

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Hisense USA Corporation
Petitioner

v.

Brightplus Ventures LLC
Patent Owner

Patent No. 7,872,705
Filing Date: July 29, 2007
Issue Date: January 18, 2011
Title: LED Backlight System for LCD Displays

Inter Partes Review No. IPR2023-01411

**PETITIONER'S OPPOSITION TO PATENT OWNER'S
CONTINGENT MOTION TO AMEND UNDER 37 C.F.R. § 42.121**

TABLE OF CONTENTS

I.	Introduction.....	1
II.	The Proposed Substitute Claims Violate the Definiteness Requirement.....	2
III.	The Use of Multiple Waveguide Elements in a Display System Was Well Known in the Art Prior to the '705 Patent.....	3
IV.	The Proposed Substitute Claims Are Not Patentable Over Zhou In View of Fine and the Knowledge of a Person of Ordinary Skill in the Art	4
	A. Proposed Substitute Claims 35 & 42	4
	B. Proposed Substitute Claims 36 & 43	9
	C. Proposed Substitute Claims 37, 38, 44, and 45.....	10
	D. Proposed Substitute Claims 39 & 46	11
	E. Proposed Substitute Claims 40, 41, 47 & 48	14
V.	The Proposed Substitute Claims Are Not Patentable Over Johnson In View of Zhou and Fine and the Knowledge of a Person of Ordinary Skill in the Art.....	16
VI.	The Proposed Substitute Claims Are Not Patentable Over Suzuki In View of Zhou and Fine and the Knowledge of a Person of Ordinary Skill in the Art.....	20
VII.	Conclusion	24

LIST OF EXHIBITS

EXHIBIT	DESCRIPTION
1001	U.S. Patent No. 7,872,705 (“the ’705 Patent”)
1002	Prosecution History of U.S. Patent No. 7,872,705
1003	Declaration of Morgan Pattison, Ph.D.
1004	Curriculum Vitae of Morgan Pattison, Ph.D.
1005	US 6,608,614 to Johnson (“Johnson”)
1006	US 2006/0220040 to Suzuki (“Suzuki”)
1007	US 8,128,272 to Fine (“Fine”)
1008	Counterclaim filed by Patent Owner in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774, Dkt. 9 (N.D. Ga. Sep. 16, 2022)
1009	Scheduling Order in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774, Dkt. 35 (N.D. Ga.)
1010	Judicial Caseload Profile for the Northern District of Georgia
1011	Cover Pleading to Patent Owner’s Infringement Contentions in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774 (N.D. Ga.)
1012	Cover Pleading to Patent Owner’s Supplemental Infringement Contentions in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774 (N.D. Ga.) served June 21, 2023
1013	Deposition Transcript of William Bohannon (Oct. 1, 2024)
1014	Declaration of P. Morgan Pattison, Ph.D. in Response to Patent Owner’s Contingent Motion to Amend
1015	US 6,650,822 to Zhou (“Zhou”)

I. Introduction

Patent Owner's proposed substitute claims fail to meet the definiteness requirement. And even if the proposed substitute claims can be reasonably understood, they are not patentable over the prior art. In short, Patent Owner's proposed substitute claims simply amend certain of the Challenged Claims to recite two or more "waveguide elements," as opposed to "one waveguide element." And, relatedly, Patent Owner's arguments regarding the purported patentability of the proposed substitute claims is fundamentally based on Patent Owner's claim that each of the prior art references of record is "only directed to a single waveguide element" and is "silent" about the use of "multiple waveguide elements."

But, in fact, the use of multiple waveguide elements in backlight systems for flat-panel displays was well known in the art years prior to the filing date of the '705 Patent. For example, U.S. Patent No. 6,650,822 to Zhou (Ex. 1015), which issued on November 18, 2003, expressly discloses the use of a "plurality" of "optical waveguides" in flat-panel displays. And Zhou alone discloses or renders obvious each of Patent Owner's proposed substitute claims. Additionally, the prior art already of record (*i.e.*, Johnson, Suzuki, and Fine) in view of Zhou also renders obvious each of Patent Owner's proposed substitute claims. Patent Owner's Contingent Motion to Amend should thus be denied.

II. The Proposed Substitute Claims Violate the Definiteness Requirement

At least each of proposed substitute claims 42–48 is indefinite under 35 U.S.C. § 112 and is thus unpatentable. Proposed substitute claim 42—from which each of proposed substitute claims 43–48 depends—recites:

A liquid crystal display (LCD) system comprising:

- a) a LCD panel;
- b) at least one a first waveguide element and a second waveguide element respectively comprising a first light entry region and a second light entry region;
- c) a first light-emitting source comprising a first plurality of LEDs arranged in a first strip and positioned to emit light into *the at least one* wherein the first waveguide element is positioned to receive light emitted by one or more of the LEDs of the first plurality of LEDs; *at a second light entry region of the plurality of light entry regions*
- d) a second light-emitting source comprising a second plurality of LEDs arranged in a second strip and positioned to emit light into *the at least one* wherein the second waveguide element is positioned to receive light emitted by one or more of the LEDs of the second plurality of LEDs; *and at a second light entry region of the plurality of light entry regions*
- e) a common control circuit in electrical communication with at least one of the first plurality of LEDs and the second plurality of LEDs.

Contingent Motion to Amend (“MTA”), Appendix A (emphasis added).

