

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TIANMA MICRO-ELECTRONICS CO., LTD.,
Petitioner,

v.

JAPAN DISPLAY INC. and
PANASONIC LIQUID CRYSTAL DISPLAY CO., LTD.,
Patent Owner.

Case IPR2016-00990
Patent 7,718,234 B2

Before JO-ANNE M. KOKOSKI, KRISTINA M. KALAN, and
ELIZABETH M. ROESEL, *Administrative Patent Judges*.

KALAN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Tianma Micro-electronics Co., Ltd. (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1–16, 23, and 24 of U.S. Patent No. 7,718,234 B2 (Ex. 1001, “the ’234 patent”). Paper 1 (“Pet.”). Japan Display Inc. and Panasonic Liquid Crystal Display Co., Ltd. (collectively, “Patent Owner”) did not file a Preliminary Response. On October 28, 2016, the Board instituted trial to review the patentability of claims 1–16, 23, and 24 of the ’234 patent. Paper 7 (“Dec.”). In the Scheduling Order, we cautioned that any arguments for patentability not raised in the Patent Owner Response will be deemed waived. Paper 8, 4. Patent Owner did not file a Response. During a call with the Board to discuss Patent Owner’s failure to file a Response, and to discuss Petitioner’s request to move for adverse judgment or for the Board to issue a show cause order, Patent Owner affirmatively stated that it was not abandoning the contest. Paper 9, 2–3. Petitioner filed a Statement Regarding Oral Hearing indicating that it did not seek oral argument. Paper 15. Patent Owner did not request oral argument. We determined that an oral hearing was not necessary. Paper 16.

We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. We conclude that Petitioner has established by a preponderance of the evidence that claims 1–16, 23, and 24 of the ’234 patent are unpatentable.

A. *Related Proceedings*

The parties do not identify any other proceedings related to the ’234 patent. A patent related to the ’234 patent, U.S. Patent No. 8,758,871 B2 (“the ’871 patent”) is the subject of IPR2016-00991, also filed by Petitioner.

B. The '234 Patent

The '234 patent, titled “Liquid Crystal Display and Method for Manufacturing Same,” issued on May 18, 2010. Ex. 1001, at [54], [45]. The '234 patent relates to a liquid crystal display capable of “reducing the occurrence of defective display due to variations in the initial alignment direction of a liquid crystal alignment control film in a liquid crystal display of an [In-Plane Switching (“IPS”)] scheme, realizing the stable liquid crystal alignment, providing excellent mass productivity, and having high image quality with a higher contrast ratio.” *Id.* at [57]. Specifically, the patent relates to a liquid crystal display of an IPS scheme in which an electric field substantially in parallel with a substrate is applied to a liquid crystal layer for operation, and a production process thereof. *Id.* at 1:6–10.

By way of background, the '234 patent explains that the “uniformity of alignment is a very important factor in the IPS scheme, and problems in the currently used rubbing technique have become apparent.” *Id.* at 3:64–66. According to the '234 patent, problems associated with the rubbing process technique include “TFT [thin film transistor] breakage due to static electricity produced by friction, unfavorable display due to misalignment from disordered fiber ends of a rubbing cloth or dust, and the need for frequent exchanges of rubbing cloths.” *Id.* at 3:66–4:5. Consequently, “a so-called ‘rubbing-less’ alignment technique for aligning liquid crystal molecules has been studied and various processes thereof have been proposed” in the prior art, such as aligning the liquid crystal molecules in a predetermined direction through irradiation of polarized light. *Id.* at 4:5–9, 14–19.

The '234 patent teaches that the photo-alignment process using light irradiation has several problems “from a practical standpoint.” *Id.* at 4:60–

62. For example, the '234 patent teaches that a “polymeric material obtained by introducing a photoreactive group in the side chain of a polymer represented by polyvinylcinnamate” provides insufficient heat stability of alignment and unsatisfactory reliability. *Id.* at 4:62–66.

