250 \text{ cd/m}^2 \times 1.875 \times 10^{-3} \text{ m}^2 = 0.47 \text{ cd}$ .

Nakamura teaches high-brightness InGaN/AlGaIn 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).

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 in a spectral range of 370 nm to 430 nm, i.e., the blue to ultraviolet spectrum (see ¶¶ 0006 and 0008). Fluorescent dye (5) 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).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Streck's LED backlighting panel using Nakamura's high-brightness InGaN/AlGaIn double-heterostructure blue-light emitting diodes with an appropriate phosphor so that the LEDs produce white light by mixing the emitted blue light with down-converted light emitted by the fluorescent material, as per the teachings of Tokailin. The desire for producing white-light emitting solid-state diodes was well known in the art, as per the admissions in the '795 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; and the fact that it was known from Tadatsu that LED's made from GaN-related compounds can be used with fluorescent dye to generate light with a variety of wavelengths.

Streck does not specifically teach that the individual LEDs in the regular pattern array are selectively illuminable, as per instant claim 4. However, as noted above, Streck teaches that its device can be incorporated into display panels (col. 1, lines 7-13). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have made Streck's LEDs selectively illuminable in order to illuminate a well-known changing display, such as a time and temperature message board or a display with various designs or information. In fact, as noted above, the '795 patent admits the desirability of white light displays for commercial bank time and temperature message boards (see col. 2, lines 26-29).

With respect to claim 5, while Streck does not specifically teach a controller that controls the LEDs in response to the user input, such would have been obvious to one of ordinary skill in the art at the time the invention was made in order to turn on or off the display in response to user input.

With respect to claim 6, simultaneous illumination of all LEDs in Streck's array would have been obvious to one of ordinary skill in the art at the time the invention was made, since, as seen for example in prior art Figs. 1 and 2 of Streck, illumination of the entire panel was known in some applications (see also col. 1, line 42 through col. 2, line 36).

With respect to claims 8, 14 and 15, 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 green, red or yellow phosphors would have been obvious.

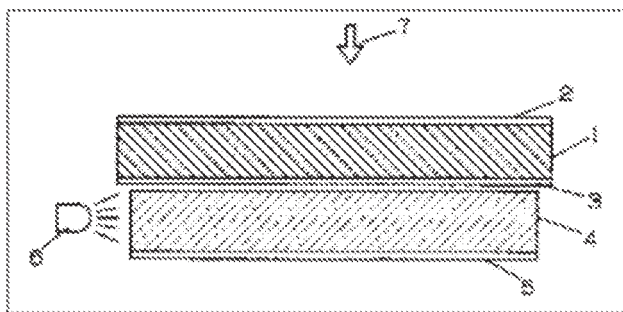
With respect to claim 11, as noted above, Nakamura's high-brightness blue-light emitting diode is an InGaN/AlGaN double-heterostructure (see abstract).

With respect to claim 18, as seen in Tadatsu's Fig. 2, resin (4) containing fluorescent dye (5), e.g., said phosphor, contacts the emitting face of the LED. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Streck's device such that phosphor (and resin) contact the

emitting face of each LED because such structure is conventional in the art, as shown by Tadatsu, and accordingly, the reasonable expectation of success.

**3. Claims 2-6 and 8-18 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over JP 4-269718 A to Nagano in combination with Nakamura, Tokailin and admissions in the '795 patent specification.** The English translation of Nagano accompanying the request is hereafter referred to below.

Nagano's Fig. 1 is reproduced below:



As seen in Fig. 1, Nagano teaches a liquid crystal display comprising a back light structure including at least one LED/phosphor assembly (6, 4) in which the LED (6) is energizable to emit radiation and the phosphor, i.e., transparent plate (4) that contains phosphor, is arranged to be impinged by radiation from the LED so that the LED/phosphor assembly produces back light illumination for the liquid crystal display (see also ¶¶ 0003 and 0009-0010). Nagano teaches that by use of phosphors of appropriate light emitting color, emission of light corresponding to the color can be obtained (see ¶ 0014).

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

Nagano does not teach that its LEDs are blue-light LEDs used in combination with phosphor to produce white light.