As reflected in the above emphasis added to the proposed substitute claim, the proposed claim language is riddled with, at best, incomplete clauses, other

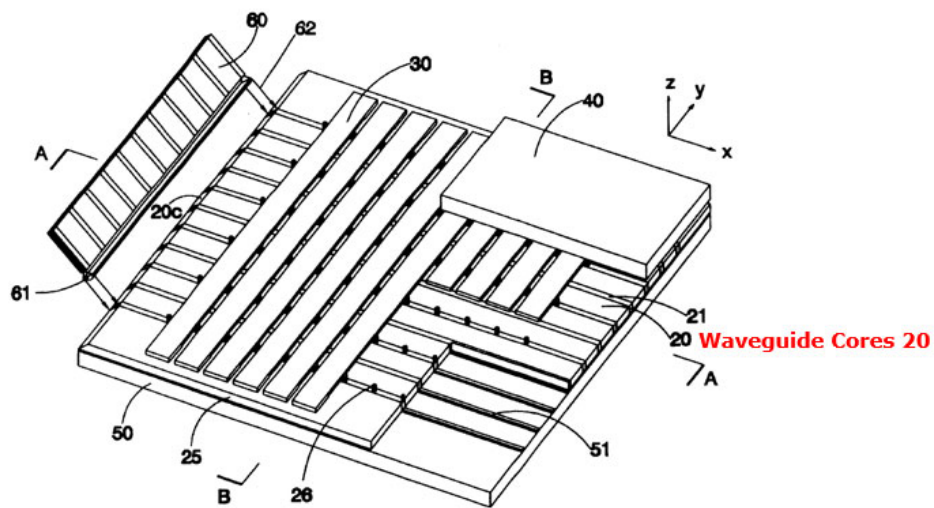
typographical errors, and instances of lack of antecedent basis. For example, the claim purports to require that each of the “first light-emitting source” and “second light-emitting source” be “positioned to emit light into the at least one [something]”—but fails to identify what that something is. The claim also purports to twice include limitations “at a second light entry region of the plurality of light entry regions”—but fails to articulate what either limitation is. Moreover, each clause refers to “the plurality of light entry regions,” which lack antecedent basis in the claim language.

III. The Use of Multiple Waveguide Elements in a Display System Was Well Known in the Art Prior to the '705 Patent

Patent Owner’s Contingent Motion to Amend is premised on Patent Owner’s suggestion that the named inventors on the '705 Patent were the first to introduce the use of “multiple” waveguides in a display system. Patent Owner is mistaken. The use of multiple waveguide elements in a display system was well known in the art years prior to the July 29, 2007, filing date on the '705 Patent.

For example, Zhou (Ex. 1015) issued on November 18, 2003, and is generally directed to “a[n] optical device consist[ing] of one or more optical waveguides.” Ex. 1015, at Abstract. Zhou discloses a flat-panel display comprising, *inter alia*, a “light source 60,” “waveguide plate 25,” and “display screen 10.” *Id.* at 6:9–19; *see id.* at 1:20–30. Zhou discloses that “light source 60 is constructed as a linear array, in which pluralities of light elements are placed one next to each other,” and that,

relatedly, “waveguide plate 25 consists of a plurality of waveguide channels consisting of waveguide cores 20,” wherein “[e]ach waveguide core 20 is aligned with one element of the light source 60 array.” *Id.* at 6:19–32. As illustrated in Figure 2 of Zhou (below), for example, Zhou discloses that a display can include at least ten different “waveguide cores 20” (separated by “claddings 21”):



Ex. 1015, at Fig. 2; *see id.* at 4:45–46, 6:15–49; *see also* Ex. 1014, ¶¶11–16.

IV. The Proposed Substitute Claims Are Not Patentable Over Zhou In View of Fine and the Knowledge of a Person of Ordinary Skill in the Art

A. Proposed Substitute Claims 35 & 42

Zhou discloses (or, at a minimum, renders obvious) each element of proposed substitute claims 35 and 42. Those claims each recite, in short, a LCD system comprising [i] a LCD panel, [ii] a first waveguide element and a second waveguide element, [iii] a first plurality of LEDs in a first strip to emit light into a light entry

region of the first waveguide element, [iv] a second plurality of LEDs in a second strip to emit light into a light entry region of the second waveguide element, and [v] a common control circuit to electrical communication with either the first plurality of LEDs or the second plurality of LEDs.¹ MTA, Appendix A; *see* MTA at 7–9.

Zhou is generally directed to a “waveguide optical device” for “flat-panel displays (FPDs),” such as “liquid crystal displays (LCDs).” Ex. 1015, 3:46–49, 1:20–30; *see* Ex. 1014, ¶24; *see also* Ex. 1015, at 16:30–35 (noting “well established liquid crystal display technology”). A POSITA would have understood that Zhou’s “waveguide optical device” could be utilized as a backlight in an LCD system, for example. Ex. 1014, ¶¶16, 24. Indeed, the use of a waveguide in a backlight assembly for an LCD system was well known in the art prior to the July 29, 2007, filing date on the ’705 Patent. *E.g.*, Ex. 1005, 2:49–3:33; Ex. 1006, [0024]–[0025]; Ex. 1007, 3:41–4:62, 11:46–55. And the display systems disclosed by Zhou include a “display screen 10,” which, in an LCD system, would be an LCD panel. Ex. 1015, 6:9–14, Fig. 1 (reproduced below); *see* Ex. 1014, ¶25.