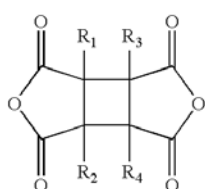
To address the problems in the prior art, the '234 patent provides a liquid crystal display comprising a pair of substrates with a liquid crystal layer disposed between the two substrates, an alignment control film disposed between the liquid crystal layer and at least one of the pair of substrates, and optical means on at least one of the pair of substrates “for changing the optical property of the liquid crystal layer in accordance with an alignment state of molecules” in the liquid crystal layer. *Id.* at 5:38–51. The '234 patent teaches that “at least one of the alignment control films is an alignment control film comprising photoreactive polyimide and/or polyamic acid provided with an alignment control ability by irradiation of substantially linearly polarized light.” *Id.* at 5:51–55. Regarding the composition of the alignment control films, the '234 patent further teaches that “it is desirable that the photoreactive alignment control film is polyamic acid or polyimide comprising at least cyclobutanetetracarboxylic acid dianhydride as acid anhydride and at least aromatic diamine as diamine.” *Id.* at 5:61–64.

C. Challenged Claims

Of challenged claims 1–16, 23, and 24, claims 1 and 16 are independent. Claims 2–15, 23, and 24 depend, directly or indirectly, from claim 1. Claim 1 is representative of the challenged claims, and recites:

1. A liquid crystal display comprising:
a pair of substrates, at least one of said substrates being
transparent;
a liquid crystal layer disposed between said pair of substrates;

a group of electrodes formed on one of said pair of substrates and configured so as to apply an electric field having a component substantially in parallel with a surface of said one of said pair of substrates to said liquid crystal layer;
a plurality of active devices connected to said group of electrodes;
an alignment control film disposed between said liquid crystal layer and at least one of said pair of substrate; and
optical means formed on at least one of said pair of substrates for changing the optical property of said liquid crystal layer in accordance with an alignment state of liquid crystal molecules of said liquid crystal layer;
wherein at least one of said alignment control films is an alignment control film comprising photoreactive polyimide and/or polyamic acid provided with an alignment control ability by irradiation of substantially linearly polarized light having a wavelength range from 200 nm to 400 nm;
wherein said photoreactive alignment control film contains polyamic acid or polyimide comprising cyclobutanetetracarboxylic acid dianhydride and/or its derivative and aromatic diamine; and
wherein the cyclobutanetetracarboxylic acid dianhydride and/or its derivative is a compound represented by a formula [1]:



where R₁, R₂, R₃, R₄ of the compound of formula [1] each represent a hydrogen atom, a fluorine atom, an alkyl group or alkoxy group with a carbon number of 1 to 6, with the proviso that at least one of R₁, R₂, R₃ and R₄ of the compound of formula [1] is not hydrogen.

Ex. 1001, 35:9–56.

D. Instituted Grounds of Unpatentability

We instituted an *inter partes* review of claims 1–16, 23, and 24 of the '234 patent on the following grounds:

References	Basis	Claim(s) Challenged
Tomioka ¹ and Nishikawa ²	§ 103(a)	1–6, 8–12, 15, 16, and 23
Tomioka, Nishikawa, and Chaudhari ³	§ 103(a)	7
Tomioka, Nishikawa, and Suzuki ⁴	§ 103(a)	13
Tomioka, Nishikawa, and Morii ⁵	§ 103(a)	14
Tomioka, Nishikawa, and Kim ⁶	§ 103(a)	24

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable constructions in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). Under the broadest reasonable construction standard, claim terms are presumed to have their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire

¹ U.S. Patent App. Pub. No. 2001/0048498 A1 to Tomioka et al., published December 6, 2001 (Ex. 1008, “Tomioka”).

² U.S. Patent No. 5,969,055 to Nishikawa et al., issued October 19, 1999 (Ex. 1009, “Nishikawa”).

³ U.S. Patent App. Pub. No. 2001/0012081 A1 to Chaudhari et al., published August 9, 2001 (Ex. 1010, “Chaudhari”).

⁴ JP 10–307295 to Suzuki et al., published November 17, 1998 (Ex. 1011, “Suzuki”).

⁵ U.S. Patent No. 6,141,078 to Morii et al., issued October 31, 2000 (Ex. 1012, “Morii”).