As admitted in the '795 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, lines 26-62).

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 10, 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  $250 \text{ cd/m}^2$  (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  $25 \text{ mm} \times 75 \text{ mm} = 1875 \text{ mm}^2 = 1.875 \times 10^{-3} \text{ m}^2$ . Thus, the brightness of the blue light in Tokailin's Example 3 is  $250 \text{ cd/m}^2 \times 1.875 \times 10^{-3} \text{ m}^2 = 0.47 \text{ cd}$ .

Nakamura teaches high-brightness InGaN/AlGaIn 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 Nagano's liquid crystal display such that Nakamura's high-brightness InGaN/AlGaIn double-heterostructure blue-light emitting diode is used for Nagano's LED with an appropriate phosphor so that white light (as shown by Tokailin) is produced for the backlight. The desire for producing white-light emitting solid-state diodes was well known in the art, as per the admissions in the '795 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 2-6 and 16, Nagano does not disclose an array of LED and phosphor assemblies arranged to produce white light back light illumination for the liquid crystal display. Nagano, however, teaches the use of LEDs similar to point light sources for the light source of Fig. 1. Nagano also teaches that light sources for side illuminating LCDs have a problem in that the illuminating effect of these LEDs is small (see ¶ 0004). Further, it is well-known that an array of LEDs behaves as a point light source when the LEDs are situated at a large distance with respect to the object being illuminated by the LEDs. Also, Nagano teaches a LCD device using backlight with a simple structure that has a size and shape that is freely selectable (see ¶ 0005). As such, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the light source of Nagano such that an array of LEDs is located at distance so that the array approximates a point source for the advantage of increasing the illumination from the light source despite the possibility of a larger sized device because Nagano teaches the size and shape are freely selectable. With respect to claim 3, an array is a regular pattern.

With respect to claim 4, Nagano in combination with Nakamura, Tokailin and admissions in the '795 patent specification does not specifically teach that the LED's are selectively illuminable. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared the liquid crystal display such that the LEDs are selectively illuminable so that a changing display, such as a time and temperature message board, or a particular design, can be appropriately illuminated.

With respect to claims 5 and 13, when a user switches on the power source for Nagano's liquid crystal display via a switch, the user is controlling the LED/phosphor assembly via the switch by powering it on.

With respect to claim 6, it would have been obvious for a skilled artisan to have simultaneously illuminated all of the LEDs so as to increase the output of the light source that is acting like a point light source.

With respect to claims 8, 14 and 15, 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 green, red or yellow phosphors would have been obvious.

With respect to claim 11, as noted above, Nakamura's high-brightness blue-light emitting diode is an InGaN/AlGaN double-heterostructure (see abstract).

With respect to claim 12, the use of electrical circuitry for connecting the LEDs of the array would have been obvious to one of ordinary skill in the art at the time the invention was made in order to power on and off the LEDs.

Claim 18 requires the phosphor to be in contact with an emitting face of the LED. Nagano's Fig. 1 shows a slight space between the LED (6) and phosphor plate (4). However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Nagano's liquid crystal display such that the LED

(6) contacts the phosphor plate (4) so as to adjust the amount of light input into the phosphor plate (4).

### ***Response to Arguments***

Patent Owner's arguments filed December 17, 2014 have been fully considered but they are not persuasive.

1. Claims 2-6 and 8-18 stand rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Russay in combination with Tadatsu, Nakamura, Tokailin and admissions in the '795 patent specification.

2. Claims 2-6 and 8-18 stand rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Streck in combination with Tadatsu, Nakamura, Tokailin and admissions in the '795 patent specification.

3. Claims 2-6 and 8-18 stand rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Nagano in combination with Nakamura, Tokailin and admissions in the '795 patent specification.

Patent Owner relies upon the same arguments for each of the three rejections (Remarks, p. 28). 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. 10-11). These arguments are unpersuasive for the reasons that follow.

A. Arguments with respect to pursuing the triplet approach:

Col. 8, lines 12-19 of the '795 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 39-48 of the '795 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 invention was already taught in the prior art by, for example, Tokailin 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.