¹ As discussed above (*supra* Section II), proposed substitute claim 42 (and thus its dependent claims) violates the definiteness requirement. In its Contingent Motion to Amend, however, Patent Owner argues that proposed substitute claim 42 is both supported by the specification of the ’705 Patent and patentable over the prior art for the same reasons as proposed substitute claim 35. As such, for the purposes of evaluating the claim relative to the prior art, Petitioner interprets proposed substitute claim 42 as commensurate in scope with proposed substitute claim 35.

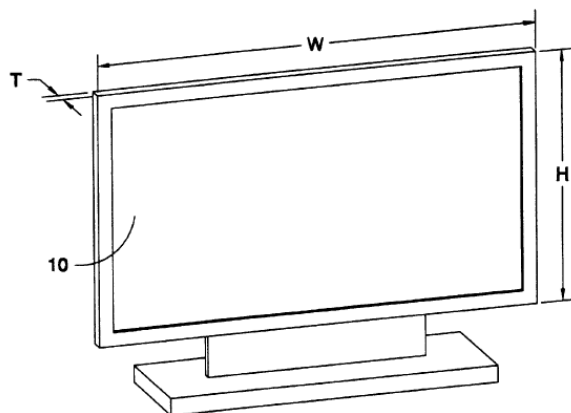


FIG. 1

As illustrated in Figure 2 (reproduced and annotated below), Zhou discloses that its “waveguide panel display[s]” are comprised of, *inter alia*, “a light source 60” and “an optical waveguide plate 25.” Ex. 1015, 6:15–19, Fig. 2.

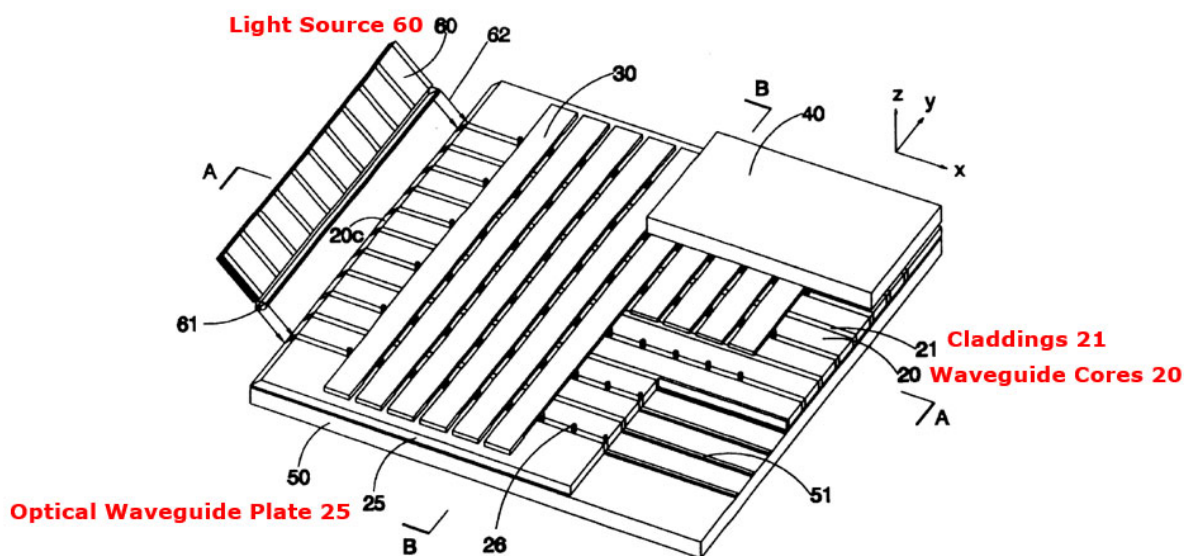
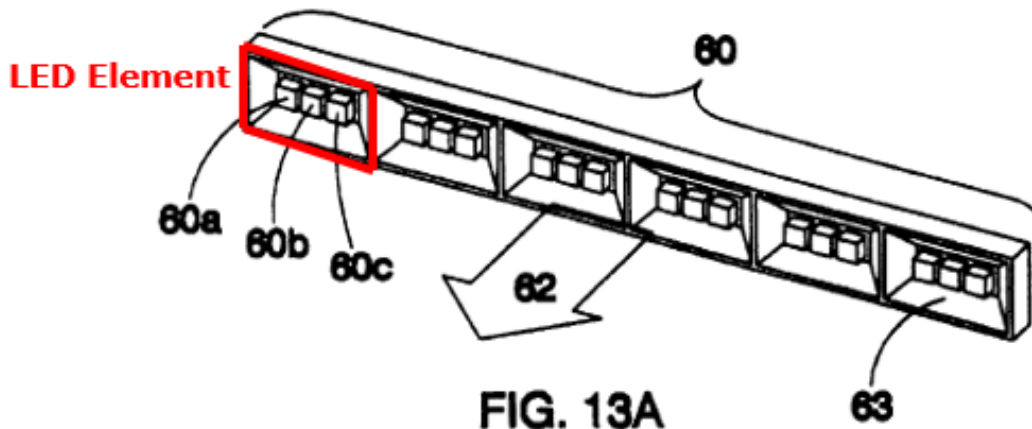


FIG. 2

Zhou’s “waveguide plate 25” is made up of a “plurality of waveguide channels consisting of waveguide cores 20 and claddings 21, with the refractive index of the waveguide cores 20 higher than that of the claddings 21.” Ex. 1015, 6:28–31; *see id.*

at Figs. 5A–5C. The “waveguide cores 20” are “optical devices that confine the propagation directions of light waves,” and thus satisfy the claimed “first waveguide element” and “second waveguide element,” respectively. *Id.* at 6:26–28.