⁶ Kim et al., *A method for liquid crystal alignment using in situ ultraviolet exposure during imidization of polyimide*, APPL. PHYS. LETT., v. 73, no. 23, 3372–74, December 7, 1998 (Ex. 1013, “Kim”).

disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

In our Institution Decision, we determined that no claim term required express construction. Dec. 6 (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (noting that only claim terms which are in controversy need to be construed, and then only to the extent necessary to resolve the controversy)). We see no reason to modify that determination here, as there is no dispute as to the construction of any of the claim terms.

B. Principles of Law

To prevail in its challenges to the patentability of the claims, a petitioner must establish facts supporting its challenges by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). “In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378–79 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burdens of persuasion and production in *inter partes* review).

A claim is unpatentable under 35 U.S.C. § 103 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. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when available, objective evidence of nonobviousness such as commercial success, long felt but unsolved needs, and failure of others.⁷ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). A decision on the ground of obviousness must include “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). The obviousness analysis “should be made explicit” and it “can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *KSR*, 550 U.S. at 418. We analyze the asserted grounds of unpatentability in accordance with the above-stated principles.

C. Analysis

i. Person of Ordinary Skill in the Art

For the purpose of this Decision, we accept Petitioner’s undisputed contention that a person of ordinary skill in the art “would have been someone with a Ph.D. degree in polymer chemistry/physics or polymer engineering and about 2 years of experience in LCD technology; or with a M.S. or B.S. degree in polymer chemistry/physics or polymer engineering and about 3-5 years of experience in LCD technology.” Pet. 15. The level

⁷ The current record does not include any evidence of secondary considerations.

of ordinary skill in the art is further demonstrated by the prior art asserted in the Petition. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

ii. Asserted Obviousness Based on Tomioka and Nishikawa

Petitioner challenges claims 1–6, 8–12, 15–16, and 23 under 35 U.S.C. § 103(a) as obvious in view of the combined teachings of Tomioka and Nishikawa. Pet. 18–42. Petitioner relies on the Declaration of Dr. John L. West (Ex. 1003) in support of its arguments.

Tomioka relates to a liquid crystal display device “of IPS mode” in which “occurrence of a sticking-image and after-image phenomenon is prevented.” Ex. 1008, at [57]. In Tomioka’s device, “pixel electrodes and common electrodes and active elements are arranged on at least one substrate, and liquid crystal of the liquid crystal layer is controlled to perform display by applying a voltage between the pixel electrode and the common electrode.” *Id.* ¶ 15. Moreover, “a pair of alignment layers individually formed on surfaces in contact with the liquid crystal layer of the pair of substrates are made of an organic polymer” of polyamic acid or imidized polymer prepared from, for example, aromatic tetracarboxylic acid anhydrides as acid containing components and aromatic diamines as amine containing components. *Id.* ¶¶ 15, 74–76. At least one of the pair of alignment layers is a photo-reactive material layer, and the alignment layer is formed by irradiating a nearly linearly polarized light onto the layer made of the photo-reactive material. *Id.* ¶ 34. Tomioka discloses in at least one example that its LCD’s alignment-control films are derived from 1,2,3,4-cyclobutane-tetracarboxylic acid anhydride as the acid anhydride and 4,4’-diamino-diphenyl methane as the diamine chemical compound. *Id.* ¶ 177 (Example 8); *see also* Ex. 1003 ¶ 118 (“Example 8 of Tomioka discloses

preparing a control-alignment film including polyamic acid varnish composed of 4,4'-diamino-diphenyl methane as the aromatic diamine and 1,2,3,4-cyclobutanetetracarboxylic acid anhydride (“CBDA”) as the acid anhydride.”).

Nishikawa relates to a liquid crystal alignment agent containing at least two kinds of polymers selected from the group consisting of polyamic acids and imidized polymers. Ex. 1009, at [57]. According to Nishikawa, the “liquid crystal alignment agent gives a liquid crystal display device having less stuck image and a high pretilt angle.” *Id.* Nishikawa provides that its LCDs can be “favorably used . . . by selecting the liquid crystal to be used, also in liquid crystal display devices of IPS (in plane switching) type.” *Id.* at 29:10–16. Nishikawa teaches that “[e]ach polymer used in the liquid crystal alignment agent” “can be obtained by reacting at least one tetracarboxylic acid dianhydride and at least one diamine compound” in an organic acid in order “to synthesize a polyamic acid and, as necessary, subjecting the polyamic acid to dehydration and ring closure.” *Id.* at 2:22–27. In identifying “compounds that are preferred from the viewpoint of achievement of good liquid crystal alignability,” Nishikawa identifies “1,2,3,4-cyclobutane-tetracarboxylic acid dianhydride” (CBDA) and “1,3-dimethyl-1,2,3,4-cyclobutanetetracarboxylic acid dianhydride” as “particularly preferred.” *Id.* at 5:42–44, 5:64–67.