In fact, 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

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(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 blue light, whether it be from a blue EL element or a 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 '795 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. 5-6). Patent Owner cites the Stringfellow and Nakamura Declarations and argues that the contemplated use of blue LEDs would be in "triplet" combination (Remarks, p. 6).

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. 11). Patent Owner further cites the Stringfellow and

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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. 12-13). 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. 13-14 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.<sup>10</sup> 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).<sup>11</sup>

Footnote 11 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 light to white light by down-conversion using phosphors, as shown by Tokailin and Tadatsu.

Dr. Nakamura is a co-inventor of the Tadatsu reference. The Examiner can find no teaching in Tadatsu that limits this reference to a triplet approach. As noted above, 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/AlGaIn 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 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 '795 patent specification. In particular, as admitted in the '795 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, lines 26-62). Further, the disadvantages of the triplet approach were also well-known as noted at col. 3, lines 3-28 in the Background of the Invention section of the '795 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.<sup>17</sup> Fig. 10.14 [from p. 216] of Dr. Nakamura's book is reproduced below:

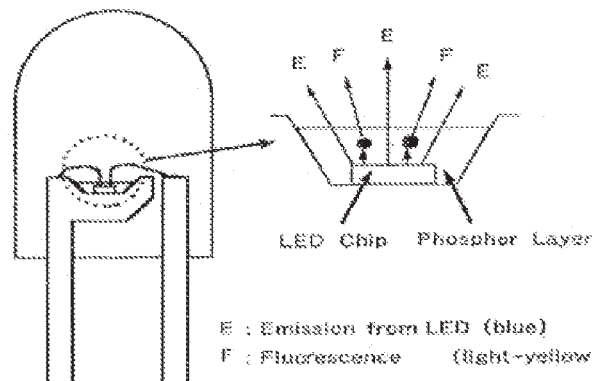


Fig. 10.14. Structure of white LEDs

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. 14 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 Tadatsu and down-convert the blue light of the high-brightness

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blue LED in the Nakamura reference to 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 p. 15 of the Remarks:

In addition, Nichia chose to license the patent family of U.S. Patent No. 6,600,175, including the '795 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

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“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. 15-16).

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, 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 '795 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

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providing a practical means to achieve both full color and white light illumination.” (See col. 1, lines 40-44). 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 3-28 in the Background of the Invention section of the '795 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 light to white light, as shown by Tokailin and Tadatsu.

Patent Owner cites the Stringfellow and Cranton Declarations 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 for backlighting lossy LCDs in order to clearly display information.” (Remarks, p. 16).

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

B. Arguments with respect to rationale:

Patent Owner argues the following on p. 17 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 and their use as LCD backlights. While

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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. ¶¶ 64-65; 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 of down-conversion to produce white light. 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. In fact, even the Pinnow reference (U.S. 3,691,482, hereafter "Pinnow '482") cited in ¶¶ 57-62 of the Stringfellow Declaration 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). 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 is too bright, it would cause visual discomfort and degrade viewing quality (Remarks, pp. 18-19). In particular, citing the Cranton Declaration, the following is argued on p. 19 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  $\text{cd/m}^2$ , and that the display was small (25 x 75 mm) and that the final output of 100  $\text{cd/m}^2$  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 '795 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. Tadatsu was able to down-convert blue light from an LED to a variety of longer wavelengths. 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 an LCD is "highly lossy"; "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, as a viable option for backlighting the already lossy LCDs." (Remarks, pp. 19-20).

These arguments are unpersuasive. While Tokailin exhibited a more than 60% loss in output i.e., a brightness of  $250 \text{ cd/m}^2$  (0.47 cd) for the blue EL element changed to a brightness  $100 \text{ cd/m}^2$  (0.19 cd) for white light, Nakamura's blue LED (1.2 cd) is more than 100% brighter than Tokailin's blue EL element (see Rejection No. 1 above, Examples 1 and 3 of Tokailin and p. 1688 of Nakamura). 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). Even further, it was already known in the art that LEDs can be used to backlight an LCD, as shown by Russay, Streck and Nagano.