Zhou discloses that its “light source 60 is constructed as a linear array, in which pluralities of light elements are placed one next to each other.” Ex. 1015, 6:19–21. Zhou discloses that, in a preferred embodiment, “the light source 60 is an LED array.” *Id.* at 7:19–22; *see id.* at 15:61–62 (“Light sources are preferably made of light emitting diodes (LEDs).”). In one such embodiment, “light source 60” is comprised of a “linear array of full color LED elements,” wherein each LED element “consists of three sub-elements, consisting of red 60a, green 60b, and blue 60c colors, of surface emitting LEDs,” as illustrated in Figure 13 of Zhou (reproduced and annotated below). *Id.* at 16:1–5, Fig. 13. A POSITA would have understood that each of Zhou’s “LED elements” is thus a strip of a plurality of “surface emitting LEDs,” including as illustrated in Figure 13 of Zhou, for example. Ex. 1014, ¶30.



Zhou discloses that, “[w]hen a display is assembled,” each individual “LED element” (consisting of the three red-green-blue surface emitting LEDs 60*a*, 60*b*, and 60*c*)—respectively, the claimed “first light-emitting source comprising a first plurality of LEDs arranged in a first strip” and “second light-emitting source comprising a second plurality of LEDs arranged in a second strip”) is “aligned with a corresponding waveguide core 20.” Ex. 1015, 16:19–22; *see id.* at 6:32–33 (“Each waveguide core 20 is aligned with one element of the light source array 60.”).

Relatedly, Zhou discloses that “[a] light beam 62” emitted from each LED element “is coupled into [each] waveguide core 20 through a lens 61 to a waveguide end 20*c*.” Ex. 1015, 6:50–53, Figs. 2–3; *see* Ex. 1014, ¶32. As such, each “LED element” is positioned to emit light into each “waveguide 20,” respectively, at a “waveguide end 20*c*”—respectively, the claimed “first light entry region” of the “first waveguide element” and “second light entry region” of the “second waveguide element.” *Id.* at 6:32–33, 6:50–53, 16:19–22, Figs. 2–3, 13; *see* Ex. 1014, ¶32.

Light waves from each of the waveguide cores 20, respectively, are thereafter extracted out to display an image on the “front of the display” to a “viewer 90.” Ex. 1015, 6:38–7:12. Relatedly, Zhou discloses a “control means, including control circuits, for producing images by controlling ... light emission from [the] light source.” Ex. 1015, 4:13–15. Further, Zhou discloses, “[w]hen using an LED array light source, the light intensity of the LED array is preferably controlled by a parallel

driven current or pulse modulation circuit”—the claimed “common control circuit in electrical communication with at least one of the first plurality of LEDs and the second plurality of LEDs.” Ex. 1015, 16:46–48; *see* Ex. 1014, ¶33. And Zhou further teaches that each LED (*i.e.*, the red, green, and blue “sub-elements”) in each “LED element” can be “modulated simultaneously.” Ex. 1015, 16:50–51.

B. Proposed Substitute Claims 36 & 43

Proposed substitute claims 36 and 43 each recite the additional limitations “wherein the LCD panel has a viewable surface, and the first and second waveguide elements each have a transmissive surface, [] wherein each transmissive surface is smaller than the viewable surface.” Each of these elements is disclosed in (or, at a minimum, rendered obvious by) Zhou.

As illustrated in Figure 1 of Zhou, a “display screen 10” of a “panel display set” has a “width W and height H”—the claimed “viewable surface.” Ex. 1015, 6:9–14, Fig. 1; Ex. 1014, ¶25. Zhou discloses that this “panel display set” is constructed by using, *inter alia*, “waveguides” (plural). Ex. 1015, 6:9–14. Indeed, the panel display set includes a “plurality” of “waveguide cores 20.” *Id.* at 6:28–30. And, as illustrated in Figure 2 of Zhou (reproduced below), a POSITA would have understood that the transmissive surface of each “waveguide core 20” is smaller than the viewable surface of the display screen 10:

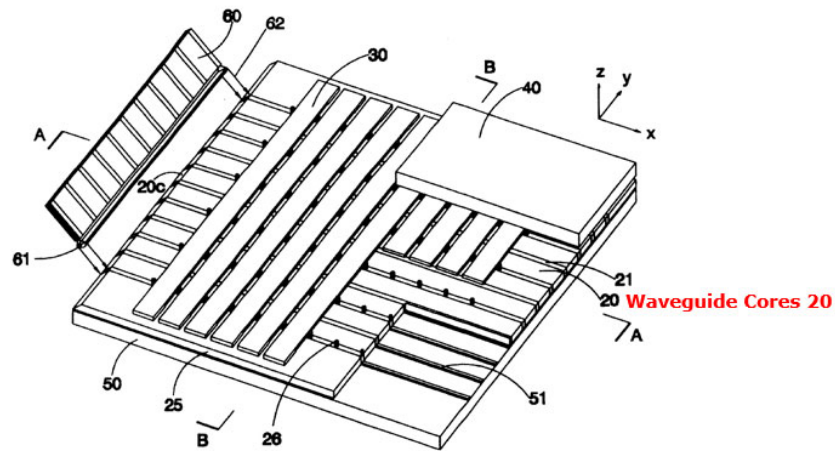


FIG. 2

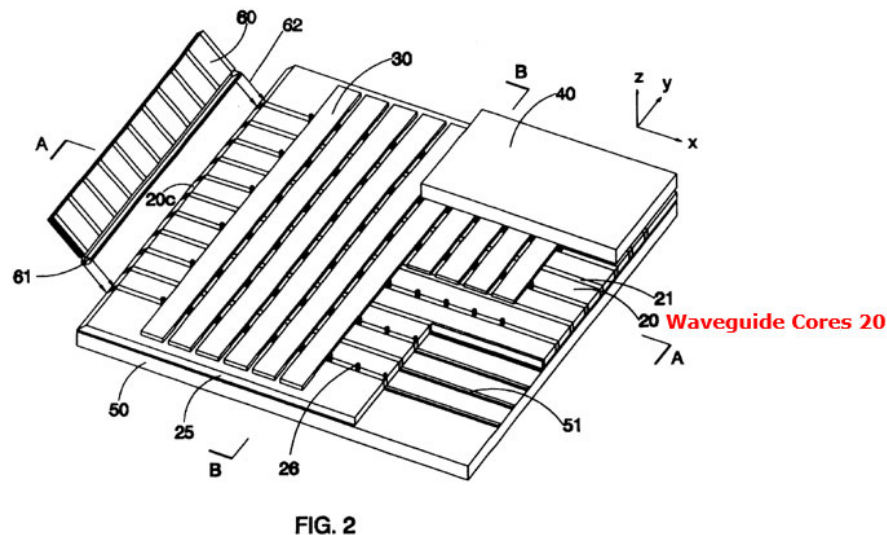
Id. at Figs. 2–3, 6:10–12, 6:50–7:9 (disclosing transmission of light beam through “waveguide core 20” to a “viewer 90” via “trajectory 62b”); *see* Ex. 1014, ¶28.

C. Proposed Substitute Claims 37, 38, 44, and 45

Proposed substitute claims 37 and 44 each recite that the LCD system be “embodied in a television, wherein each of the first and second waveguide elements are positioned to light a portion of the LCD panel.” And proposed substitute claims 38 and 45 each similarly recite that the LCD system be “embodied in a computer monitor, wherein each of the first and second waveguide elements are positioned to light a portion of the LCD panel.” Each of these additional elements is disclosed in (or, at a minimum, rendered obvious by) Zhou.

Zhou teaches that “flat-panel displays (FPDs),” such as “liquid crystal displays (LCDs),” may be used in “[c]onventional television (TV) sets and computer monitors.” Ex. 1015, 1:20–30; *see* Ex. 1014, ¶¶16, 24; *see also* Ex. 1015, Fig. 1. And

a POSITA would have understood that Zhou discloses that each “waveguide core 20” in the “plurality” of “waveguide cores 20” is positioned to light a respective portion of the “display screen 10” of the display, including as illustrated in Figure 2 of Zhou (reproduced below). *E.g.*, Ex. 1015, 6:9–7:12; Fig. 2; *see* Ex. 1014, ¶28.



D. Proposed Substitute Claims 39 & 46

Proposed substitute claim 39 recites the additional limitation “wherein the first light-emitting source [comprising a first plurality of LEDs] and the second light-emitting source [comprising a second plurality of LEDs] are embedded within a surface of the first and second waveguide, respectively.” Proposed substitute claim 46 similarly recites the additional limitation “wherein the first plurality of LEDs and second plurality of LEDs are embedded within a surface of and emit light into the first and second waveguide, respectively.” Each of these additional elements is disclosed in, or, alternatively, rendered obvious by, Zhou, including in view of Fine.

As discussed above, Zhou discloses that, in a preferred embodiment, “light source 60” is comprised of a “linear array of full color LED elements,” wherein each individual LED element consists of three individual “surface emitting LEDs” (60*a*, 60*b*, and 60*c*) as illustrated in Figure 13 of Zhou. *Id.* at 16:1–5, Fig. 13; *see* Ex. 1014, ¶¶29–30. Zhou also discloses that, in some embodiments, “light source 60” may be “integrated into a light-source module,” which, “[d]uring display device assembly, ... can be simply attached to the surface of waveguides in a single step.” Ex. 1015, 12:61–65. To the extent this disclosure in Zhou does not teach or suggest embedding elements of the light source 60 into the respective waveguide cores 20 of Zhou, it would have been obvious to do so in view of Fine (Ex. 1007). Ex. 1014, ¶¶34–37.

Fine describes an illumination apparatus 10 that includes “light emitting sources 12” that propagate light through a “waveguide material 14.” Ex. 1007, 11:50–55. Fine teaches that “[l]ight source 12 can be a LED.” *Id.* at 13:24. Fine also teaches that such LEDs 12 can be “embedded in the bulk of waveguide material 14.” *Id.* at 13:66–67, 12:16–17, Fig. 2b.

A POSITA would have been motivated to modify Zhou in view of Fine’s teachings with respect to embedded LEDs within a waveguide element. Ex. 1014, ¶¶35–37. Zhou is directed to improved “flat-panel displays (FPDs),” including “liquid crystal displays (LCDs)” that “use[] a backlight for illumination” (as well as other “light-emitting diode (LED) matrix displays”). Ex. 1015, 1:20–33. Zhou’s

displays seek to improve, *inter alia*, the “light extraction efficiency” of such displays. *Id.* at 4:33–36.