Petitioner has presented sufficient evidence showing that the combined teachings of Tomioka and Nishikawa teach or suggest every limitation of claims 1–6, 8–12, 15, 16, and 23. Pet. 18–42. For example, with respect to claim 1, Petitioner argues that “Tomioka discloses an LCD containing each limitation of claim 1, except the recited CBDA derivatives. That difference is nonetheless obvious.” *Id.* at 18. Specifically, Petitioner

argues, with supporting testimony from Dr. West, that Tomioka discloses (1) a liquid crystal display as claimed (Ex. 1008 ¶¶ 13 (“[a]n object of the present invention is to provide a high-quality liquid crystal display device,” 177 (Example 8 forms a liquid crystal display device); (2) a pair of substrates as claimed (*id.* at [57] (describing “[a] liquid crystal display device comprising a pair of substrates”), Fig. 1, ¶¶ 13, 86 (stating that Figures 1 and 2 show “the first embodiment of the liquid crystal display device 50 is composed of a pair of transparent glass substrates 1, 15”), 89, 108, 177); (3) a group of electrodes as claimed (*id.* ¶¶ 86 (identifying “common electrode 2 and pixel electrode 5 formed on the substrate 1”), 108, 177); (4) a plurality of active devices as claimed (LCDs that use TFTs as active devices that are connected to the group of electrodes (*id.* ¶¶ 86, 87, 108, 120, 177, Fig. 9)); (5) an alignment control film as claimed (*id.* ¶¶ 86 (identifying “alignment layers 9, 11 of the liquid crystal 10 of the substrates 1, 15”), 108, 177); (6) optical means as claimed (*id.* ¶¶ 86 (identifying “polarizing plate 16 of an optical means changing optical characteristic corresponding to an alignment state of the liquid crystal”), 108, 177); (7) “wherein at least one of said alignment control films is an alignment control film comprising photoreactive polyimide and/or polyamic acid” as claimed (*id.* ¶¶ 34 (“in the present invention, the at least one of the pair of alignment layer is a photo-reactive material layer”), 64 (“[t]he alignment layer of polyimide group material is usually formed by printing polyamic acid vanish of precursor of polyimide”), 177 (Example 8 uses a polyamic acid)); and (8) “wherein said photoreactive alignment control film contains polyamic acid or polyimide comprising cyclobutanetetracarboxylic acid dianhydride and/or its derivative and aromatic diamine” (*id.* ¶¶ 32 (describing the alignment layer as being “made of an organic polymer of

dehydration ring closure of polyamic acid composed of diamine compounds . . . and tetracarboxylic acid anhydride,” 72–76, 177 (Example 8 uses a polyamic acid varnish composed of 4,4'-diamino-diphenyl methane and CBDA). Pet. 18–21 (relying on Ex. 1003 ¶¶ 109–17).

Regarding the final “wherein” clause of claim 1, Petitioner argues: “Tomioka’s LCDs differ from claim 1 only by the substitution of CBDA with CBDA derivatives such as 1,3-dimethyl-1,2,3,4-cyclobutanetetracarboxylic acid dianhydride (“1,3-dimethyl-CBDA”); an obvious difference.” Pet. 22 (citing Ex. 1003 ¶ 120). Petitioner argues that this is nothing more than a simple substitution of one known element for another to obtain predictable results. *Id.* (citing *In re Fout*, 675 F.2d 297, 301 (CCPA 1982) (“Express suggestion to substitute one equivalent for another need not be present to render such substitution obvious.”)). Petitioner notes that “Tomioka acknowledges that its ‘acid containing components’ are not limited to the dianhydrides listed” therein, and that “Nishikawa explicitly identifies both CBDA and 1,3-dimethyl-CBDA as preferred dianhydrides for achieving ‘good liquid crystal alignability.’” *Id.* at 24. Therefore, according to Petitioner and Dr. West, “one of ordinary skill in the art would have considered CBDA and 1,3-dimethyl-CBDA to be interchangeable for purposes of forming alignment-control films.” *Id.*; see Ex. 1003 ¶¶ 126–29.