Patent Owner argues the following on pp. 21-22 of the Remarks:

In addition, Dr. Stringfellow explains that a POSITA would appreciate other detriments to down conversion, if that approach were considered. For



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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. This might be especially desirable for color LCDs as the triplet white light could be tuned to the peculiar requirements of the LCDs color filters. Cranton Decl. ¶ 20. 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. ¶ 41. Thus it would be impractical if not impossible to tune the down converted LED to the LCD. Stringfellow Decl. ¶ 30; Forbes Decl. ¶ 41; Cranton Decl. ¶ 31. Moreover, Dr. Cranton explains that a color LCD using a triplet backlight would be expected to have a larger color gamut than a color LCD using a down converted blue LED, and Dr. Cranton explains that this too would be perceived as a detriment to an LCD backlight as it would limit the color production capabilities of the LCD itself. Cranton Decl. ¶ 31-32.

Dr. Forbes notes that, due to the fundamental differences in the light sources of EL displays and LCD displays backlit by 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 backlight. Forbes Decl. ¶¶ 44-47. In particular, Dr. Forbes notes that the significant differences in heat and photon production between EL displays and LED backlights 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 3-28 in the Background of the Invention section of the '795 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 and Tadatsu, as well as the Pinnow '482 reference

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cited in the Stringfellow Declaration. The Russay, Streck and Nagano references are not limited to either approach for the LEDs used to backlight their LCDs.

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 '795 patent (col. 10, lines 31-55) 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). 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 '795 patent teaches that the amount of dyes or fluorescers "can be readily determined without undue experimentation" (see col. 10, lines 56-64).

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 Tadatsu that blue LED's made from GaN-related compounds can be down-converted with fluorescent dye 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, p. 23).

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

C. Arguments with respect to secondary considerations:

Patent Owner cites the Brandes Declaration for the proposition of commercial success (Remarks, pp. 24-26). In particular, Patent Owner points to Fig. 6 on p. 16 of the Brandes Declaration, i.e., "Liquid Crystal Flat Panel Display Shipments", as evidence of commercial success in displacing traditional cold cathode fluorescent (CCFL) solutions (Remarks, pp. 24-25).

Patent Owner's argument of commercial success is unpersuasive. The data in Figs. 1-5 of the Brandes Declaration is directed to sales of white LEDs. The instant

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claims are directed to a liquid crystal display, not a white LED. Accordingly, the data in Figs. 1-5 is not relevant to the instant claims.

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. Flat panel liquid crystal displays are one of many types of liquid crystal displays. The instant claims are not directed to "flat panel" liquid crystal displays and thus, are not commensurate in scope with the showing. 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 Fig. 6 is derived from market research data (see ¶ 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 '795 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 '795 patent] had anything at all to do with commercial success. *Id.*

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In particular, with respect to licensing, ¶ 40 of the Brandes Declaration states that "a confidential '795 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".

For example, in order to achieve 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 10 along with the use of a plurality or array of LEDs as per dependent claims 2-6, 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 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

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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 Fig. 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 the Russay, Streck and Nagano references. 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. 27-28 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 '795 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 für Angewandte Festkörperphysik 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



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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 p. 28 of the Remarks:

The '795 patent has also been the subject of 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 as claimed in the '795 patent. *Id.* The licensee currently has a commercial LCD product that practices the invention claimed in the '795 patent. Brandes Decl., ¶ 9. Dr. Brandes further explains several additional licenses that cover the '795 patent, *Id.* at ¶¶ 10-21.

This argument is unpersuasive. Most of the licenses cited in ¶¶ 10-21 of the Brandes Declaration are not directed to LCDs and thus, are not relevant to the claimed invention. It appears there is only one license to a LCD flat panel manufacturer, as cited in ¶ 8 of the Brandes Declaration. The instant claims are not limited to LCD flat panels, and it's not clear exactly what this licensee manufactures. Further, 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 noted on p. 45 of the Board Decision, in the absence of the specific terms of the license or the circumstances under which it was granted, it is not seen how the license is 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. 7,615,795 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

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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:

By EFS: Registered users may submit via the electronic filing system EFS-Web at <https://efs.uspto.gov/efile/myportal/efs-registered>

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