In relation, Fine is directed to, *inter alia*, improvements to “known LED based backlight devices,” including so as to deliver “superior properties” with respect to “brightness, intensity and/or color profiles.” Ex. 1007, 4:50–59, 5:2–10. And Fine states that its teachings “can be incorporated in a passive display device,” such as a “liquid crystal display (LCD)” that employs a “backlight assembly.” Ex. 1007, 5:22–23, 3:37–52. Indeed, Fine states that a goal of its invention “to provide substantially uniform illumination,” which Fine notes is “particularly useful when ... incorporated in a backlight unit of a passive display device.” Ex. 1007, 16:31–38.

A POSITA would thus have been motivated to use the improvements described within Fine (*e.g.*, LEDs embedded within waveguide material) to improve the “light extraction efficiency” sought in Zhou. Ex. 1015, 4:33–36; *see also* Ex. 1014, ¶¶36–37. Indeed, Fine expressly teaches that “embedding” LEDs in a waveguide, as taught in Fine, “allows to efficiently collect the emitted light” from the LEDs. Ex. 1007, 13:5–6; *see id.* at 12:6–13:23 (discussing “several advantages for embedding the light source within the waveguide material”). Fine also discloses that a display apparatus according to its invention will “provide substantially uniform illumination” (Ex. 1007, 16:31–38), and Zhou is specifically concerned with achieving improved “uniformity.” Ex. 1015, 3:10–15. A POSITA would thus

Ex. 1015, at Fig. 2; *see id.* at 4:45–46, 6:15–49; *see also* Ex. 1014, ¶14.

Additionally, as discussed above (*see supra* Section IV.A), Zhou discloses that “[e]ach waveguide core 20 is aligned with one element of the light source array 60.” Ex. 1015, 6:32–33. Zhou also discloses that, in a preferred embodiment, “light source 60” is comprised of a “linear array of full color LED elements,” wherein each individual LED element consists of three individual “surface emitting LEDs” (60*a*, 60*b*, and 60*c*), as illustrated in Figure 13 of Zhou. *Id.* at 16:1–5, Fig. 13; *see* Ex. 1014, ¶¶29–30. A POSITA would have understood that each of Zhou’s “LED elements” is thus a strip of a plurality of “surface emitting LEDs,” including as illustrated in Figure 13 of Zhou, for example. Ex. 1014, ¶30.

Zhou also discloses that, “[w]hen a display is assembled,” each “LED element” is “aligned with a corresponding waveguide core 20.” Ex. 1015, 16:19–22. In operation, “[a] light beam 62” emitted from each LED element “is coupled into [each] waveguide core 20 through a lens 61 to a waveguide end 20*c*.” *Id.* at 6:50–53, Figs. 2–3. A POSITA would thus have understood that Zhou discloses each “LED element” (*i.e.*, “strip” of LEDs 60*a*, 60*b*, 60*c*) is positioned to emit light into each “waveguide 20,” respectively, at a “waveguide end 20*c*.” Ex. 1015, 6:32–33, 6:50–53, 16:19–22, Figs. 2–3, 13; *see* Ex. 1014, ¶¶31–32.

And a POSITA further would have understood that Zhou discloses numerous sets of aligned “waveguide cores 20” and “LED elements” (as illustrated, for

example, in Figure 2 of Zhou), including: (a) a first “LED element” positioned to emit light into “waveguide end 20c” of a first waveguide core 20; (b) a second “LED element” positioned to emit light into “waveguide end 20c” of a second waveguide core 20; (c) a third “LED element” positioned to emit light into “waveguide end 20c” of a third waveguide core 20; and (d) a fourth “LED element” positioned to emit light into “waveguide end 20c” of a fourth waveguide core 20. *See* Ex. 1014, ¶32.

V. The Proposed Substitute Claims Are Not Patentable Over Johnson In View of Zhou and Fine and the Knowledge of a Person of Ordinary Skill in the Art

Patent Owner’s argument that Johnson (Ex. 1005) does not render obvious the proposed substitute claims is based fundamentally on Patent Owner’s claim that “Johnson is silent about multiple waveguide elements.” MTA at 13, 16, 18; *see* MTA at 20. In particular, Patent Owner argues “Johnson is only directed to a single waveguide element,” which is “substantially the same size as the LCD stack 12” in Johnson and, relatedly, “positioned to light the entire LCD panel” in Johnson. MTA at 13, 16, 18. As such, Patent Owner argues that Johnson *alone* does not render obvious any of Patent Owner’s proposed substitute claims. *See, e.g.*, MTA at 13–14.

At least proposed substitute claims 35–38, 40, 41, 42–45, 47, and 48 are obvious over Johnson in view of Zhou, however. As set forth in the Petition and Petitioner’s Reply, Johnson discloses or renders obvious each unamended element of the proposed substitute claims 35–38, 40, 41, 42–45, 47, and 48—a fact Patent

Owner does not dispute. In particular, Johnson discloses “an LED-based backlight for a liquid-crystal display (LCD).” Ex. 1005, 1:7–9. Therein, “[b]acklight assembly 10 provides light to an LCD stack,” which a POSITA would have understood is an LCD panel. *Id.* at 2:49–52, Fig. 2; Ex. 1003, ¶40. Johnson discloses “waveguide 20,” which is “designed to accept light from one or more light sources and uniformly deliver the light to LCD stack 12.” Ex. 1005, 2:64–67, Fig. 2. Namely, Johnson discloses that “LED array 16” consisting of “LEDs 18” arranged in a strip is positioned to emit light into “waveguide 20” through a “first major surface 22,” and that, additionally, a “second LED array 30” consisting of “LEDs 32” arranged in a strip may be positioned to emit light into “waveguide 20” through one or more “edge surface 28.” *Id.* at 3:15–33, 6:9–15; Fig. 2; *see* Ex. 1003, ¶¶51–53. And Johnson discloses “control system 40,” including “controller 44” and “processor 44b,” that is in electrical communication (via “conductive lines 46”) with LEDs 18 in LED array 16 and LEDs 32 in second LED array 30. Ex. 1005, 3:43–47.