Petitioner argues that Tomioka discloses the additional limitations of challenged dependent claims 2, 3, 5, 6, 8–12, 15, and 23. *Id.* at 29–30 (citing Ex. 1008 ¶¶ 177–78), 34–37 (citing Ex. 1008 ¶¶ 36–37, 72–73, 81, 111–12, 114, 116, 177, 179), 41–42. Regarding claim 4, which requires that “the aromatic diamine compound contains at least one of compounds selected from a group of compounds consisting of ones represented by

formulas [2] to [16],” Petitioner argues that Tomioka discloses twenty-two diamines that can be used to make its alignment-control layer, and that ten of these are of Formulae [2], [3], [5], [6], and [16]. *Id.* at 30–32 (citing Ex. 1008 ¶ 74). Petitioner further argues that “Nishikawa suggests that many of Tomioka’s overlapping list are preferred aromatic diamines for polyamic acid and polyimide alignment-control films.” *Id.* at 32 (citing Ex. 1009, 11:13–16). Regarding independent claim 16, directed to a method of producing an LCD, Petitioner’s analysis “largely follows the analysis provided for the LCDs of claim 1.” *Id.* at 37–41.

We have considered the arguments and evidence presented by Petitioner, and are persuaded that Petitioner has demonstrated by a preponderance of the evidence that independent claims 1 and 16 would have been obvious based on the combination of Tomioka and Nishikawa. *See* Pet. 18–29, 37–41; Ex. 1003 ¶¶ 109–31, 157–80. We also have considered Petitioner’s arguments and evidence as to dependent claims 2–6, 8–12, 15, and 23, and likewise are persuaded that Petitioner has demonstrated by a preponderance of the evidence that those claims would have been obvious based on the combination of Tomioka and Nishikawa. *See* Pet. 29–37, 41–42; Ex. 1003 ¶¶ 132–56, 181–83. Based on the evidence in this record, we agree with Petitioner’s reasoning, which is supported by the unrebutted testimony of Dr. West, and adopt it as our own, that one with ordinary skill in the art would have recognized that the use of 1,3-dimethyl-CBDA, as taught by Nishikawa, in place of CBDA in Tomioka’s LCD would have been a matter of simple substitution. We credit the unrebutted testimony of Dr. West that, “[b]ased at least on the results of Example 8 of Nishikawa, one of ordinary skill in the art would have recognized that 1,3-dimethyl-CBDA, like CBDA, can be used to form an alignment-control film,” and

could have substituted CBDA with 1,3-dimethyl-CBDA, another preferred dianhydride for achieving good liquid crystal alignability, without any unique challenges or difficulties. Ex. 1003 ¶¶ 124, 126–27. For the foregoing reasons, Petitioner has demonstrated by a preponderance of the evidence the obviousness of claims 1–6, 8–12, 15, 16, and 23 over the combined teachings of Tomioka and Nishikawa.

*iii. Asserted Obviousness Based on Tomioka, Nishikawa,
and Chaudhari*

Petitioner challenges claim 7 under 35 U.S.C. § 103(a) as obvious in view of the combined teachings of Tomioka, Nishikawa, and Chaudhari. Pet. 42–44.

Claim 7 depends from claim 1 and further recites that “said alignment control film has a thickness from 1 nm to 30 nm above the electrodes constituting said group of electrodes.” Ex. 1001, 38:5–6. Petitioner has presented sufficient evidence showing that the combined teachings of Tomioka, Nishikawa, and Chaudhari teach or suggest every limitation of claim 7. As Petitioner correctly notes, Tomioka discloses a film with a thickness of 50 nm (Ex. 1008 ¶ 177), and Chaudhari minimizes the problem of “image sticking” by providing thin (i.e. 100 Å (10 nm) or less) films that allow for charge hopping or tunneling. See Pet. 43 (citing Ex. 1010 ¶¶ 11–13). Relying on Dr. West’s testimony, Petitioner asserts that “one of ordinary skill in the art would have found it obvious to modify the Tomioka film to 1–30nm, as it was a design choice and there were no technological limitations preventing the formation of such a film.” *Id.* (citing Ex. 1003 ¶ 184). According to Dr. West, “based on Chaudhari’s disclosure, one of ordinary skill in the art would have been motivated to make the alignment-

control films of Example 8 of Tomioka very thin, such as 10 nm, to improve display quality, as taught by Chaudhari.” Ex. 1003 ¶ 186.