Additionally, it would have been obvious to a POSITA to implement Johnson’s invention with two or more waveguide 20 elements (with corresponding LED light sources, respectively), including in view of Zhou. Ex. 1014, ¶¶40–43. Indeed, Johnson claims a backlight for an LCD comprising “a combining element,” which the dependent claims make clear is a “waveguide.” Ex. 1005, 7:7–18, 7:37–38. And Johnson expressly states that, “where the claims recite ‘a’ or ‘a first’ element

or the equivalent thereof”—as in the case of the “waveguide”—“such claims should be understood to include incorporation of one or more such elements, neither requiring nor excluding two or more such elements.” *Id.* at 6:57–60.

And a POSITA would have understood, including in view of Zhou, that Johnson’s waveguides 20 could be used in a modular fashion in a large LCD display. Ex. 1014, ¶¶40–43. For example, for an LCD stack 12 four-times as wide as the one exemplified in Figures 1 and 2 of Johnson, a POSITA would recognize that, as an alternative to building and using a waveguide 20 four-times as wide as the one exemplified in Figures 1 and 2 of Johnson, four (4) of the waveguides 20 illustrated in Figures 1 and 2 of Johnson—as well as four (4) of the corresponding LED arrays 18, for example—could be arranged linearly, in modular fashion, similar to Zhou’s waveguide cores 20, to achieve the same end. Ex. 1014, ¶43. Indeed, Zhou expressly teaches that its invention—including its plurality of waveguide cores 20—provides for an “inexpensive, simple, energy efficient, high quality” flat-panel display “that can be manufactured in sizes ranging ... to tens of feet,” including with respect to potentially both “television (TV) sets” and “computer monitors.” Ex. 1015, 3:35–38, 1:20–30; *see id.* at 3:45–49; *see also* Ex. 1014, ¶¶41–42.

A POSITA thus would have recognized that use of multiple waveguide elements (with corresponding light sources) in modular fashion in flat-panel displays, as taught in Zhou, was a known solution in designing and constructing

large flat-panel displays (“tens of feet” in size), as described in Zhou, including with respect to the similar LED-based LCD systems described in Johnson, and for this reason would expect a successful combination of Johnson and Zhou on this point. Ex. 1014, ¶42. And in such combination, each of individual waveguides 20 would itself necessarily have a surface smaller than the surface of the entire LCD panel and likewise only light a portion of the larger LCD panel. Ex. 1014, ¶43.

Additionally, proposed substitute claims 39 and 46—which require that the claimed plurality of LEDs be “embedded” within the corresponding waveguide element, respectively—are obvious over Johnson and Zhou in further view of Fine. Ex. 1014, ¶44. As discussed above, Fine describes an illumination apparatus 10 that includes “light emitting sources 12” that propagate light through a “waveguide material 14.” Ex. 1007, 11:50–55. Fine teaches that “[l]ight source 12 can be a LED.” *Id.* at 13:24. And Fine teaches that such LEDs 12 can be “embedded in the bulk of waveguide material 14.” *Id.* at 13:66–67, 12:16–17, Fig. 2b.

A POSITA would have been motivated to modify the Johnson-Zhou system in view of Fine’s teachings with respect to embedded LEDs within a waveguide element. Ex. 1014, ¶44. Each of Johnson, Zhou, and Fine are directed to LED-based backlighting for flat-panel displays. Ex. 1005, 2:64–67; Ex. 1015, 1:20-33; Ex. 1007, 3:37–52, 4:50–59, 5:22–23, 16:31–38. And a POSITA would have been motivated to use the improvements described within Fine (LEDs embedded within waveguide

material) to improve the Johnson-Zhou system. Ex. 1014, ¶44. Fine discusses “several advantages for embedding the light source within the waveguide material,” including, for example, “to efficiently collect the emitted light” from the LEDs. Ex. 1007, 12:6–13:23. A POSITA would thus have recognized that the combination is simply the use of a known solution described in Fine to modify a similar system in Johnson (as modified in accordance with Zhou), and for this reason would expect a successful combination. Ex. 1014, ¶44.

VI. The Proposed Substitute Claims Are Not Patentable Over Suzuki In View of Zhou and Fine and the Knowledge of a Person of Ordinary Skill in the Art

Patent Owner’s argument that Suzuki (Ex. 1006) does not render obvious the proposed substitute claims is based fundamentally on Patent Owner’s claim that “Suzuki is silent about multiple waveguide elements.” MTA at 14, 16, 18; *see* MTA at 20. In particular, Patent Owner argues “Suzuki is only directed to a single waveguide element,” which is “substantially the same size as the LCD panel 2” in Suzuki and, relatedly, “positioned to light the entire LCD panel” in Suzuki. MTA at 14, 17, 18. As such, Patent Owner argues that Suzuki *alone* does not render obvious any of Patent Owner’s proposed substitute claims. *See, e.g.*, MTA at 14–15.