We are persuaded by Petitioner’s presentation of arguments, which we adopt as our own, and credit Petitioner’s expert testimony supporting this ground. See Pet. 42–44; Ex. 1003 ¶¶ 184–87. On this record, Petitioner has established by a preponderance of the evidence the obviousness of claim 7 in view of the combined teachings of Tomioka, Nishikawa, and Chaudhari.

iv. Asserted Obviousness Based on Tomioka, Nishikawa, and Suzuki

Petitioner challenges claim 13 under 35 U.S.C. § 103(a) as obvious in view of Tomioka, Nishikawa, and Suzuki. Pet. 44–45.

Claim 13 ultimately depends from claim 1, and requires that “the pixel electrode and the common electrode opposite thereto are disposed in parallel with each other and each have a bending structure.” Ex. 1001, 38:25–27.

Petitioner has presented sufficient evidence showing that the combined teachings of Tomioka, Nishikawa, and Suzuki teach or suggest every limitation of claim 13. Petitioner notes that Tomioka discloses that its pixel electrode and common electrode are disposed in parallel with each other and each has a U-shape bending structure. Pet. 44 (citing Ex. 1008, Fig. 2). Dr. West explains that, “[a]s seen in Figure 2 of Tomioka, the pixel electrode 5 and the common electrode 2 opposite thereto are disposed in parallel with each other and each of the electrodes has a U-shape bending structure.”

Ex. 1003 ¶ 188. Suzuki, according to Petitioner, “discloses an IPS-LCD in which common electrode and source (pixel) electrode are disposed in parallel with each other in a V-shape bending structure.” Pet. 44 (citing Ex. 1011 ¶¶ 73–75, 80, Fig. 4). Dr. West states that Suzuki’s “configuration helps suppress variation in tint of the displayed images due to changes in the angle of view,” and, therefore, “Suzuki teaches that electrodes that are

disposed in parallel with each other and each have a bending structure can be used to improve the quality of LCDs.” Ex. 1003 ¶ 189. Petitioner further relies on Dr. West’s testimony to argue that one of ordinary skill in the art would have been motivated to improve the viewing angle of Tomioka’s LCDs by modifying Tomioka’s Example 8 with Suzuki’s electrode configuration to help suppress variation in tint of the displayed images due to changes in the angle of view. Pet. 45 (citing Ex. 1003 ¶¶ 189–90).

We are persuaded by Petitioner’s presentation of arguments, which we adopt as our own, and credit Petitioner’s expert testimony supporting this ground. See Pet. 44–45; Ex. 1003 ¶¶ 188–90. On this record, Petitioner has established by a preponderance of the evidence the obviousness of claim 13 in view of the combined teachings of Tomioka, Nishikawa, and Suzuki.

v. Asserted Obviousness Based on Tomioka, Nishikawa, and Morii

Petitioner challenges claim 14 under 35 U.S.C. § 103(a) as obvious in view of Tomioka, Nishikawa, and Morii. Pet. 45–47.

Claim 14 ultimately depends from claim 1 and further requires forming the common electrode and/or the pixel electrode on an organic insulating film, “and said liquid crystal alignment film is formed on the organic insulating film and the group of electrodes.” Ex. 1001, 38:29–32. Petitioner has presented sufficient evidence showing that the combined teachings of Tomioka, Nishikawa, and Morii teach or suggest every limitation of claim 14. Petitioner notes that Tomioka discloses an insulating layer that may be organic (Ex. 1008 ¶¶ 26–27), and that Morii “discloses forming pixel electrodes 2 on an organic insulating film 16 with a polyimide alignment-control film 23 formed on the electrodes 2 and the insulating film 16,” which is an organic film. Pet. 45 (citing Ex. 1012, 9:40–42, 10:7–9, 50–51, 58–59; 11:15–24). Petitioner further notes that Morii also advises