At least proposed substitute claims 35–38, 40, 41, 42–45, 47, and 48 are obvious over Suzuki in view of Zhou, however. As set forth in the Petition and Petitioner’s Reply, Suzuki discloses or renders obvious each unamended element of

the proposed substitute claims 35–38, 40, 41, 42–45, 47, and 48—a fact Patent Owner does not dispute. In particular, Suzuki discloses a “liquid crystal display 1” comprising, *inter alia*, “a liquid crystal display panel 2” and a “backlight unit 6” that includes a “light guide 11” that has “LED light sources 15” provided on “light entrance surfaces 12 of the light guide 11.” Ex. 1006, [0024]–[0027], Figs. 1–3. In particular, a “plurality of LED sets” (also called “RGBG” sets)—each including one red LED, one blue LED, and two green LEDs—are provided in series on the “light entrance surfaces 12” of the “light guide 11.” *Id.*, [0034]. And Suzuki discloses a “LED driving circuit” in electrical communication with at least one LED in such a set. *E.g.*, Ex. 1006, [0044]; Ex. 1003, ¶¶59–60.

Additionally, it would have been obvious to a POSITA to implement Suzuki’s invention with two or more “light guide 11” elements (with corresponding LED light sources, respectively), including in view of Zhou. Ex. 1014, ¶¶47–50. In particular, a POSITA would have understood, including in view of Zhou, that Suzuki’s light guides 11 could be used in a modular fashion in a large LCD display. *Id.* For example, for an LCD panel 2 four-times as wide as the one exemplified in Figures 1–3 of Suzuki, a POSITA would recognize that, as an alternative to building and using a light guide 11 four-times as wide as the one exemplified in Figures 1–3 of Suzuki, four (4) of the light guides 11 illustrated in Figures 1–3 of Suzuki—as well as four (4) of the corresponding LED light sources 15—could be arranged linearly,

in modular fashion, similar to Zhou’s waveguide cores 20, to achieve the same end. Ex. 1014, ¶50. Indeed, Zhou expressly teaches that its invention—including its plurality of waveguide cores 20—provides for an “inexpensive, simple, energy efficient, high quality” flat-panel display “that can be manufactured in sizes ranging ... to tens of feet,” including with respect to potentially both “television (TV) sets” and “computer monitors.” Ex. 1015, 3:35–38, 1:20–30; *see id.* at 3:45–49; *see also* Ex. 1014, ¶¶48–49.

A POSITA thus would have recognized that use of multiple waveguide elements (with corresponding light sources) in modular fashion in flat-panel displays, as taught in Zhou, was a known solution in designing and constructing large flat-panel displays (“tens of feet” in size), as described in Zhou, including with respect to the similar LED-based LCD systems described in Suzuki, and for this reason would expect a successful combination of Suzuki and Zhou on this point. Ex. 1014, ¶49. And in such combination, each of individual light guides 11 would itself necessarily have a surface smaller than the surface of the entire LCD panel and likewise only light a portion of the larger LCD panel. Ex. 1014, ¶50.

Additionally, proposed substitute claims 39 and 46—which require that the claimed plurality of LEDs be “embedded” within the corresponding waveguide element, respectively—are obvious over Suzuki and Zhou in further view of Fine. Ex. 1014, ¶51. As discussed above, Fine describes an illumination apparatus 10 that

includes “light emitting sources 12” that propagate light through a “waveguide material 14.” Ex. 1007, 11:50–55. Fine teaches that “[l]ight source 12 can be a LED.” *Id.* at 13:24. And Fine teaches that such LEDs 12 can be “embedded in the bulk of waveguide material 14.” *Id.* at 13:66–67, 12:16–17, Fig. 2b.

A POSITA would have been motivated to modify the Suzuki-Zhou system in view of Fine’s teachings with respect to embedded LEDs within a waveguide element. Ex. 1014, ¶51. Each of Suzuki, Zhou, and Fine are directed to LED-based backlighting for LCDs. Ex. 1006, [0004], [0024], [0025], [0030]; Ex. 1015, 1:20–33; Ex. 1007, 3:37–52, 4:50–59, 5:22–23, 16:31–38. And a POSITA would have been motivated to use the improvements described within Fine (LEDs embedded within waveguide material) to improve the Suzuki-Zhou system. Ex. 1014, ¶51. Fine discusses “several advantages for embedding the light source within the waveguide material,” including, for example, “to provide substantially uniform illumination.” Ex. 1007, 12:6–13:23, 16:31–38. This advantage comports with Suzuki’s goal of improving the “uniformity in color and luminance” sought and described in Suzuki. Ex. 1006, [0042]; *see* Ex. 1014, ¶51. A POSITA would thus have recognized that the combination is simply the use of a known solution described in Fine to modify a similar system in Suzuki (as modified by Zhou), and for this reason would expect a successful combination. Ex. 1014, ¶51.

VII. Conclusion

Given each of Patent Owner's proposed substitute claims is either indefinite and/or not patentable over the prior art, Patent Owner's Contingent Motion to Amend should be denied.

Respectfully submitted,

By: /s/ Matias Ferrario
Matias Ferrario
Registration No. 51,082

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on the date below a copy of this
**PETITIONER'S OPPOSITION TO PATENT OWNER'S CONTINGENT
MOTION TO AMEND** has been served via email on the following:

hni@nilawfirm.com
twang@nilawfirm.com
nmassand@nilawfirm.com

Dated: October 17, 2024

By: /s/ Matias Ferrario
Matias Ferrario
Registration No. 51,082