disposing “pixel electrodes 2 on the organic film 16 and closer to liquid crystal layer 7.” *Id.* at 46. Dr. West points out that “Morii further states that ‘[w]ith this arrangement, irregularities in color [which] occurred on conventional IPS panels could be eliminated and an IPS panel of high display quality as a display could be manufactured.” Ex. 1003 ¶ 196 (citing Ex. 1012, 11:53–56). According to Dr. West, “to further improve the display characteristics of Tomioka’s LCD, one of ordinary skill in the art would have been motivated to (i) form the common electrode and/or pixel electrode on an organic film and (ii) form the alignment-control film on the organic film and on the electrodes as shown in Morii.” *Id.* ¶ 197.

We are persuaded by Petitioner’s presentation of arguments, which we adopt as our own, and credit Petitioner’s expert testimony supporting this ground. *See* Pet. 45–47; Ex. 1003 ¶¶ 191–99. On this record, Petitioner has established by a preponderance of the evidence the obviousness of claim 14 in view of the combined teachings of Tomioka, Nishikawa, and Morii.

vi. Asserted Obviousness Based on Tomioka, Nishikawa, and Kim

Petitioner challenges claim 24 under 35 U.S.C. § 103(a) as obvious in view of the combined teachings of Tomioka, Nishikawa, and Kim. Pet. 47–48.

Claim 24 depends from claim 1 and further recites that the alignment control ability of the alignment control film is “promoted and stabilized by heating, irradiation of infrared rays, irradiation of far infrared rays, irradiation of electron beams, or irradiation of radioactive rays to said alignment control film.” Ex. 1001, 40:36–39. Petitioner has presented sufficient evidence showing that the combined teachings of Tomioka, Nishikawa, and Kim teach or suggest every limitation of claim 24. Petitioner points out that Tomioka discloses that “irradiating with linearly-

polarized UV light at 313 nm without heating imparts alignment-control ability to the film.” Pet. 47 (citing Ex. 1008 ¶ 177). Petitioner relies on Dr. West’s testimony to argue that “one of ordinary skill in the art would have been motivated to modify Tomioka’s Example 8 process with Kim’s *in situ* method with a reasonable expectation of improving the properties of the alignment-control film.” *Id.* at 48 (citing Ex. 1003 ¶¶ 202–03). According to Dr. West, “in practicing the process disclosed in Example 8 of Tomioka, when the films are exposed to linearly-polarized UV light, one of ordinary skill in the art would have been motivated to further apply heat in order to promote or stabilize the alignment-control ability of the films.” Ex. 1003 ¶ 201. Dr. West notes that Kim discloses an *in situ* method for LC alignment using linearly-polarized UV light exposure in combination with heat, providing “better thermal stability” and “less processing time,” and that Kim’s *in situ* method “can be applied to any UV sensitive polymer to produce an alignment layer.” *Id.* ¶ 202 (quoting Ex. 1013, 3372, 3374). Petitioner also presents arguments and cites to evidence supporting its position that Kim was publicly accessible as of December 1998. Pet. 47–48.

We are persuaded by Petitioner’s presentation of arguments, which we adopt as our own, and credit Petitioner’s expert testimony supporting this ground. *See* Pet. 47–48; Ex. 1003 ¶¶ 200–204. We find that Petitioner’s evidence of public accessibility, including Kim’s appearance in a well-known scientific publication several years prior to the critical date, Dr. West’s testimony as to the publication’s reputation and searchability, and Kim’s citation in another journal prior to the critical date, support its argument that Kim is prior art. Pet. 47–48; Ex. 1003 ¶ 204; *see Voter Verified, Inc. v. Premier Election Solutions, Inc.*, 698 F.3d 1374, 1380 (Fed. Cir. 2012). On this record, Petitioner has established by a preponderance of

the evidence the obviousness of claim 24 in view of the combined teachings of Tomioka, Nishikawa, and Kim.

III. CONCLUSION

We have considered the Petition and the evidence presented in support thereof and, for the foregoing reasons, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 1–16, 23, and 24 of the '234 patent are unpatentable.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–16, 23, and 24 of the '234 patent are held *unpatentable*; and

FURTHER ORDERED because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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